DATA AND RESULTS OF MONITORING AT THE UNNAMED TRIBUTARY TO THE SOUTH BRANCH OF INDIAN CREEK (WILLOWBROOK DRAIN), IL 22, NEAR LONG GROVE, IL

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Executive Summary

ISGS monitored water levels and water quality in several locations along the unnamed tributary to the south branch of Indian Creek (Willowbrook Drain) in the vicinity of IL 22 in Long Grove, Illinois. Water levels at IL 22 showed flooding up to about 0.5 m (1.5 ft) above base flow, likely flooding at least some orchid habitat at the downstream Eastern Fringed Prairie Orchid Nature Preserve. Additional smaller floods occurred regularly in the creek. Water quality was monitored by collecting grab samples regularly, and by continuously measuring water-quality parameters using Hydrolab dataloggers. Observed temporal trends include increases in specific conductivity during wintertime deicing activities and increases in turbidity during spring and fall due to higher rainfall and more unvegetated ground. Water quality in the creek varied by location in the watershed relative to roadways, instream ponds and other features, and groundwater discharge locations. Spatial trends include general increases in mean turbidity and mean pH downstream in the watershed. Creek conditions were measured both upstream and downstream of Old McHenry Rd and IL 22 to better identify impacts from roadway operations. Solute and sediment loads increased downstream across roadways, shown by increases in mean and maximum specific conductivity and mean turbidity. Major roadways appear to dilute creek waters during nonwinter periods when low solute loads are present in roadway runoff, shown by lower downstream mean specific conductivity, minimum pH and some mean pH data, although there is some variation in results between sampling locations due to duration of sampling and creek features.

Introduction

This report was prepared by the Illinois State Geological Survey (ISGS) to summarize activities to date performed under contract #IDOT 2011-05575 and transmit that information to the Illinois Department of Transportation (IDOT). This report is limited to activities regarding monitoring of the Unnamed Tributary to the South Branch of Indian Creek, otherwise known as Willowbrook Drain and hereafter referred to as “the creek,” in the vicinity of IL 22 near Long Grove, Illinois (Figure 1). Purpose and scope, methods, data, and conclusions are discussed.

Purpose and Scope

IDOT is currently planning reconstruction and expansion of IL 22 in the vicinity of Long Grove. A major issue is the Eastern Fringed Prairie Orchid Nature Preserve (EFPONP) located approximately 150 m (500 ft) south of IL 22 in the floodplain of the creek (Figure 1). Concerns have been raised regarding the potential impacts of the reconstruction on the preserve, which has legal protections as a dedicated Illinois Nature Preserve. Changes in hydraulics and water quality of the creek may impact the orchid habitat, which is regularly inundated by floodwaters from the creek. ISGS has been tasked by IDOT to monitor conditions in the creek prior to roadway reconstruction to establish baseline conditions, and to examine the data for evidence of any current impacts to water quality or water levels caused by roadway operations.

Methods

Water quality in the creek was analyzed by collecting grab samples of the water on regular intervals and continuously monitoring various water-quality parameters using dataloggers. Sampling and monitoring were conducted biweekly to monthly at up to 5 locations along the creek (OR1 through OR4d, Figure 1) beginning on November 30, 2009 until the date of this report.

Sampling and monitoring was performed along the creek beginning at the most upstream location west of Old McHenry Road, where the creek begins as outflow from a wetland complex (OR1), although the location is in the right of way adjacent to the road and therefore does not represent completely unimpacted conditions. Sampling and monitoring occurred for a limited time at this location due to summertime drying of the wetland complex, which required moving the location to the east side of Old McHenry Rd on June 9, 2010, because water presence was more regular. On December 20, 2010, grab sampling alone was reestablished at OR1 in an attempt to more fully characterize geochemical changes across Old McHenry Rd, although Hydrolab monitoring was not resumed. Sampling and monitoring was also performed downstream of each crossing of a roadway, including Old McHenry Rd (OR2), Krueger Rd (OR3), and IL 22 (OR4d). On January 19, 2011, sampling and monitoring were added at the OR4u location to compare conditions across IL 22.

Water samples were analyzed for selected metals, anions, total dissolved solids (TDS), total suspended solids (TSS), phosphate, pH, alkalinity, ammonia-nitrogen, and total and dissolved non-volatile organic carbon (see the Appendix for a complete list of

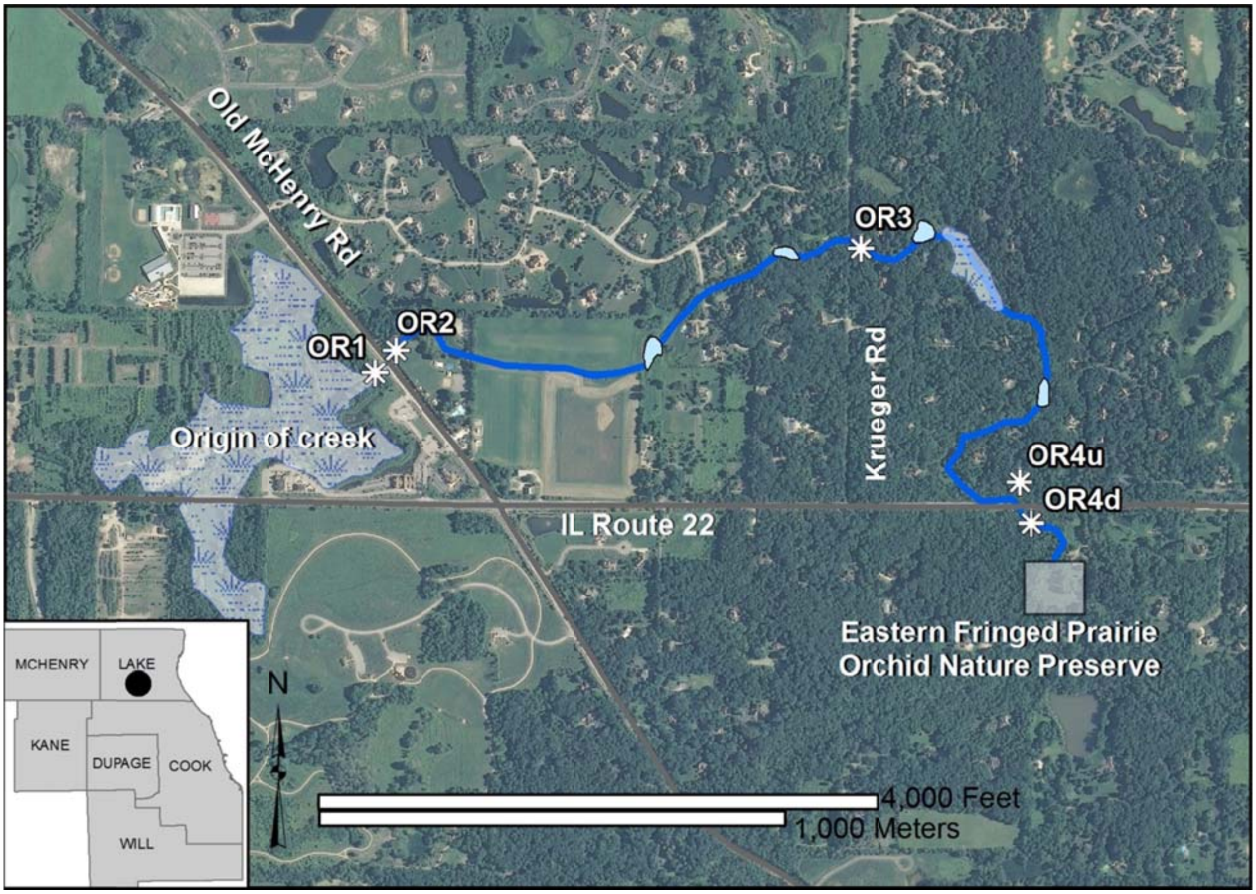


Figure 1. Location of study area, sampling sites, and Eastern Fringed Prairie Orchid Nature Preserve (EFPONP). Map sources: 2005 orthophotograph superimposed with data from USGS 1:24,000 digital raster graphic (ISGS 2011).

analytes). Samples were analyzed at the Illinois State Water Survey Public Service Laboratory according to standard techniques. Grab samples were collected using a peristaltic pump with silicone tubing connected to a flow-through cell. A Hydrolab MS5 datalogger was used to measure field parameters including temperature, pH, and specific conductivity, and to ensure stabilization of those parameters prior to sampling. The pumping rate was approximately 0.5 liter (0.13 gal) per minute in accordance with low-flow sampling procedures (ASTM Standard D6771-02 [ASTM 2002]). Samples collected for analysis of dissolved non-volatile organic carbon, metals, anions, TDS, and phosphate were filtered using a 0.45-micron disposable filter. Samples for metals, total and dissolved non-volatile organic carbon, and ammonia were preserved with acid (0.2% nitric acid, 0.5% phosphoric acid, 0.5% phosphoric acid, and 0.2% sulfuric acid, respectively), and all samples were placed on ice for transport to the Illinois State Water Survey laboratory for analysis within the appropriate holding times. Blank and duplicate samples were submitted for quality-control purposes.

In addition to sample collection, Hydrolab MS5 multi-parameter water-quality dataloggers were installed in the creek on December 18, 2009 at all locations except OR4u that was installed in January 2011. The logger at OR1 was removed in June of 2010 and not replaced. All existing loggers were replaced with new Hydrolab DS5X dataloggers in April 2011 and monitored through the date of this report. These devices measured a suite of water-quality parameters hourly, including pH, temperature, specific conductivity, and turbidity. These devices were intended to continuously measure parameters between sampling events to identify conditions between grab samples. MS5 Hydrolabs were calibrated with standards every 2 weeks, and DS5X Hydrolabs were calibrated monthly. Calibrations were conducted in the field whenever possible, but indoors for climate control in the coldest months. All Hydrolab data were carefully examined for accuracy. In many cases, segments of data were removed after being identified as inaccurate based on any one of numerous factors, including identifying dry, frozen, or buried loggers, instrument malfunctions, or errors in programming.

In addition to the geochemical monitoring discussed above, water levels in the creek were monitored at OR4d with a Schlumberger Diver pressure transducer, installed in February 2010. This location was nearest to the preserve that ISGS was allowed to access.

Precipitation utilized in this report was the daily total reported by the Weather Service Office at the O'Hare International Airport, obtained from the Midwestern Regional Climate Center (2011) at the Illinois State Water Survey.

Results

Included in this section are concentrations of geochemical constituents in grab samples determined through laboratory analysis, water-quality parameters measured with dataloggers in the creek, creek levels measured at one location nearest the preserve, and precipitation.

Water Levels and Precipitation

Water levels were monitored at OR4d from February 2010 through the date of this report to measure and assess the hydraulic conditions in the creek and any potential influence on the EFPONP. A hydrograph for OR4d is shown in Figure 2. The base flow in the creek is approximately 215.75 m (707.84 ft). The maximum level in the creek reached 216.25 m (709.48) on May 13, 2010, which is about 0.5 m (1.5 ft) above approximate base flow; this flood likely inundated at least some orchid habitat in the preserve, although surveying of the habitat elevations has not yet been allowed by the landowner. Many additional, smaller peaks occurred where water levels rose at least 0.3 m (1 ft) above base flow, suggesting that the creek experiences flashy flows. The longest period where water levels were sustained above average lasted from March 8 until March 20, 2011. Precipitation events are associated with many of the peaks in the hydrograph, indicating surface-water runoff, but some peaks lag behind the precipitation event or are less apparent, possibly related to antecedent moisture conditions, season, and other factors.

Generally, peak flows are generated by surface processes (Knighton 1998); therefore, if surface runoff increases, an increase in the peaks on the hydrograph would be expected. Studies have shown that habitat degradation is associated with the increased imperviousness of catchment development (Packman 1999, Booth 1991). Imperviousness induces higher peak flows which can increase the amount and type of suspended solids in the system, and thus increasing sedimentation in flooded areas. Changes to the natural hydropattern of the orchid habitat due to more frequent or longer duration flooding would be expected to be detrimental, and also should be avoided due to the protected legal status of the Illinois Nature Preserve. The current hydropattern of the habitat has not yet been documented due to denial of access by the landowner.

Grab Samples

Results of grab samples collected from November 30, 2009, through March 29, 2011, are listed in the Appendix, including maximum, minimum, and mean concentrations of each analyte. A summary of some relevant analytes from the grab samples (TSS, TDS, chloride, and pH) can be found in Table 1. Graphs illustrating mean geochemical constituents by sampling location are shown in Figure 3a–f.

Generally, mean nutrient levels of phosphorous, phosphate, nitrate, and ammonia, decrease downstream, probably due to dilution or instream ponds, although not always uniformly due to point source inputs and stream features. Lowest levels often are seen at the three downstream sites (OR3 through OR4d) (Figure 3e), possibly due to the presence of instream ponds, the presence of additional sources downstream, or dilution. Mean iron levels also decrease downstream (Figure 3d). Some analytes increase downstream, including mean alkalinity and mean calcium (Figure 3f, 3a), although downstream decreases in mean calcium are seen across Old McHenryRd and IL 22, suggesting that precipitation-driven runoff from the roadways dilutes creek waters. Also, some nonuniform increases were seen downstream in mean sodium and mean sulfate (Figure 3f, 3b). Mean chloride is highest at OR1 and OR4u, most likely related to the short durations of sampling at each location, which included a wintertime salting season but not the remainder of the year.

Mean total dissolved solids (TDS) and mean total suspended solids (TSS) data are shown

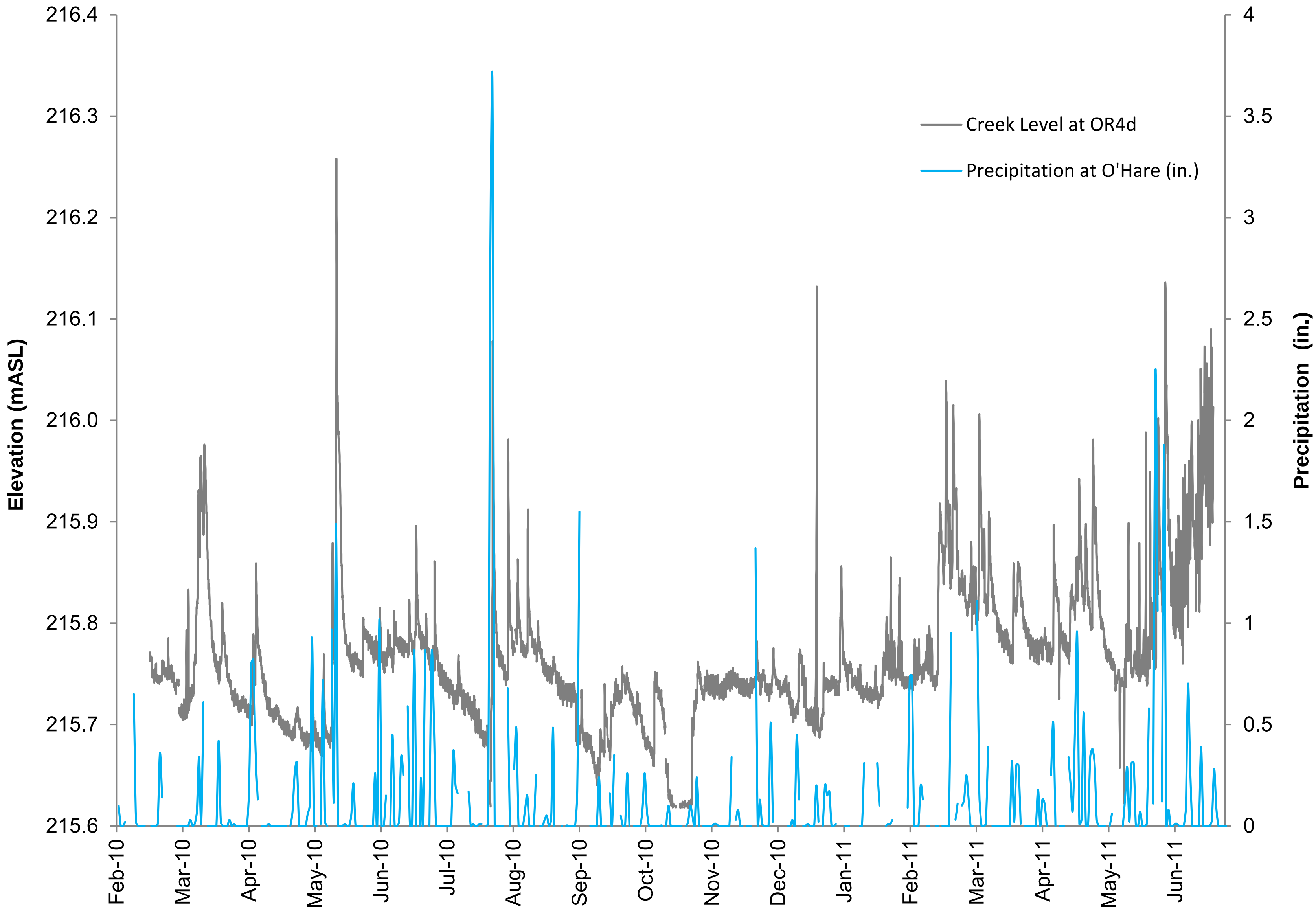
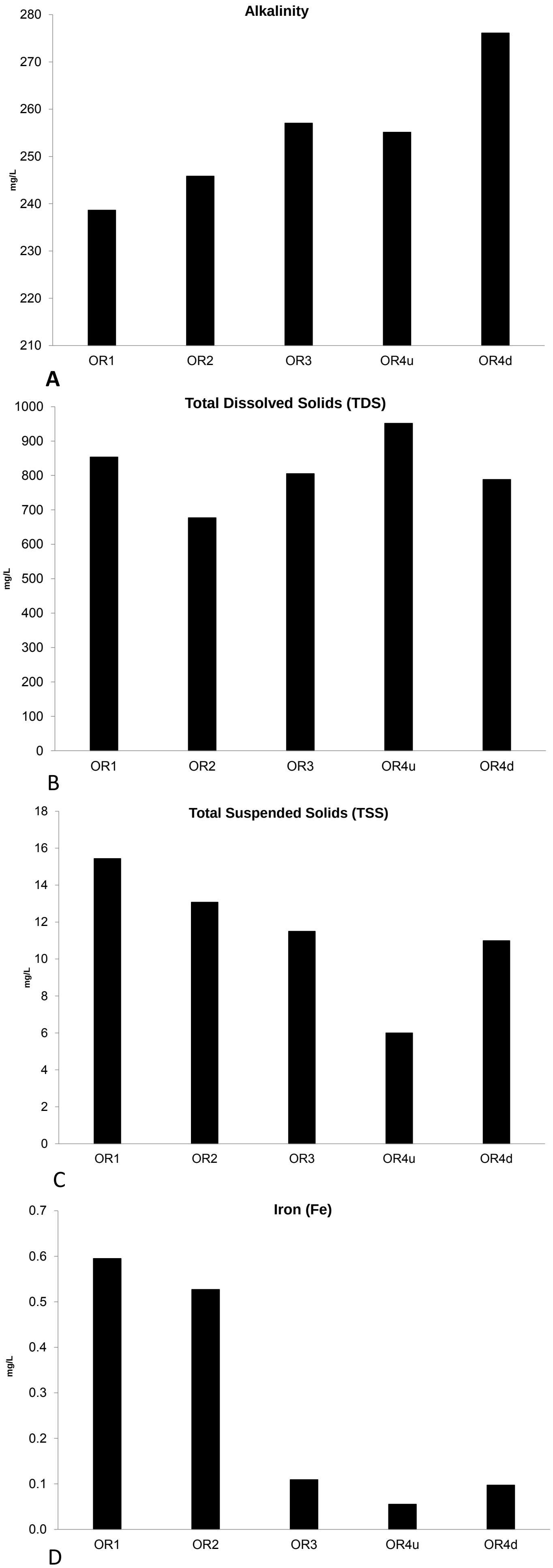


Figure 2. Hydrograph for site OR4d showing creek level through time and precipitation recorded at O'Hare Airport.

		Specific Conductivity uS/cm	Turbidity NTU	TSS mg/L	TDS mg/L	Chloride mg/L	pH
	min	371	0	2.8	293	71	6.35
OR1	*max*	2543	2957	108.0	4463	2361	8.29
	mean	938	42	15.4	854	314	6.92
	min	162	0	2.4	299	76	5.98
OR2	*max*	3281	2922	95.3	1580	630	8.61
	mean	1162	47	13.1	677	218	7.20
	min	313	0	4.0	395	87	5.74
OR3	*max*	2143	2913	106.0	1394	319	8.61
	mean	1250	52	11.5	805	195	7.25
	min	776	0	4.4	708	193	7.17
OR4u	*max*	1529	2807	7.6	1155	329	8.74
	mean	1096	34	6.0	952	258	8.02
	min	368	0	3.2	458	100	6.15
OR4d	*max*	3249	2981	45.2	1435	343	8.54
	mean	1205	55	11.0	788	190	7.41

Table 1. Maximum, minimum, and mean values for specific conductivity, turbidity, total suspended solids, total dissolved solids, chloride, and pH at sites OR1 through OR4d.



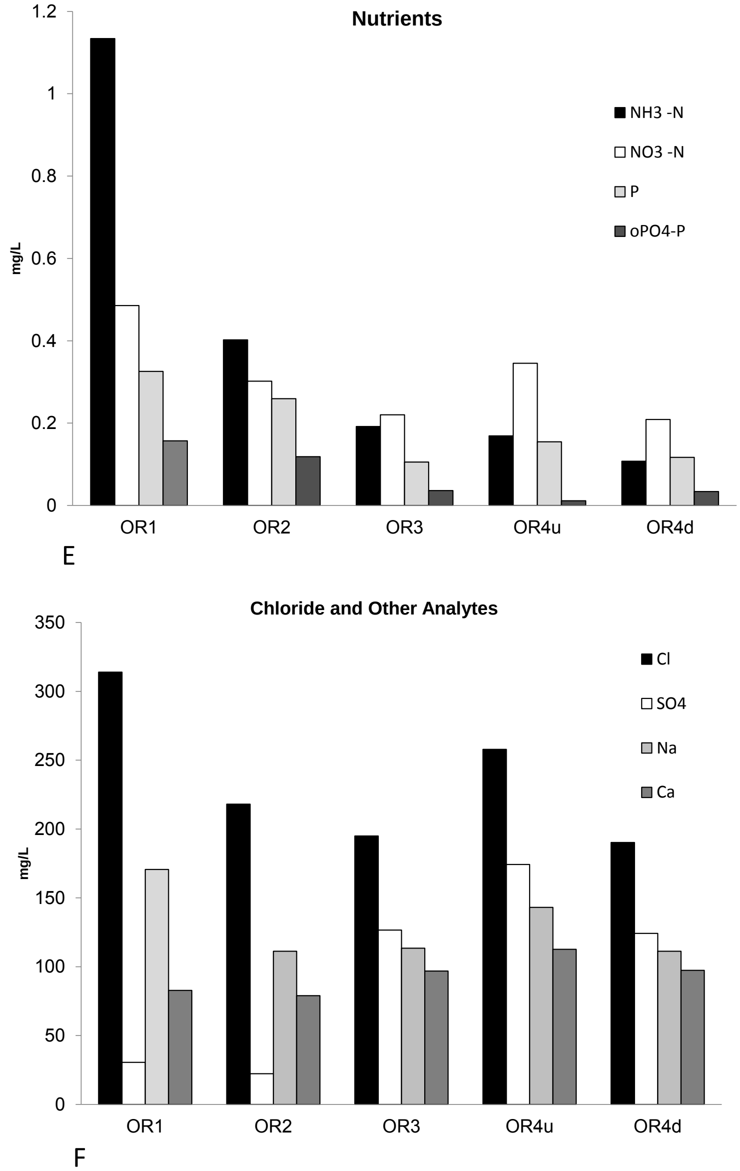


Figure 3a-f. Mean values of selected geochemical constituents at sites OR1 through OR4d.

in figures 3b and 3c, respectively. An overall decrease in mean and maximum TSS from upstream to downstream is apparent, but OR4u has the lowest concentrations, perhaps due to instream detention upstream of OR4u that may allow sedimentation. A large increase in mean TSS is seen downstream across IL 22, suggesting impacts from the roadway. Mean and maximum TDS values have no uniform trend, although there are clear decreases downstream across Old McHenry Rd and IL 22, suggesting dilution of creek waters with roadway runoff, which is low in solute load in the non-winter months.

TSS through time is plotted in Figure 4 for comparison between sampling locations through time. Few trends are seen, although OR4d and OR2 often have the highest TSS levels recorded during any particular event. This may be expected given that they are downstream of the two major road crossings (IL 22 and Old McHenry Rd, respectively). The location of the maximum TSS concentration in the watershed found during each sampling event varied, but the entire watershed generally appeared to increase or decrease during any particular sampling event, suggesting floods in the watershed transport significant sediment and all locations experience elevated sediment loads.

Water samples were analyzed for heavy metals and other trace elements (Appendix). Copper, nickel, and zinc were detected at most sites, and chromium only at OR4d. No trace of cadmium or lead was found above detection limits.

ISGS examined the Illinois General Use Water Quality Standards (Subpart B: General Use Water Quality Standards, Section 302.208, Numeric Standards for Chemical Constituents) (Illinois Pollution Control Board, undated) to determine if measured levels exceed standards. Some analytes have numerical standards that are set (e.g., chloride at 500 mg/L), and, for other analytes, numerical standards must be calculated for each sample using an equation that takes into account other sample parameters that affect toxicity, such as hardness. For those analytes with set numerical standards, only chloride (500 mg/L) was exceeded on 2 occasions by grab samples (one at OR1 and one at OR2), although estimates of chloride from datalogged specific conductivity data suggest additional exceedances as discussed later. pH was not outside the range of 6.5 to 9.0 in the grab samples, but it was less than the minimum 6.5 in some datalogged readings as discussed later. Numerical standards were calculated for roadway metals of interest, including copper, chromium, nickel, and zinc (lead and cadmium were not detected), and exceedances were only found for the chronic standard of nickel at all sites except OR4u, with the greatest numbers of exceedances increasing downstream, peaking at OR4d with 23 exceedances. No other analytes exceeded chronic levels, and no levels of any analyte exceeded acute levels at any location.

Datalogged Water Quality

Water-quality field parameters were collected hourly by Hydrolab MS5 from December 2009 until March 2011, and by new Hydrolab DS5X dataloggers from April 2011 through the date of this report. Loggers were periodically removed from a site or replaced due to changes in the environmental conditions, logger malfunction, and data relevance, so that occasional data gaps occur. The Hydrolab at OR1 was removed due to dry site conditions on June 9, 2010, therefore there are no Hydrolab records for OR1 afterward. The Hydrolab at OR4u was not installed until January 19, 2011. Parameters measured include turbidity, specific conductivity, temperature, and pH. Results for all Hydrolab parameters are presented.

Turbidity measurements were collected, and a summary of maximum, minimum and mean turbidity readings is found in Table 1, and a graph of turbidity through time is shown in Figure 5. Mean turbidity generally increases downstream, although the lowest is found at OR4u, perhaps caused by instream ponds located just upstream that likely cause sediment deposition, thus improving water quality. The highest mean turbidity occurs at OR4d, as well as the highest maximum reading, although elevated readings are found at all other sites. As shown on Figure 5, the highest turbidity spikes and the majority of spikes occur at OR2 and OR4, leading to increases in mean turbidity observed downstream across Old McHenry Rd and IL 22. OR1 also recorded a number of high spikes early in the monitoring, possibly caused by runoff from Old McHenry Rd. Maximum turbidity is reached in the spring months at all sites likely due to high precipitation and runoff over unvegetated ground. OR3 was repeatedly turbid in Fall 2010 but less so in the remainder of the study period, with no known cause. Summer and winter months are often less turbid, likely due to frozen conditions in winter and fully vegetated conditions and reduced runoff in summer. Spikes are sometimes related to precipitation events, but the sites do not react uniformly to a specific precipitation event. Turbidity spikes of the magnitude observed in the monitoring are well above the range of calibration generally done for the dataloggers and depend on extrapolation beyond the range of calibration.

Therefore, there may be significant error at the highest measurement levels, although trends and relative concentrations are expected to be reliable. Particulate matter in suspension has been specifically linked to water quality (Packman 1999) because pollutants sorb to particulates and are transported through the stream (Stone and Droppo 1994), and increases in particulate matter over time have a negative effect on aquatic life. Sedimentation is expected to be detrimental to conservative vegetation due to the influx of seeds, nutrients, and pollutants, which may hinder the native vegetation or assist nonnative or adventitious species.

Specific conductivity for all sites is shown through time in Figure 6 and summarized in Table 1. Wintertime spikes in specific conductivity seen in Figure 6 are noted in December 2009 and from November 2010 through February 2011, likely associated with roadway deicing activities. These spikes exceed 3,200 uS/cm at OR2 and OR4d, although all stations except OR4u have similar spikes exceeding 2,000 uS/cm. During winter, levels at OR1, OR2, and OR4d are often highest, which is expected given the proximity to road salting activities along IL 22 and Old McHenry Rd. During non-winter months, often when creek flow is lower in midsummer, specific conductivity at OR3 is often highest, likely due to groundwater discharge into the creek; these periods generally have only moderate specific conductivity, so this trend is not significant for this study. Another trend is that large, sudden decreases to levels near 500 uS/cm are noted at all sites, and are generally associated with precipitation events that likely cause dilution of streams. Mean and maximum specific conductivity are greater downstream of Old McHenry Rd and IL 22 relative to upstream (Table 1). Minimum levels are lower on the downstream side of Old McHenry Rd and IL 22, suggesting dilution of creek waters with low conductivity roadway runoff in nonwinter months. Upward and downward spikes not associated with

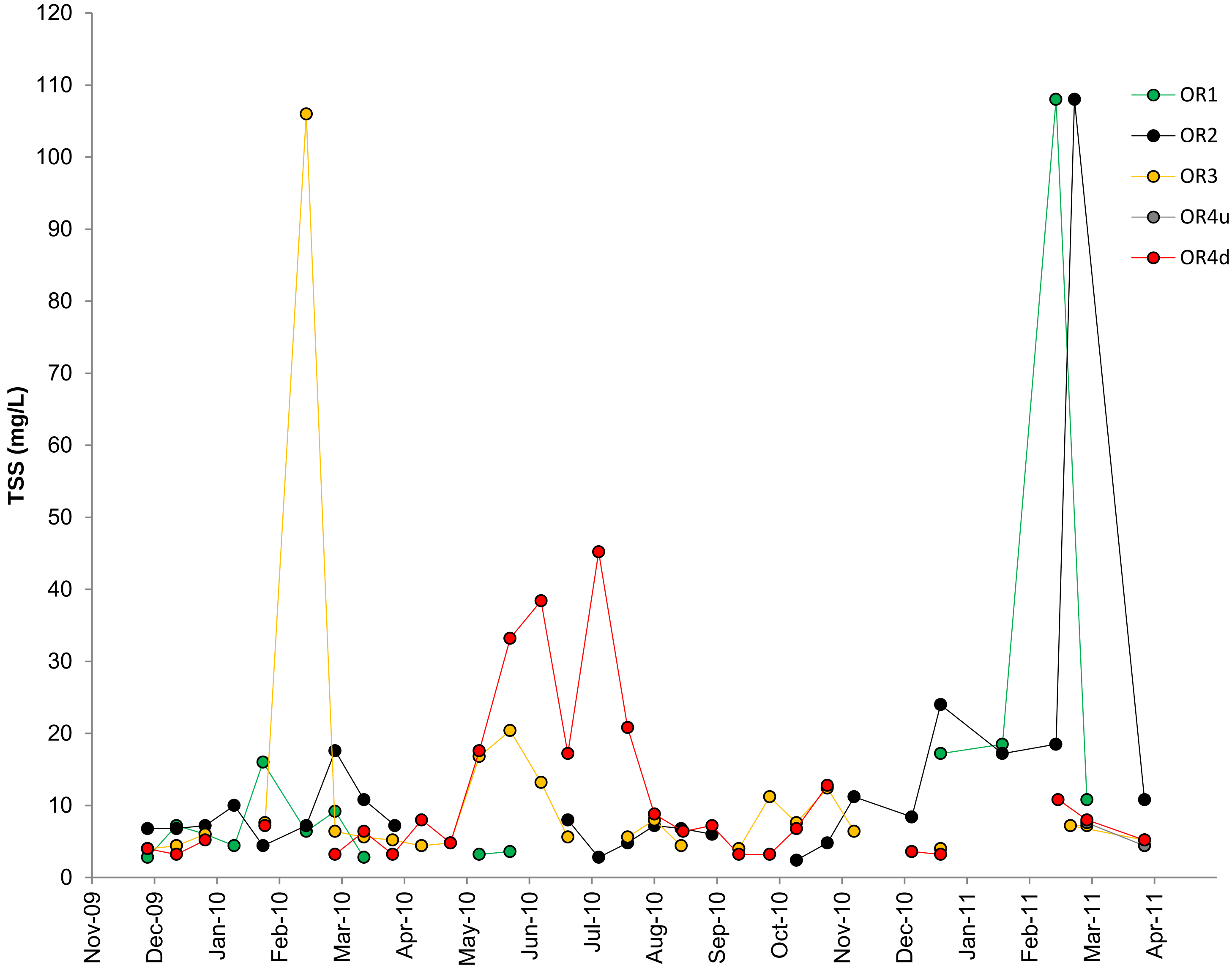


Figure 4. Total suspended solids (TSS) at sites OR1 through OR4d.

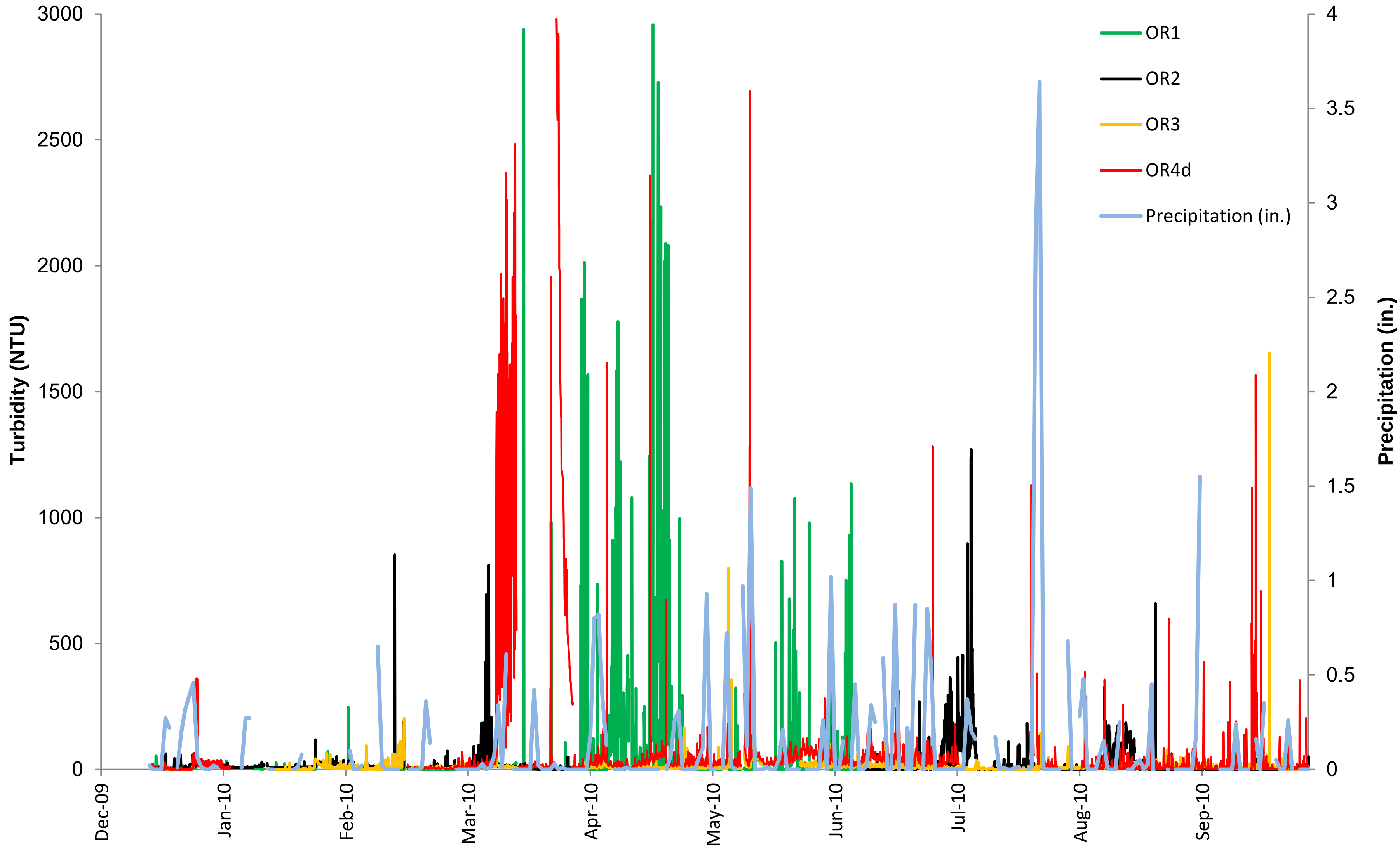


Figure 5. Turbidity readings and precipitation for stations OR1 through OR4d.

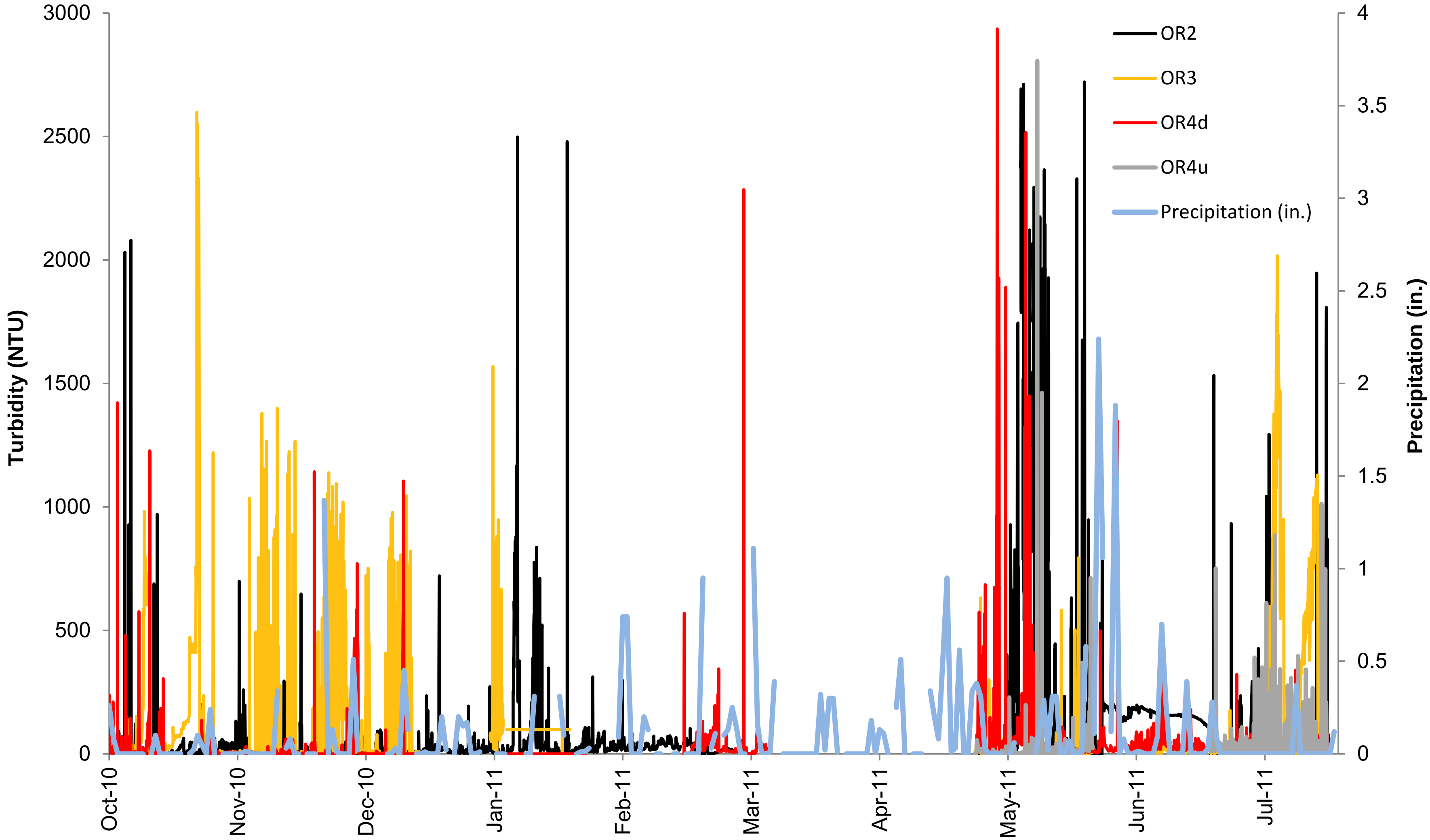


Figure 5 continued. Turbidity readings and precipitation for stations OR1 through OR4d.

precipitation or road salting are seen, and have no obvious origin. Human or animal disturbance of the loggers or nearby waters is possible, and there may be local precipitation events that are not recorded at O'Hare Airport. Increases in chloride or specific conductivity in natural areas are associated with nonnative vegetation (Panno et al. 1999), and any increase in lane-miles in the watershed would be expected to increase wintertime spikes and cause longer-term increases, as well as larger dilutions of streams in nonwinter months. This results increases variability of conditions throughout the year.

Seasonal and diurnal fluctuation are evident in the temperature data (Figure 7). Hydrolabs record a similar trend at each site without any notable upstream to downstream changes. No obvious relationship to roadway operations is apparent.

Figure 8 shows pH through time at all locations. The mean pH recorded by each Hydrolab datalogger is shown in Table 1. pH increases from upstream to downstream through OR4u, then decreases at OR4d. pH is likely to be increasing due to groundwater discharge into the stream in the downstream reaches of the watershed. The reduction of mean pH that occurs at OR4d is possibly caused by dilution of groundwater-rich creek waters with low-alkalinity roadway runoff. The maximum pH measured was 8.74 at OR4u (Table 1); no values exceed the 9.0 pH unit General Use Standard. Some datalogged measurements were made below 6.5 pH units, which is less than the minimum pH in the General Use Standard, but they often occur in nonoptimal conditions such as when freezing or nearly dry, when the logger is expected to be less accurate. No measurements in the grab samples show pH levels outside of the 6.5 to 9 range.

Comparison of Conditions Across Roadway Segments
While some obvious relationships between roadway operations and water quality in the creek are discussed above, some relationships are not uniform throughout the watershed due to site conditions such as instream ponds or point sources within the watershed. Therefore, to help isolate and identify impacts of roadway operations, it is also useful to directly compare data collected upstream and downstream of where the creek crosses a roadway. The two locations where this is possible to make these comparisons are at Old McHenry Rd (OR1 vs. OR2) and IL 22 (OR4u vs. OR4d). Data were only collected from OR1 and OR4u during limited periods, so any conclusions should be viewed with caution.

Comparing OR1 and OR2, there are downstream increases across Old McHenry Rd in mean (262 uS/cm) and maximum (738 uS/cm) specific conductivity and pH, and mean turbidity, and there are decreases in mean and maximum TSS, TDS, and chloride (Table 1). Some of these apparently contradictory observations, such as a downstream increase in specific conductivity but a decrease in chloride, may be related to the short period of sampling at OR1. In addition, grab sampling generally reflects more average conditions rather than including all storm events where roadway influences may become apparent, so that TSS, TDS, and chloride grab samples may not reflect the range of conditions that occur, unlike the datalogged turbidity and specific conductivity values.

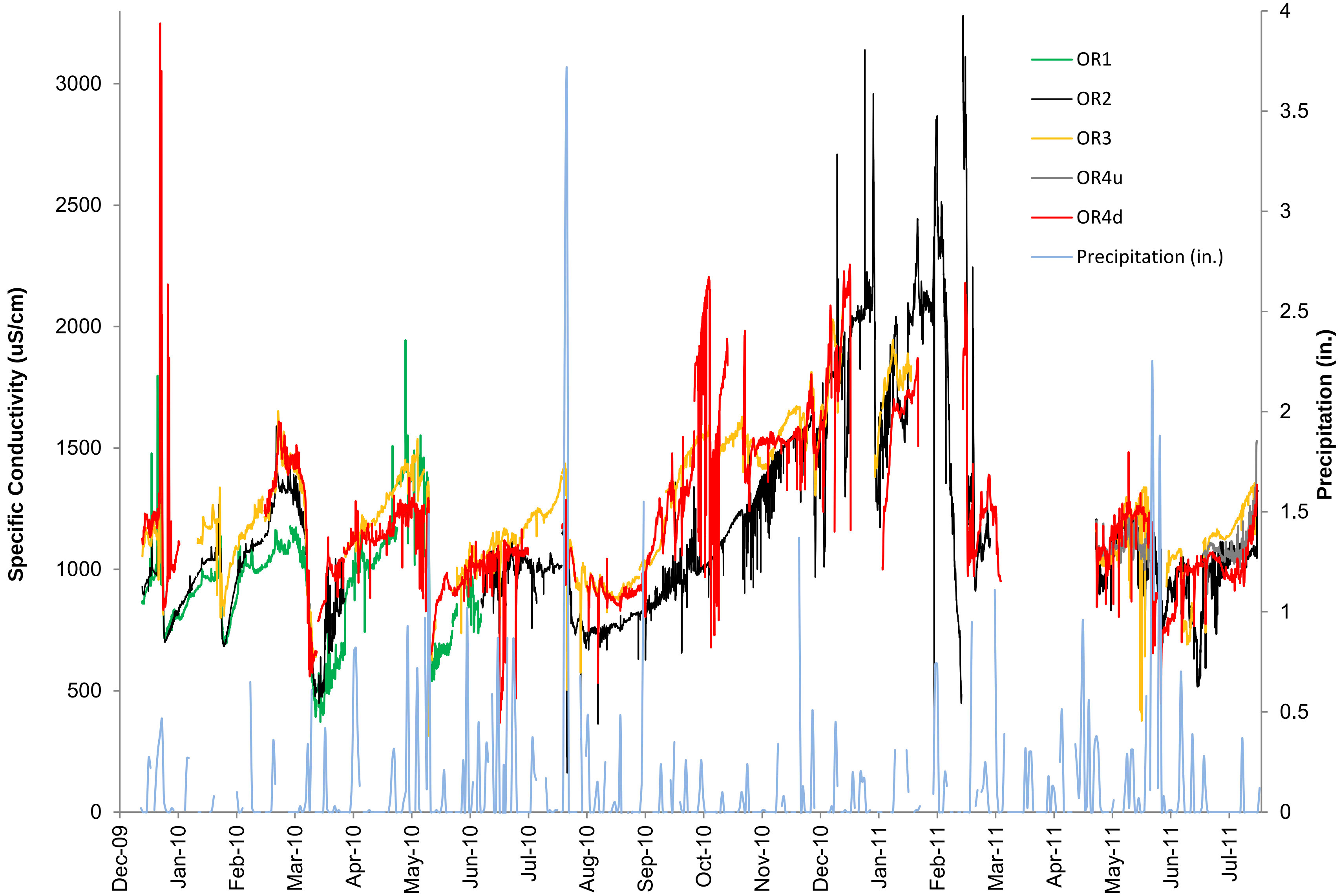


Figure 6. Specific conductivity at sites OR1 through OR4d.

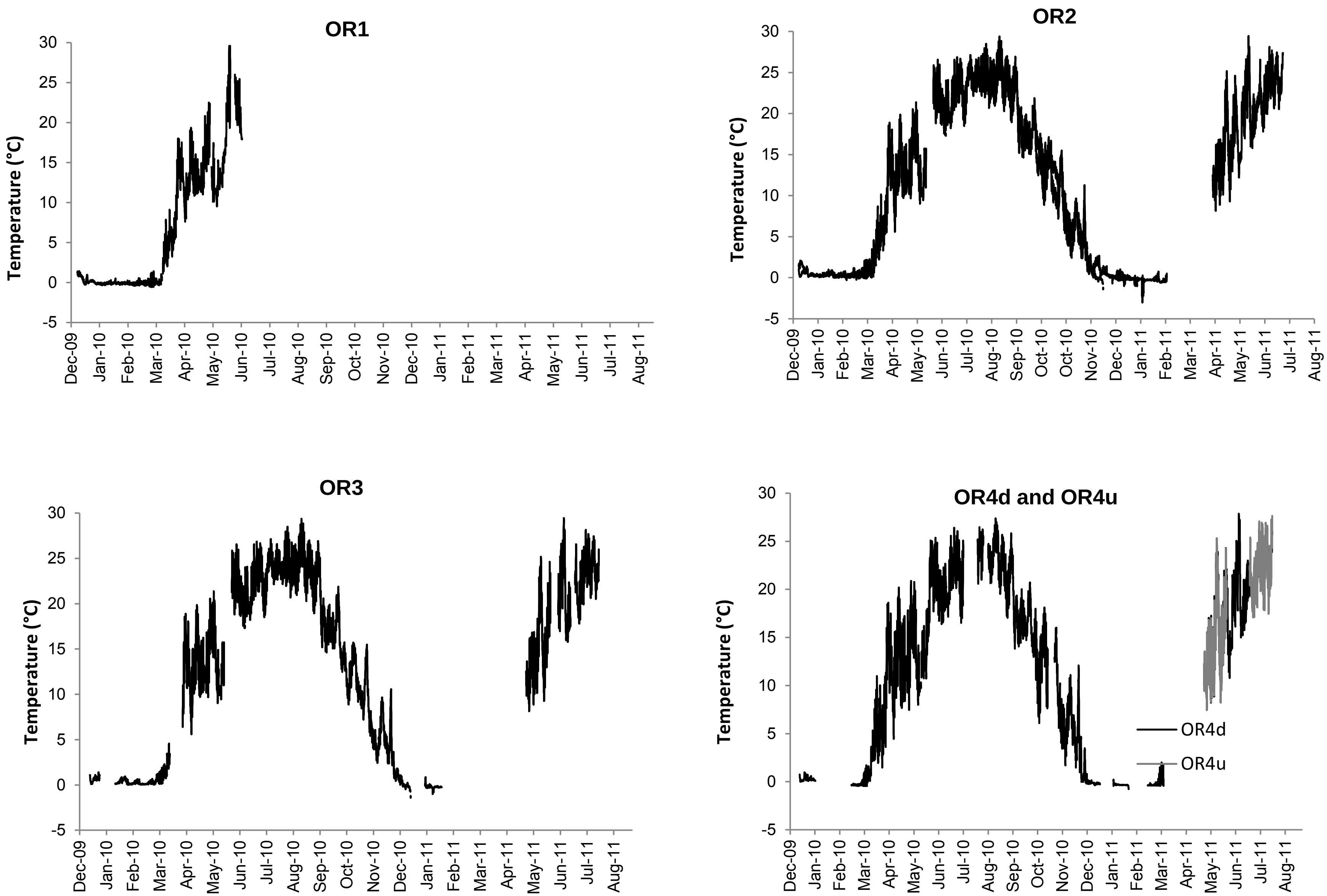


Figure 7. Temperatures recorded at sites OR1 through OR4d from December 2009 through July 2011.

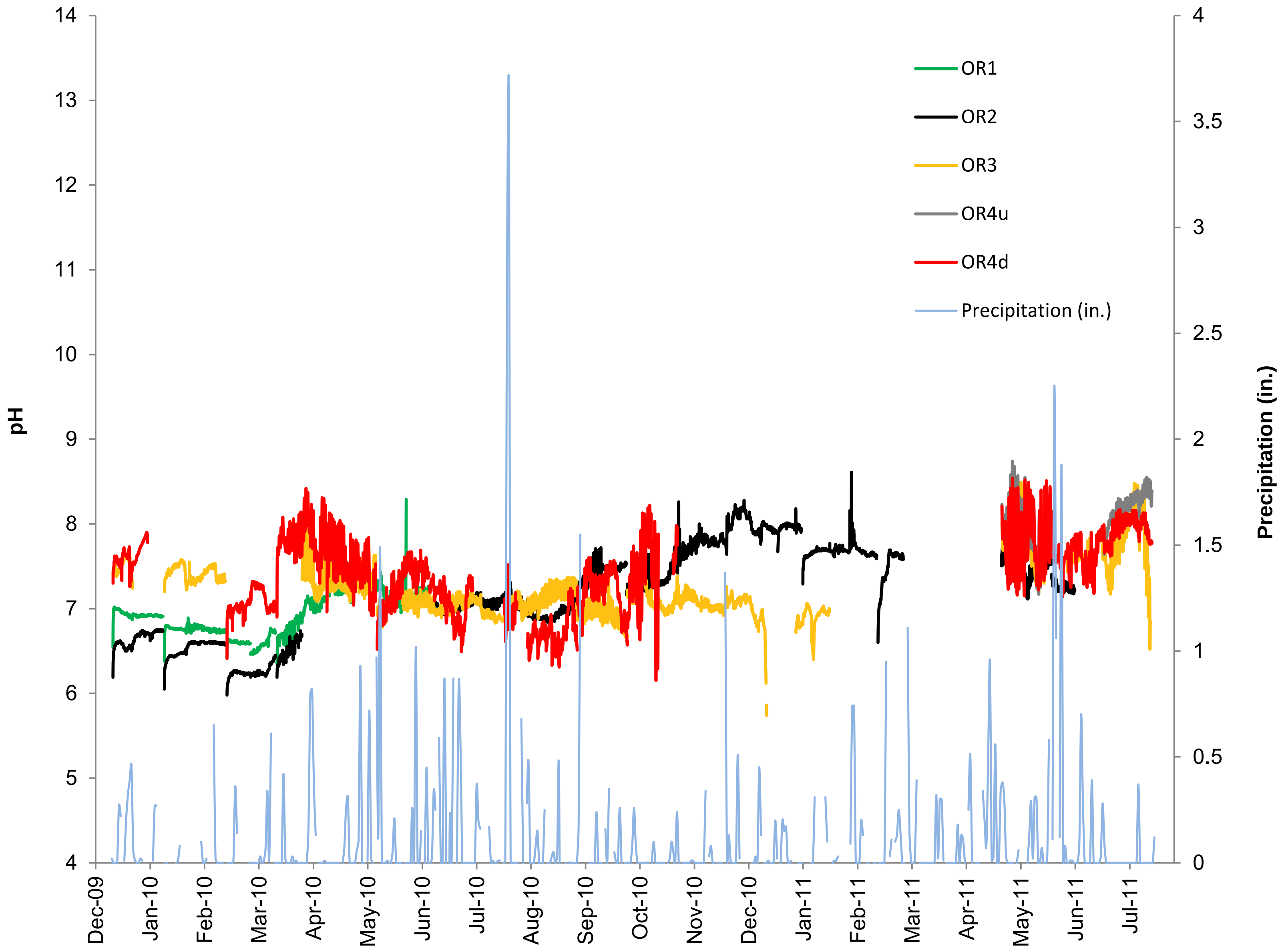


Figure 8. Graph of pH for sites OR1 through OR4d.

Also, the OR1 location is not isolated from runoff from Old McHenry Rd, so that it does not represent uninfluenced conditions. Given the more comprehensive datalogged data, the sediment and solute loads of the creek apparently increase as it crosses Old McHenry Rd.

Comparing OR4u and OR4d, there are downstream increases across IL 22 in mean (109 uS/cm) and maximum (1,720 uS/cm) specific conductivity, turbidity, and TSS, and increases in maximum TDS and chloride (Table 1). There are downstream decreases in mean and maximum pH, mean chloride, and mean TDS. As above, the apparently contradictory decrease in mean chloride is likely due to the limited duration of monitoring at OR4u that included a winter but no low-chloride time of the year. The predominance of evidence suggests that roadway operations increase sediment and maximum solute load in the creek as it crosses IL 22, as well as reduce stream pH and average solute load as low alkalinity runoff from the road surface enters the stream during nonwinter months. OR4u is a location where many pollutants are at their lowest and some parameters such as pH are at their highest, making influences of IL 22 more apparent.

Predicted Chloride Levels Using Specific Conductivity Dataloggers
In other ISGS studies on urban streams, high conductivity has been observed in tandem with elevated chloride concentrations. Because of the frequent occurrence of this relationship and strong impact of chloride on electrical conductivity, ISGS and others have used specific conductivity be used as a proxy for chloride concentrations in urban streams (Weaver 2002, Paul 2008). Figure 9 shows chloride levels in samples collected in the watershed versus the specific conductivity of each sample. There is a strong correlation between specific conductivity and chloride (R^2=0.9073), allowing a linear regression model to be calculated that can be used to estimate chloride levels for any specific conductivity datalogger measurement. From this model, when specific conductivity exceeds 2164 ppm, chloride is estimated to exceed 500 ppm, which is the General Use Standard. Specific conductivity at OR2 met or exceeded 2164 ppm several times in November 2010 through February 2010, and at OR4d in December 2009 and 2010. Therefore, based on the model, chloride levels at OR2 and OR4d exceeded the General Use Standard of 500 mg/L at those times; these locations are directly downstream of the two major roadway crossings (Old McHenry Rd and IL 22), where increases in chloride due to road salting would be expected. Also, grab samples collected at OR1 and OR2 showed chloride levels in excess of 500 mg/L. Additional lane miles in the watershed would be expected to increase the number and level of exceedances of the General Use Standard.

Quality Control
Blank and duplicate samples were collected as part of a quality assurance/quality control (QA/QC) program. Results of these samples are shown in the Appendix. For the duplicate samples, there were only 13 out of 412 total analytes with greater than 20% percent difference between the original and the duplicate sample. Nickel and titanium had the largest differences (4 and 3 samples, respectively), suggesting that those metals might need to be more carefully examined if any detailed analysis would be performed in the future. All of these 13 analytes contained levels that were less than 10 times the detection

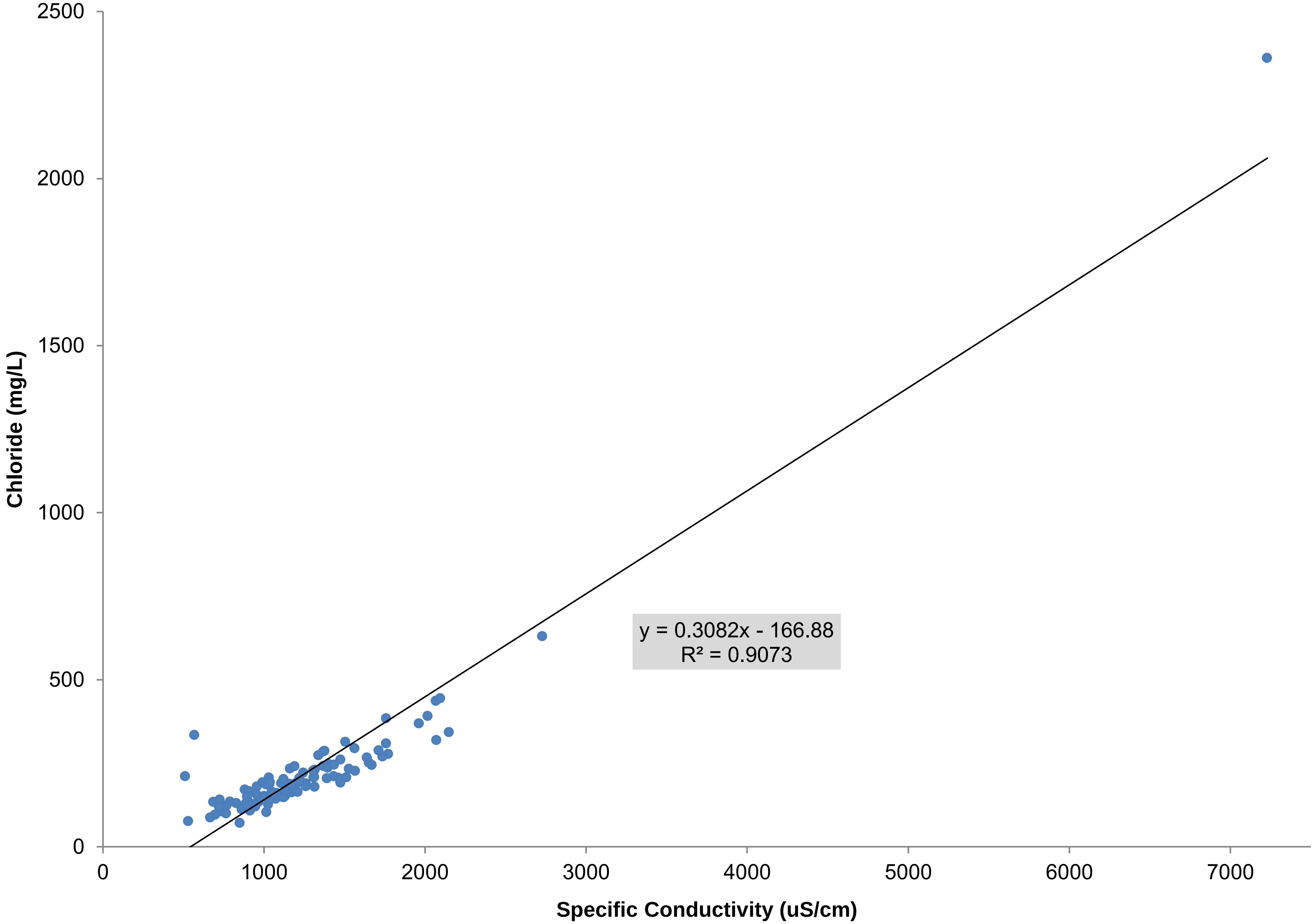


Figure 9. A plot of chloride verses specific conductivity used as a numerical model to predict chloride concentrations in the watershed.

limit, which is considered nonoptimal for analysis and is typical of when larger percent differences occur, and therefore these 13 analytes do not suggest laboratory problems or needed adjustments to the data. The remaining 399 analytes have acceptable to excellent percent differences, suggesting reliable laboratory methods and results.

Blank samples were submitted to the laboratory to determine if field methods affected levels of analytes reported. Blanks were composed of deionized water that was sampled using field methods, placed into sample containers using typical preservation and filtering, and submitted to the lab for the usual handling and analysis. Detections were made in 199 out of 1,360 analyses, but none of these are considered indicative of problems with methods or data or required corrections. No samples had an apparently larger number of detections than the others, suggesting that the collection and processing methods were uniform throughout the sampling program. The largest value reported was 17.9 mg/L silica, which is the only silica detection in any blank and is far larger than any other detection of any analyte; all other analytes had levels that were less than 3 mg/L, so laboratory reporting error is suspected. The largest number of detections was for calcium, which was found in all 34 samples but at levels less than 2 mg/L. Given that the blank was made from deionized water and the source is a calcium bicarbonate tap water, the presence of low levels of calcium is unsurprising. The next largest numbers of detections were for dissolved nonvolatile organic carbon (32 detections) and total nonvolatile organic carbon (30 detections); all detections were less than 3 mg/L, and are likely from filters and other laboratory methods and are not of concern. The remaining analytes found in more than 2 detections were, in decreasing order, sodium (22 detections less than 2 mg/L), magnesium (17 detections less than 2 mg/L), iron (11 detections less than 0.02 mg/L), chloride (8 detections less than 3 mg/L), and potassium (6 detections less than 1 mg/L). These detected analytes are generally highly mobile ions or often derive from filters and laboratory equipment, and do not indicate issues with field or laboratory methods. None of these detections suggest any adjustments to the field data or conclusions.

Summary

The data collected by ISGS form a baseline for comparison of post-construction conditions in the creek. Also, by comparing concentrations of analytes through time at the different monitoring points, estimates were made of impacts that occur at various locations in the watershed and the processes responsible for the impacts. However, many trends found in the various analytes and recorded parameters varied greatly depending on season, watershed and creek features, characteristics of sampling location, and other factors, so that roadway impacts on the creek were not always clear. For this reason, conditions also were compared upstream and downstream of the two major roadways that the creek crosses to help identify existing impacts to the creek. No modeling of any parameter was performed, so that no predictions are presented of potential impacts to the preserve from the planned reconstruction project. Any observations of potential impacts are qualitative only, and do not account for any project features designed to mitigate impacts, such as detention.

Water levels in the creek at IL 22 showed flashy flows with large increases (up to 0.5 m [1.5 ft]) several times during the monitoring period as well as many smaller increases. The largest flows are estimated to have inundated at least part of the orchid habitat within EFPONP, although surveying is necessary to confirm this assumption. Additional increases in runoff to the creek would be expected to increase the number and duration of flooding events that impact the orchid habitat, possibly altering the natural hydropattern and providing a transport mechanism for sediment, pollutants, and weed dispersal.

Roadway operations typically cause increases in chloride and specific conductivity due to deicing operations. This is seen in the study area as shown by the increase in mean and maximum specific conductivity downstream across Old McHenryRd (OR1 versus OR2) and across IL 22 (OR4u versus OR4d). In addition, specific conductivity at OR4d and OR2 are often the highest of all monitoring points, especially in the winter when road salt is applied. Conversely, during summer when specific conductivity of the creek is much lower, OR3 is often highest, likely caused by an increased content of groundwater in the creek, as well as dilution by low-conductivity roadway runoff downstream of Old McHenry Rd and IL 22 in nonwinter months. Groundwater discharge apparently occurs in the lower reaches of the watershed, although this study did not address that issue. Mean chloride values show decreases downstream, possibly suggesting dilution from increased runoff inputs, but creek volumes were not measured so that dilution cannot be identified; alternatively, the conclusion may be biased by the short periods of sampling at two sites and the biweekly sampling method, which is not expected to show short-term peaks and therefore may not reflect the totality of conditions in the creek.

Dissolved metals typical of roadway runoff were found in the study, including copper, chromium, nickel, and zinc, although levels did not exceed General Use Standards except for the chronic standard for nickel, which was exceeded at all sites except OR4u; the number of samples that exceeded the standard generally increased downstream, possibly due to cumulative impacts from roadways.

Mean pH in the creek increases downstream through OR4u, likely showing increased groundwater discharge, the main source of alkalinity that would increase pH. There is a large decrease in mean pH downstream across IL 22, suggesting dilution of the creek with lower-pH runoff from the roadway surface. ISGS knows of no studies that clearly relate impacts to native habitat from changes to the pH of the water supply, although any changes to the quality of the water source for a nature preserve are likely to have some influence on the geochemistry of the water and possibly other factors, and seem likely to be considered an impact given the status of the preserve.

Increased runoff from roadways to streams may also increase sediment content through enhanced erosion in the stream or from transporting sediment off the road surface. Mean turbidity in the study area generally increases downstream, with highest maximum and mean levels occurring at OR4d. The high mean at OR1 may be related to the short period of record, rather than long-term conditions. Increases in mean turbidity were found downstream across both Old McHenry Rd and IL 22. Conversely, mean TSS decreases downstream through OR4u, with a large increase in maximum and mean level downstream across IL 22. The presence of ponds along the creek likely cause large decreases in sediment transport between OR2 and OR4u, along with any dilution of the creek waters from groundwater discharge. The downstream increase in mean turbidity but decrease in mean TSS is likely due to the differing sampling regimes; grab sampling of TSS likely misses peak events and reflects a more average stream condition, but the datalogged turbidity includes storm events that influence the mean level. Turbidity measurements in the creek indicate seasonal pulses of turbidity due to high rainfall, likely related to springtime thaw where unvegetated ground is present, thus facilitating increased rates of erosion and contributing sediment to the creek. An increase in imperviousness in the system will likely increase the amount of runoff, thereby increasing the amount of sediment in the system. This could lead to decreased water quality, greater sediment deposition in the EFPONP during flooding events, and could increase the amount of pollutants deposited in the EFPONP along with the suspended particulate matter.

Cations such as mean iron also decrease downstream, perhaps due to adsorption and deposition of suspended sediment, or other biotic or abiotic processes (Figure 3d). Increases in other analytes indicate that constituents are being added to the watershed from point or non-point sources. For example, increases in alkalinity and calcium downstream suggest groundwater inputs to the creek (Figures 3a, 3f) as noted above. Also, downstream increases were seen in sulfate, suggesting impacts to water quality from deicing activities, septic discharges, and residential water softening (Figure 3f).

Future Work Schedule

Ongoing sampling is expected until no longer required by IDOT. Attempts were made to install monitoring wells and dataloggers in the preserve and collect samples, but landowner permission was denied. Future work would include the documentation of water levels and chemistry in the actual orchid habitat, which would be helpful for preservation of the habitat as well as documentation of any potential impacts caused by the planned road reconstruction.

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Appendix Results of geochemical analysis of grab samples taken from November 30, 2009 through March 29, 2011

date collected	field conductivity	field pH	sample location	Sample ID	Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	S
					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				MDL:	0.037	0.108	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.018	0.0025	0.0015	0.022	0.026	0.014	0.063	0.041	0.217
11/30/09	791	7.52	OR1	TOLLWAY 307	<0.037	<0.108	<0.023	0.032	<0.00055	74.2	<0.012	<0.013	<0.0058	<0.00079	0.142	9.12	<0.058	30.7	0.0816	<0.022	56.4	<0.014	0.162	<0.041	10.3
12/14/09	910	7.31	OR1	TOLLWAY 326	<0.037	<0.108	0.035	0.0459	<0.00055	76.6	<0.012	<0.013	<0.0058	0.00094	0.402	9.76	<0.058	33.7	0.888	<0.022	62.5	0.027	0.235	<0.041	9.65
12/28/09	686	7.34	OR1	TOLLWAY 345	0.085	<0.108	0.033	0.0301	<0.00055	49.1	<0.012	<0.013	<0.0058	0.00116	0.342	9.10	<0.058	22.1	0.375	<0.022	57.1	0.024	0.216	<0.041	7.48
1/11/10	913	7.03	OR1	TOLLWAY 357	0.051	<0.108	0.039	0.0467	<0.00055	68.7	<0.012	<0.013	<0.0058	<0.00079	1.01	8.25	<0.058	32.3	0.672	<0.022	77.2	0.015	0.436	<0.041	11.3
1/25/10	726	7.65	OR1	TOLLWAY 374	0.060	<0.108	0.033	0.0357	<0.00055	53.1	<0.012	<0.013	<0.0058	0.00090	0.712	8.59	<0.058	23.5	0.575	<0.022	58.5	0.017	0.404	<0.041	7.83
2/15/10	1015	7.17	OR1	TOLLWAY 396	<0.037	<0.108	0.037	0.0500	<0.00055	83.1	<0.012	<0.013	<0.0058	<0.00079	0.940	7.26	<0.058	36.1	0.669	<0.022	101	0.021	0.485	<0.041	10.8
3/1/10	1171	6.56	OR1	TOLLWAY 409	<0.037	<0.108	0.040	0.0540	<0.00055	89.2	<0.012	<0.013	<0.0058	<0.00079	0.677	7.27	<0.058	37.9	0.790	<0.022	119	0.017	0.550	<0.041	8.09
3/15/10	511	7.00	OR1	TOLLWAY 429	<0.037	<0.108	<0.023	0.0240	<0.00055	42.3	<0.012	<0.013	<0.0058	0.00101	0.148	4.15	<0.058	19.0	0.179	<0.022	39.3	<0.014	<0.063	<0.041	10.5
3/30/10	849	7.63	OR1	TOLLWAY 451	<0.037	<0.108	0.027	0.0320	<0.00055	63.2	<0.012	<0.013	<0.0058	<0.00079	0.0682	4.53	<0.058	27.2	0.0228	<0.022	89.0	<0.014	<0.063	<0.041	11.4
4/12/10	1034	7.68	OR1	TOLLWAY 466	<0.037	<0.108	0.029	0.0367	<0.00055	72.4	<0.012	<0.013	<0.0058	<0.00079	0.0662	4.67	<0.058	33.9	0.0201	<0.022	98.9	<0.014	<0.063	<0.041	11.5
4/26/10	1368	7.39	OR1	TOLLWAY 488	<0.037	<0.108	<0.023	0.0443	<0.00055	83.9	<0.012	<0.013	<0.0058	<0.00079	0.0591	5.40	<0.058	35.8	0.0471	<0.022	145	0.030	<0.063	<0.041	11.0
5/10/10	1377	6.96	OR1	TOLLWAY 503	<0.037	<0.108	0.034	0.0478	<0.00055	91.1	<0.012	<0.013	<0.0058	<0.00079	0.107	6.05	<0.058	39.0	0.149	<0.022	152	<0.014	<0.063	<0.041	9.86
5/25/10	789	7.08	OR1	TOLLWAY 530	<0.037	<0.108	0.031	0.0374	<0.00055	53.3	<0.012	<0.013	<0.0058	<0.00079	0.257	6.02	<0.058	23.8	1.57	<0.022	72.7	<0.014	0.077	<0.041	6.84
12/20/10	2067	6.62	OR1	TOLLWAY 735	<0.037	<0.11	0.035	0.0823	<0.00055	135	<0.012	<0.013	<0.0058	<0.00079	0.296	6.73	<0.11	62.4	2.56	<0.022	191	0.032	0.140	<0.041	4.89
1/19/11	1962	6.67	OR1	TOLLWAY 748	<0.037	<0.11	0.038	0.0838	<0.00055	152	<0.012	<0.013	<0.0058	<0.00079	3.18	8.09	<0.11	71.4	1.57	<0.022	170	<0.014	0.534	<0.041	14
2/14/11	7229	6.81	OR1	TOLLWAY 760	<0.037	<0.11	<0.023	0.138	<0.00055	165	<0.012	<0.013	<0.0058	0.00231	1.98	16.6	<0.11	51.8	0.689	<0.022	1380	<0.014	0.512	<0.041	25.0
3/1/11	1021	7.01	OR1	TOLLWAY 770	<0.037	<0.11	0.034	0.0372	<0.00055	66.9	<0.012	<0.013	<0.0058	0.00258	0.236	11.2	<0.11	31.5	0.237	<0.022	101	<0.014	<0.073	<0.041	15.3
3/29/11	1018	8.00	OR1	TOLLWAY 807	<0.037	<0.11	0.028	0.0365	<0.00055	71.1	<0.012	<0.013	<0.0058	0.00092	0.090	7.96	<0.11	31.6	0.0204	<0.022	100	<0.043	0.156	<0.041	13.1
				MIN OR1	***0.05***	***0.00***	***0.03***	***0.02***	***0.00***	***42.34***	***0.00***	***0.00***	***0.00***	***0.00***	***0.06***	***4.15***	***0.00***	***18.97***	***0.02***	***0.00***	***39.35***	***0.01***	***0.08***	***0.00***	***4.89***
				MAX OR1	***0.085***	***0.000***	***0.040***	***0.138***	***0.000***	***165.367***	***0.000***	***0.000***	***0.000***	***0.003***	***3.181***	***16.603***	***0.000***	***71.389***	***2.562***	***0.000***	***1379.516***	***0.032***	***0.550***	***0.000***	***25.003***
				MEAN OR1	***0.065***	***NA***	***0.034***	***0.050***	***NA***	***82.806***	***NA***	***NA***	***NA***	***0.001***	***0.595***	***7.820***	***NA***	***35.756***	***0.618***	***NA***	***170.603***	***0.023***	***0.326***	***NA***	***11.026***

date collected	field conductivity	field pH	sample location	Sample ID	Sb	Se	Si	Sn	Sr	Ti	Tl	V	Zn	pH	alkalinity	TDS, 180 C	TSS	oPO_4-P	NH_3-N	F	Cl	NO_3-N	SO_4	total NVOC	dissolved NVOC
					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L as $CaCO_3$	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				MDL:	0.059	0.131	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.01	0.06	0.08	0.09	0.07	0.31	0.31	0.31
11/30/09	791	7.52	OR1	TOLLWAY 307	<0.059	<0.131	2.91	<0.086	0.217	<0.00056	<0.017	<0.047	<0.0073	7.38	226	509	2.8	0.095	<0.06	0.18	115	<0.07	28.2	16.0	12.9
12/14/09	910	7.31	OR1	TOLLWAY 326	<0.059	<0.131	3.58	<0.086	0.233	<0.00056	<0.017	<0.047	<0.0073	7.72	260	577	7.2	0.172	<0.06	0.15	134	<0.07	26.7	17.6	16.1
12/28/09	686	7.34	OR1	TOLLWAY 345	<0.059	<0.131	2.91	<0.086	0.146	0.00265	<0.017	<0.047	<0.0073	7.35	176	410	6.0	0.175	0.12	0.14	108	0.49	22.3	13.9	12.6
1/11/10	913	7.03	OR1	TOLLWAY 357	<0.059	<0.131	3.90	<0.086	0.214	0.00176	<0.017	<0.047	<0.0073	7.16	247	540	4.4	0.309	0.27	0.16	141	<0.07	32.1	15.3	14.7
1/25/10	726	7.65	OR1	TOLLWAY 374	<0.059	<0.131	3.48	<0.086	0.157	0.00215	<0.017	<0.047	<0.0073	7.10	204	434	16.0	0.322	0.40	0.11	104	0.53	22.5	16.7	14.6
2/15/10	1015	7.17	OR1	TOLLWAY 396	<0.059	<0.131	4.26	<0.086	0.231	0.00103	<0.017	<0.047	<0.0073	7.03	269	601	6.4	0.355	0.51	0.12	163	<0.07	32.1	18.2	17.3
3/1/10	1171	6.56	OR1	TOLLWAY 409	<0.059	<0.131	5.28	<0.086	0.244	0.00136	<0.017	<0.047	<0.0073	6.98	282	669	9.2	0.408	0.66	<0.08	211	<0.07	25.6	21.3	19.6
3/15/10	511	7.00	OR1	TOLLWAY 429	<0.059	<0.131	2.57	<0.086	0.109	0.00123	<0.017	<0.047	<0.0073	7.23	128	293	2.8	0.036	<0.06	0.13	71.1	0.22	29.1	10.2	8.77
3/30/10	849	7.63	OR1	TOLLWAY 451	<0.059	<0.131	2.70	<0.086	0.173	<0.00056	<0.017	<0.047	<0.0073	7.48	180	543	<3.0	0.014	<0.06	0.13	161	<0.07	30.4	9.10	8.38
4/12/10	1034	7.68	OR1	TOLLWAY 466	<0.059	<0.131	1.93	<0.086	0.220	<0.00056	<0.017	<0.047	<0.0073	7.61	218	636	<3.0	0.014	<0.06	0.13	188	<0.07	31.4	11.2	10.5
4/26/10	1368	7.39	OR1	TOLLWAY 488	<0.059	<0.131	0.951	<0.086	0.259	<0.00056	<0.017	<0.047	<0.0073	7.60	246	844	<3	0.018	<0.06	0.13	285	<0.07	30.9	10.7	9.84
5/10/10	1377	6.96	OR1	TOLLWAY 503	<0.059	<0.131	0.521	<0.086	0.273	<0.00056	<0.017	<0.047	<0.0073	7.71	256	805	3.2	0.024	<0.06	0.14	287	<0.07	27.4	14.9	13.3
5/25/10	789	7.08	OR1	TOLLWAY 530	<0.059	<0.131	0.489	<0.086	0.175	<0.00056	<0.017	<0.047	<0.0073	7.50	174	475	3.6	0.055	<0.06	0.17	135	<0.07	19.3	14.0	12.2
12/20/10	2067	6.62	OR1	TOLLWAY 735	<0.059	<0.13	5.04	<0.086	0.442	<0.00056	<0.017	<0.047	<0.0073	7.25	414	1201	17.2	0.010	0.29	0.23	437	<0.07	13.0	24.1	19.0
1/19/11	1962	6.67	OR1	TOLLWAY 748	<0.059	<0.13	7.10	<0.086	0.470	<0.00056	<0.017	<0.047	<0.0073	7.08	474	1128	18.5	0.425	0.87	0.14	369	<0.07	35.9	26.7	24.5
2/14/11	7229	6.81	OR1	TOLLWAY 760	<0.059	<0.13	5.27	<0.086	0.562	<0.00056	0.021	<0.047	0.0076	6.97	163	4463	108	0.344	5.95	0.25	2361	1.08	65.5	35.9	27.1
3/1/11	1021	7.01	OR1	TOLLWAY 770	<0.059	<0.13	3.34	<0.086	0.189	0.00065	<0.017	<0.047	<0.0073	7.42	182	626	10.8	0.040	<0.03	0.15	193	0.10	40.7	27.3	23.1
3/29/11	1018	8.00	OR1	TOLLWAY 807	<0.059	<0.13	3.36	<0.086	0.205	<0.00056	<0.017	<0.047	<0.0097	7.67	198	609	NA	0.011	<0.03	0.14	190	<0.07	36.5	16.8	15.4
				MIN OR1	***0.00***	***0.00***	***0.49***	***0.00***	***0.11***	***0.00***	***0.02***	***0.00***	***0.01***	***6.97***	***128.03***	***293.00***	***2.80***	***0.01***	***0.12***	***0.11***	***71.05***	***0.10***	***13.00***	***9.10***	***8.38***
				MAX OR1	***0.000***	***0.000***	***7.102***	***0.000***	***0.562***	***0.003***	***0.021***	***0.000***	***0.008***	***7.715***	***473.989***	***4463.000***	***108.000***	***0.425***	***5.946***	***0.251***	***2360.600***	***1.081***	***65.517***	***35.916***	***27.104***
				MEAN OR1	***NA***	***NA***	***3.311***	***NA***	***0.251***	***0.002***	***0.021***	***NA***	***0.008***	***7.346***	***238.647***	***853.500***	***15.436***	***0.157***	***1.134***	***0.152***	***313.924***	***0.485***	***30.534***	***17.777***	***15.549***

Appendix Results of geochemical analysis of grab samples taken from November 30, 2009 through March 29, 2011 (continued)

date collected	field conductivity	field pH	sample location	Sample ID	Al mg/L	As mg/L	B mg/L	Ba mg/L	Be mg/L	Ca mg/L	Cd mg/L	Co mg/L	Cr mg/L	Cu mg/L	Fe mg/L	K mg/L	Li mg/L	Mg mg/L	Mn mg/L	Mo mg/L	Na mg/L	Ni mg/L	P mg/L	Pb mg/L	S mg/L
				MDL:	0.037	0.108	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.018	0.0025	0.0015	0.022	0.026	0.014	0.063	0.041	0.217
11/30/09	798	7.52	OR2	TOLLWAY 306	<0.037	<0.108	<0.023	0.033	<0.00055	73.2	<0.012	<0.013	<0.0058	<0.00079	0.229	9.10	<0.058	31.2	0.160	<0.022	57.8	<0.014	0.147	<0.041	10.4
12/14/09	912	7.31	OR2	TOLLWAY 328	<0.037	<0.108	0.032	0.0476	<0.00055	77.5	<0.012	<0.013	<0.0058	<0.00079	0.570	9.13	<0.058	34.1	0.771	<0.022	66.0	0.025	0.230	<0.041	10.6
12/28/09	728	7.28	OR2	TOLLWAY 346	0.067	<0.108	0.034	0.0333	<0.00055	53.0	<0.012	<0.013	<0.0058	0.00096	0.339	8.69	<0.058	24.4	0.360	<0.022	56.7	0.021	0.201	<0.041	10.8
1/11/10	956	7.15	OR2	TOLLWAY 359	<0.037	<0.108	0.035	0.0464	<0.00055	67.7	<0.012	<0.013	<0.0058	<0.00079	0.970	7.46	<0.058	29.9	0.696	<0.022	81.0	<0.014	0.370	<0.041	11.7
1/25/10	696	7.61	OR2	TOLLWAY 375	0.176	<0.108	0.033	0.0352	<0.00055	53.4	<0.012	<0.013	<0.0058	<0.00079	0.580	8.18	<0.058	24.1	0.522	<0.022	57.0	0.014	0.340	<0.041	9.70
2/15/10	1107	6.94	OR2	TOLLWAY 394	<0.037	<0.108	0.042	0.0528	<0.00055	85.0	<0.012	<0.013	<0.0058	<0.00079	0.808	7.02	<0.058	35.4	0.745	<0.022	110	0.020	0.466	<0.041	11.2
3/1/10	1339	6.74	OR2	TOLLWAY 411	<0.037	<0.108	0.057	0.0597	<0.00055	94.3	<0.012	<0.013	<0.0058	<0.00079	0.679	7.41	<0.058	34.1	0.849	0.038	158	0.022	0.472	<0.041	8.96
3/15/10	530	7.03	OR2	TOLLWAY 427	0.046	<0.108	<0.023	0.0243	<0.00055	41.4	<0.012	<0.013	<0.0058	0.00103	0.206	4.72	<0.058	17.4	0.172	<0.022	42.0	<0.014	<0.063	<0.041	8.39
3/30/10	881	7.55	OR2	TOLLWAY 452	<0.037	<0.108	0.027	0.0332	<0.00055	64.6	<0.012	<0.013	<0.0058	<0.00079	0.104	4.57	<0.058	28.1	0.0401	<0.022	95.0	0.019	<0.063	<0.041	11.4
6/9/10	906	7.56	OR2	TOLLWAY 561	<0.037	<0.108	0.029	0.0362	<0.00055	58.3	<0.012	<0.013	<0.0058	<0.00079	0.216	6.29	<0.058	26.8	0.506	<0.022	87.0	0.021	<0.063	<0.041	6.62
6/22/10	991	6.80	OR2	TOLLWAY 571	<0.037	<0.108	0.043	0.0369	<0.00055	62.5	<0.012	<0.013	<0.0058	<0.00079	0.223	6.13	<0.058	28.4	0.657	<0.022	95.6	0.024	<0.063	<0.041	6.50
7/7/10	956	7.12	OR2	TOLLWAY 602	<0.037	<0.108	0.050	0.0402	<0.00055	62.4	<0.012	<0.013	<0.0058	<0.00079	0.0994	5.78	<0.058	31.4	0.379	<0.022	97.2	<0.014	<0.063	<0.041	6.54
7/21/10	1162	7.20	OR2	TOLLWAY 621	<0.037	<0.108	0.057	0.0518	<0.00055	65.4	<0.012	<0.013	<0.0058	<0.00079	0.156	5.84	<0.058	32.7	0.750	<0.022	119	0.027	<0.063	<0.041	4.08
8/3/10	721	7.95	OR2	TOLLWAY 635	<0.037	<0.108	0.053	0.033	<0.00055	53.3	<0.012	<0.013	<0.0058	<0.00079	0.208	7.67	<0.058	22.2	0.354	<0.022	62.5	<0.014	<0.063	<0.041	6.84
8/16/10	768	6.84	OR2	TOLLWAY 649	<0.037	<0.108	0.053	0.037	<0.00055	55.6	<0.012	<0.013	<0.0058	<0.00079	0.199	7.33	<0.058	23.3	0.548	<0.022	64.6	<0.014	0.082	<0.041	4.79
8/31/10	829	7.65	OR2	TOLLWAY 670	<0.037	<0.11	0.047	0.0376	<0.00055	63.3	<0.012	<0.013	<0.0058	<0.00079	0.117	6.45	<0.11	27.2	0.293	<0.022	68.6	0.018	<0.073	<0.041	4.43
9/13/10	895	7.16	OR2	TOLLWAY 679	<0.037	<0.11	0.058	0.0326	<0.00055	66.2	<0.012	<0.013	<0.0058	<0.00079	0.180	6.17	<0.11	29.8	0.0900	<0.022	78.0	0.020	<0.073	<0.041	3.58
9/27/10	1013	7.86	OR2	TOLLWAY 694	<0.037	<0.11	0.055	0.0429	<0.00055	70.9	<0.012	<0.013	<0.0058	<0.00079	0.611	6.32	<0.11	31.1	0.317	<0.022	97.4	0.020	<0.073	<0.041	2.73
10/11/10	1122	7.27	OR2	TOLLWAY 705	<0.037	<0.11	0.043	0.0437	<0.00055	79.1	<0.012	<0.013	<0.0058	<0.00079	0.190	5.42	<0.11	34.5	0.514	<0.022	103	0.024	0.146	<0.041	2.64
10/26/10	1031	7.40	OR2	TOLLWAY 714	0.050	<0.11	0.040	0.0333	<0.00055	60.6	<0.012	<0.013	<0.0058	0.00197	0.184	5.75	<0.11	25.3	0.170	<0.022	117	0.025	0.246	<0.041	6.62
11/8/10	1505	7.57	OR2	TOLLWAY 720	<0.037	<0.11	0.039	0.0505	<0.00055	95.7	<0.012	<0.013	<0.0058	<0.00079	0.0606	4.65	<0.11	42.0	0.164	<0.022	142	0.040	0.115	<0.041	3.57
12/6/10	1759	6.98	OR2	TOLLWAY 726	<0.037	<0.11	0.037	0.0614	<0.00055	119	<0.012	<0.013	<0.0058	<0.00079	0.0691	5.43	<0.11	52.1	1.07	<0.022	175	0.046	0.083	<0.041	4.72
12/20/10	2067	6.62	OR2	TOLLWAY 737	<0.037	<0.11	0.042	0.0823	<0.00055	132	<0.012	<0.013	<0.0058	<0.00079	0.222	6.77	<0.11	61.0	2.69	<0.022	194	0.038	0.127	<0.041	4.85
1/3/11	1562	8.42	OR2	TOLLWAY 742	<0.037	<0.11	0.036	0.0499	<0.00055	98.4	<0.012	<0.013	<0.0058	<0.00079	0.566	8.17	<0.11	46.6	0.898	<0.022	147	<0.014	0.084	<0.041	14.1
1/19/11	*2017*	*6.72*	OR2	TOLLWAY 750	<0.037	<0.11	0.040	0.0860	<0.00055	155	<0.012	<0.013	<0.0058	<0.00079	3.54	8.20	<0.11	71.8	1.61	<0.022	183	<0.014	0.525	<0.041	14
2/14/11	*2728*	*6.64*	OR2	TOLLWAY 758	<0.037	<0.11	0.035	0.104	<0.00055	166	<0.012	<0.013	<0.0058	<0.00079	2.92	8.10	<0.11	73.8	1.66	<0.022	325	<0.014	0.782	<0.041	10.4
3/1/11	1190	7.83	OR2	TOLLWAY 767	0.113	<0.11	0.036	0.0414	<0.00055	69.7	<0.012	<0.013	<0.0058	0.00224	0.389	10.2	<0.11	32.3	0.259	<0.022	129	<0.014	0.112	<0.041	16.1
3/29/11	1038	8.15	OR2	TOLLWAY 806	<0.037	<0.11	0.029	0.0363	<0.00055	68.5	<0.012	<0.013	<0.0058	0.00088	0.133	7.71	<0.11	30.3	0.0380	<0.022	105	<0.043	0.142	<0.041	13.3
				MIN OR2	***0.05***	***0.00***	***0.03***	***0.02***	***0.00***	***41.38***	***0.00***	***0.00***	***0.00***	***0.00***	***0.06***	***4.57***	***0.00***	***17.35***	***0.04***	***0.04***	***42.01***	***0.01***	***0.08***	***0.00***	***2.64***
				MAX OR2	***0.176***	***0.000***	***0.058***	***0.104***	***0.000***	***165.793***	***0.000***	***0.000***	***0.000***	***0.002***	***3.537***	***10.154***	***0.000***	***73.811***	***2.694***	***0.038***	***324.628***	***0.046***	***0.782***	***0.000***	***16.092***
				MEAN OR2	***0.091***	***NA***	***0.042***	***0.047***	***NA***	***78.996***	***NA***	***NA***	***NA***	***0.001***	***0.527***	***6.951***	***NA***	***35.039***	***0.617***	***0.038***	***111.199***	***0.025***	***0.259***	***NA***	***8.186***

date collected	field conductivity	field pH	sample location	Sample ID	Sb mg/L	Se mg/L	Si mg/L	Sn mg/L	Sr mg/L	Ti mg/L	Tl mg/L	V mg/L	Zn mg/L	pH	alkalinity mg/L as CaCO₃	TDS, 180 C mg/L	TSS mg/L	oPO_4-P mg/L	NH_3-N mg/L	F mg/L	Cl mg/L	NO_3-N mg/L	SO_4 mg/L	total NVOC mg/L	dissolved NVOC mg/L
				MDL:	0.059	0.131	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.01	0.06	0.08	0.09	0.07	0.31	0.31	0.31
11/30/09	798	7.52	OR2	TOLLWAY 306	<0.059	<0.131	2.89	<0.086	0.220	<0.00056	<0.017	<0.047	<0.0073	7.33	227	468	6.8	0.099	<0.06	0.17	116	<0.07	28.1	17.3	12.8
12/14/09	912	7.31	OR2	TOLLWAY 328	<0.059	<0.131	3.62	<0.086	0.252	<0.00056	<0.017	<0.047	<0.0073	7.60	260	573	7.2	0.174	<0.06	0.17	136	<0.07	29.1	16.5	15.3
12/28/09	728	7.28	OR2	TOLLWAY 346	<0.059	<0.131	3.20	<0.086	0.174	0.00201	<0.017	<0.047	<0.0073	7.32	190	423	10	0.172	0.11	0.15	106	0.45	32.4	13.3	12.1
1/11/10	956	7.15	OR2	TOLLWAY 359	<0.059	<0.131	3.72	<0.086	0.219	0.00058	<0.017	<0.047	<0.0073	7.18	246	585	4.4	0.280	0.25	0.16	156	<0.07	34.3	14.1	13.5
1/25/10	696	7.61	OR2	TOLLWAY 375	<0.059	<0.131	3.47	<0.086	0.167	0.00165	<0.017	<0.047	<0.0073	7.15	198	418	7.2	0.269	0.34	0.11	96.2	0.49	27.3	14.3	13.4
2/15/10	1107	6.94	OR2	TOLLWAY 394	<0.059	<0.131	4.72	<0.086	0.246	0.00092	<0.017	<0.047	<0.0073	7.07	269	681	17.6	0.309	0.46	0.12	190	<0.07	31.0	17.7	16.3
3/1/10	1339	6.74	OR2	TOLLWAY 411	<0.059	<0.131	5.27	<0.086	0.269	0.00131	<0.017	<0.047	<0.0073	7.07	279	792	10.8	0.357	0.60	<0.08	274	<0.07	27.3	19.6	19.2
3/15/10	530	7.03	OR2	TOLLWAY 427	<0.059	<0.131	2.66	<0.086	0.102	0.00188	<0.017	<0.047	<0.0073	7.18	130	299	7.2	0.049	<0.06	0.12	76.4	0.28	23.0	10.8	9.83
3/30/10	881	7.55	OR2	TOLLWAY 452	<0.059	<0.131	2.72	<0.086	0.176	<0.00056	<0.017	<0.047	<0.0073	7.50	181	556	<3.0	0.014	<0.06	0.13	171	<0.07	30.7	8.83	8.44
6/9/10	906	7.56	OR2	TOLLWAY 561	<0.059	<0.131	1.35	<0.086	0.223	<0.00056	<0.017	<0.047	<0.0073	7.51	189	540	8.0	0.045	<0.06	0.09	167	<0.07	18.6	20.0	17.7
6/22/10	991	6.80	OR2	TOLLWAY 571	<0.059	<0.131	1.93	<0.086	0.237	<0.00056	<0.017	<0.047	<0.0073	7.30	195	588	2.8	0.054	<0.06	0.15	193	<0.07	17.0	14.6	18.8
7/7/10	956	7.12	OR2	TOLLWAY 602	<0.059	<0.131	2.83	<0.086	0.252	<0.00056	<0.017	<0.047	<0.0073	7.60	207	596	4.8	0.035	<0.06	0.18	180	<0.07	17.1	17.2	13.7
7/21/10	1162	7.20	OR2	TOLLWAY 621	<0.059	<0.131	3.54	<0.086	0.270	<0.00056	0.018	<0.047	<0.0073	7.57	221	650	7.2	0.041	0.16	0.18	234	<0.07	9.90	22.9	19.5
8/3/10	721	7.95	OR2	TOLLWAY 635	<0.059	<0.131	2.83	<0.086	0.176	<0.00056	<0.017	<0.047	<0.0073	7.45	160	488	6.8	0.056	<0.06	0.15	120	<0.07	18.3	22.5	19.0
8/16/10	768	6.84	OR2	TOLLWAY 649	<0.059	<0.131	3.69	<0.086	0.202	<0.00056	<0.017	<0.047	<0.0073	7.21	188	467	6.0	0.039	<0.06	0.17	123	<0.07	12.7	19.5	19.3
8/31/10	829	7.65	OR2	TOLLWAY 670	<0.059	<0.13	3.00	<0.086	0.224	<0.00056	<0.017	<0.047	<0.0073	7.59	214	465	<3.0	0.019	<0.06	0.18	130	<0.07	10.9	21.6	19.9
9/13/10	895	7.16	OR2	TOLLWAY 679	<0.059	<0.13	2.69	<0.086	0.224	<0.00056	<0.017	<0.047	<0.0073	7.61	222	541	<3.0	0.020	0.07	0.18	150	<0.07	9.16	18.5	19.2
9/27/10	1013	7.86	OR2	TOLLWAY 694	<0.059	<0.13	2.93	<0.086	0.236	<0.00056	<0.017	<0.047	<0.0073	7.56	232	585	2.4	0.037	0.15	0.20	186	<0.07	6.37	18.8	18.3
10/11/10	1122	7.27	OR2	TOLLWAY 705	<0.059	<0.13	2.59	<0.086	0.260	<0.00056	<0.017	<0.047	<0.0073	7.70	247	608	4.8	0.019	0.06	0.21	203	<0.07	5.85	19.8	18.9
10/26/10	1031	7.40	OR2	TOLLWAY 714	<0.059	<0.13	2.98	<0.086	0.194	0.00101	<0.017	<0.047	<0.0073	7.74	179	598	11.2	0.075	<0.03	0.18	207	<0.07	17.5	28.7	23.8
11/8/10	1505	7.57	OR2	TOLLWAY 720	<0.059	<0.13	2.39	<0.086	0.339	<0.00056	<0.017	<0.047	<0.0073	7.88	287	828	8.4	0.007	<0.03	0.18	314	<0.07	8.65	23.8	19.9
12/6/10	1759	6.98	OR2	TOLLWAY 726	<0.059	<0.13	3.44	<0.086	0.404	<0.00056	<0.017	<0.047	<0.0073	7.62	334	977	24.0	0.007	0.11	0.19	385	<0.07	11.1	21.8	19.6
12/20/10	2067	6.62	OR2	TOLLWAY 737	<0.059	<0.13	4.93	<0.086	0.439	<0.00056	<0.017	<0.047	<0.0073	7.35	414	1219	14.8	0.010	0.36	0.22	444	<0.07	13.0	23.0	19.1
1/3/11	1562	8.42	OR2	TOLLWAY 742	<0.059	<0.13	4.12	<0.086	0.330	<0.00056	<0.017	<0.047	<0.0073	7.14	313	958	16.8	0.056	0.51	0.19	295	0.18	41.5	21.9	19.3
1/19/11	*2017*	*6.72*	OR2	TOLLWAY 750	<0.059	<0.13	7.13	<0.086	0.481	<0.00056	<0.017	<0.047	<0.0073	7.15	470	1166	20.4	0.432	0.90	0.14	392	<0.07	35.9	25.1	24.1
2/14/11	*2728*	*6.64*	OR2	TOLLWAY 758	<0.059	<0.13	7.33	<0.086	0.536	<0.00056	<0.017	<0.047	<0.0073	6.93	455	1580	95.3	0.589	1.92	0.16	630	<0.07	25.4	29.1	27.7
3/1/11	1190	7.83	OR2	TOLLWAY 767	<0.059	<0.13	3.43	<0.086	0.210	0.00325	<0.017	<0.047	<0.0073	7.43	180	711	18.8	0.039	0.04	0.13	241	0.11	43.3	23.9	19.8
3/29/11	1038	8.15	OR2	TOLLWAY 806	<0.059	<0.13	3.12	<0.086	0.209	<0.00056	<0.017	<0.047	<0.0097	7.63	196	599	3.2	0.010	<0.03	0.14	194	<0.07	37.8	15.9	14.9
				MIN OR2	***0.00***	***0.00***	***1.35***	***0.00***	***0.10***	***0.00***	***0.02***	***0.00***	***0.00***	***6.93***	***129.81***	***299.00***	***2.40***	***0.01***	***0.04***	***0.09***	***76.38***	***0.11***	***5.85***	***8.83***	***8.44***
				MAX OR2	***0.000***	***0.000***	***7.331***	***0.000***	***0.536***	***0.003***	***0.018***	***0.000***	***0.000***	***7.878***	***469.684***	***1580.000***	***95.300***	***0.589***	***1.920***	***0.223***	***629.810***	***0.491***	***43.312***	***29.116***	***27.683***
				MEAN OR2	***NA***	***NA***	***3.519***	***NA***	***0.260***	***0.002***	***0.018***	***NA***	***NA***	***7.406***	***245.832***	***677.107***	***13.076***	***0.118***	***0.402***	***0.161***	***218.106***	***0.302***	***22.261***	***19.329***	***17.617***

Appendix Results of geochemical analysis of grab samples taken from November 30, 2009 through March 29, 2011 (continued)

date collected	field conductivity	field pH	sample location	Sample ID	Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	S
					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				MDL:	0.037	0.108	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.018	0.0025	0.0015	0.022	0.026	0.014	0.063	0.041	0.217
11/30/09	979	7.67	OR3	TOLLWAY 305	<0.037	<0.108	0.051	0.032	<0.00055	94.0	<0.012	<0.013	<0.0058	0.00101	0.146	7.10	<0.058	39.9	0.157	<0.022	71.2	0.015	<0.063	<0.041	35.5
12/14/09	1073	7.66	OR3	TOLLWAY 329	<0.037	<0.108	0.061	0.0371	<0.00055	91.4	<0.012	<0.013	<0.0058	0.00108	0.176	7.20	<0.058	43.6	0.303	<0.022	81.8	0.026	<0.063	<0.041	39.3
12/28/09	890	7.69	OR3	TOLLWAY 344	<0.037	<0.108	0.055	0.0351	<0.00055	71.5	<0.012	<0.013	<0.0058	0.00120	0.191	6.80	<0.058	33.9	0.243	<0.022	69.1	0.032	0.095	<0.041	29.6
1/12/10	1109	7.43	OR3	TOLLWAY 360	<0.037	<0.108	0.079	0.0374	<0.00055	87.0	<0.012	<0.013	<0.0058	<0.00079	0.178	5.43	<0.058	42.6	0.476	<0.022	87.1	0.023	<0.063	<0.041	39.9
1/26/10	863	7.89	OR3	TOLLWAY 376	<0.037	<0.108	0.060	0.0362	<0.00055	67.2	<0.012	<0.013	<0.0058	0.00081	0.249	6.92	<0.058	33.5	0.361	<0.022	73.5	0.023	0.093	<0.041	28.8
2/15/10	1260	7.68	OR3	TOLLWAY 397	<0.037	<0.108	0.064	0.0415	<0.00055	108	<0.012	<0.013	<0.0058	<0.00079	0.286	6.34	<0.058	50.1	0.535	<0.022	122	0.038	0.070	<0.041	47.5
3/1/10	1495	7.45	OR3	TOLLWAY 412	<0.037	<0.108	0.073	0.0474	<0.00055	113	<0.012	<0.013	<0.0058	<0.00079	0.180	6.82	<0.058	50.6	0.719	<0.022	165	0.016	0.070	<0.041	46.7
3/15/10	667	7.35	OR3	TOLLWAY 430	<0.037	<0.108	0.027	0.0272	<0.00055	54.9	<0.012	<0.013	<0.0058	0.00134	0.160	4.23	<0.058	25.2	0.182	<0.022	51.3	<0.014	<0.063	<0.041	21.8
3/29/10	1049	8.07	OR3	TOLLWAY 450	<0.037	<0.108	0.056	0.0212	<0.00055	87.5	<0.012	<0.013	<0.0058	<0.00079	0.0470	4.57	<0.058	40.4	0.105	<0.022	99.0	0.022	<0.063	<0.041	38.9
4/12/10	1198	8.15	OR3	TOLLWAY 467	<0.037	<0.108	0.055	0.0271	<0.00055	93.3	<0.012	<0.013	<0.0058	0.00109	0.114	4.65	<0.058	43.7	0.186	<0.022	108	<0.014	<0.063	<0.041	36.7
4/26/10	1368	7.89	OR3	TOLLWAY 489	<0.037	<0.108	0.048	0.0429	<0.00055	98.4	<0.012	<0.013	<0.0058	0.00102	0.0386	4.89	<0.058	44.6	0.218	<0.022	136	0.020	<0.063	<0.041	34.0
5/10/10	1401	7.89	OR3	TOLLWAY 504	<0.037	<0.108	0.063	0.0393	<0.00055	101	<0.012	<0.013	<0.0058	0.00121	0.0315	4.60	<0.058	46.3	0.144	<0.022	138	0.025	<0.063	<0.041	34.0
5/25/10	906	7.35	OR3	TOLLWAY 532	<0.037	<0.108	0.055	0.0437	<0.00055	68.2	<0.012	<0.013	<0.0058	<0.00079	0.209	5.15	<0.058	31.4	0.314	<0.022	79.9	0.023	0.093	<0.041	22.1
6/9/10	1034	7.64	OR3	TOLLWAY 562	<0.037	<0.108	0.064	0.0423	<0.00055	74.5	<0.012	<0.013	<0.0058	0.00089	0.189	5.07	<0.058	36.0	0.204	<0.022	92.9	<0.014	<0.063	<0.041	34.4
6/22/10	1160	7.13	OR3	TOLLWAY 572	0.037	<0.108	0.077	0.0409	<0.00055	83.1	<0.012	<0.013	<0.0058	<0.00079	0.111	5.29	<0.058	38.7	0.181	<0.022	107	0.031	0.089	<0.041	33.9
7/7/10	1244	7.26	OR3	TOLLWAY 603	<0.037	<0.108	0.081	0.0427	<0.00055	79.5	<0.012	<0.013	<0.0058	0.00104	0.0682	5.40	<0.058	40.2	0.328	<0.022	119	<0.014	0.084	<0.041	19.5
7/21/10	1395	7.31	OR3	TOLLWAY 622	<0.037	<0.108	0.068	0.0541	<0.00055	88.9	<0.012	<0.013	<0.0058	<0.00079	0.0683	6.05	<0.058	46.9	1.33	<0.022	135	0.030	0.077	<0.041	38.5
8/3/10	941	7.95	OR3	TOLLWAY 636	<0.037	<0.108	0.094	0.039	<0.00055	73.4	<0.012	<0.013	<0.0058	0.001	0.151	6.14	<0.058	31.3	0.290	<0.022	78.7	<0.014	<0.063	<0.041	29.5
8/16/10	889	7.61	OR3	TOLLWAY 651	<0.037	<0.108	0.074	0.034	<0.00055	66.9	<0.012	<0.013	<0.0058	<0.00079	0.103	7.03	<0.058	29.8	0.160	<0.022	73.9	0.017	0.120	<0.041	15.2
8/30/10	1001	7.94	OR3	TOLLWAY 669	<0.037	<0.11	0.077	0.0466	<0.00055	77.9	<0.012	<0.013	<0.0058	<0.00079	0.0279	6.36	<0.11	35.8	0.193	<0.022	84.7	0.021	<0.073	<0.041	15.5
9/13/10	1315	7.43	OR3	TOLLWAY 682	<0.037	<0.11	0.157	0.0621	<0.00055	104	<0.012	<0.013	<0.0058	0.00124	0.0265	7.72	<0.11	50.2	0.370	<0.022	117	0.037	<0.073	<0.041	62.2
9/28/10	1475	8.37	OR3	TOLLWAY 696	<0.037	<0.11	0.203	0.0703	<0.00055	118	<0.012	<0.013	<0.0058	<0.00079	0.0442	8.48	<0.11	61.4	0.457	<0.022	133	0.038	<0.073	<0.041	84.7
10/11/10	1463	6.97	OR3	TOLLWAY 703	<0.037	<0.11	0.168	0.0658	<0.00055	111	<0.012	<0.013	<0.0058	<0.00079	0.0257	6.88	<0.11	58.0	0.419	<0.022	126	0.042	0.124	<0.041	63.3
10/26/10	1433	7.06	OR3	TOLLWAY 712	<0.037	<0.11	0.131	0.0644	<0.00055	106	<0.012	<0.013	<0.0058	<0.00079	0.125	7.92	<0.11	53.6	0.576	<0.022	124	0.031	0.167	<0.041	57.0
11/8/10	1528	7.35	OR3	TOLLWAY 718	<0.037	<0.11	0.096	0.0620	<0.00055	113	<0.012	<0.013	<0.0058	0.00235	0.0399	5.70	<0.11	57.3	0.356	<0.022	124	0.043	0.111	<0.041	49.2
12/6/10	1639	6.61	OR3	TOLLWAY 725	<0.037	<0.11	0.093	0.0562	<0.00055	131	<0.012	<0.013	<0.0058	0.00127	0.0297	5.83	<0.11	66.6	0.269	<0.022	141	0.049	0.116	<0.041	68.5
12/20/10	2070	6.97	OR3	TOLLWAY 738	<0.037	<0.11	0.111	0.0664	<0.00055	158	<0.012	<0.013	<0.0058	0.00127	0.0537	6.20	<0.11	82.7	0.284	<0.022	169	0.040	0.144	<0.041	94.7
1/3/11	1652	8.97	OR3	TOLLWAY 741	<0.037	<0.11	0.092	0.0492	<0.00055	127	<0.012	<0.013	<0.0058	<0.00079	0.0571	6.15	<0.11	63.8	0.358	<0.022	149	<0.014	<0.073	<0.041	82.5
1/19/11	1758	7.19	OR3	TOLLWAY 751	<0.037	<0.11	0.087	0.0537	<0.00055	150	<0.012	<0.013	<0.0058	<0.00079	0.0281	6.30	<0.11	76.3	0.317	<0.022	163	<0.014	<0.073	<0.041	88.0
2/14/11	1722	7.03	OR3	TOLLWAY 757	<0.037	<0.11	0.087	0.0469	<0.00055	129	<0.012	<0.013	<0.0058	<0.00079	0.0670	5.78	<0.11	65.3	0.456	<0.022	163	<0.014	<0.073	<0.041	86.0
3/1/11	1316	7.65	OR3	TOLLWAY 771	<0.037	<0.11	0.056	0.0425	<0.00055	88.6	<0.012	<0.013	<0.0058	0.00146	0.184	7.81	<0.11	42.4	0.213	<0.022	129	<0.014	<0.073	<0.041	44.5
3/29/11	1220	8.36	OR3	TOLLWAY 804	<0.037	<0.11	0.053	0.0392	<0.00055	85.8	<0.012	<0.013	<0.0058	<0.00079	0.089	5.82	<0.11	41.3	0.115	<0.022	118	<0.043	0.127	<0.041	37.4
				MIN OR3	***0.04***	***0.00***	***0.03***	***0.02***	***0.00***	***54.90***	***0.00***	***0.00***	***0.00***	***0.00***	***0.03***	***4.23***	***0.00***	***25.19***	***0.10***	***0.00***	***51.26***	***0.02***	***0.07***	***0.00***	***15.23***
				MAX OR3	***0.037***	***0.000***	***0.203***	***0.070***	***0.000***	***158.080***	***0.000***	***0.000***	***0.000***	***0.002***	***0.286***	***8.482***	***0.000***	***82.686***	***1.332***	***0.000***	***169.248***	***0.049***	***0.167***	***0.000***	***94.687***
				MEAN OR3	***0.037***	***NA***	***0.082***	***0.045***	***NA***	***96.904***	***NA***	***NA***	***NA***	***0.001***	***0.109***	***6.145***	***NA***	***46.978***	***0.338***	***NA***	***113.422***	***0.029***	***0.105***	***NA***	***45.599***

date collected	field conductivity	field pH	sample location	Sample ID	Sb	Se	Si	Sn	Sr	Ti	Tl	V	Zn	pH	alkalinity	TDS, 180 C	TSS	oPO_4-P	NH_3-N	F	Cl	NO_3-N	SO_4	total NVOC	dissolved NVOC
					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L as $CaCO_3$	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				MDL:	0.059	0.131	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.01	0.06	0.08	0.09	0.07	0.31	0.31	0.31
11/30/09	979	7.67	OR3	TOLLWAY 305	<0.059	<0.131	3.39	<0.086	0.286	<0.00056	<0.017	<0.047	<0.0073	7.71	255	602	4.0	0.021	<0.06	0.15	122	0.07	97.9	13.2	9.49
12/14/09	1073	7.66	OR3	TOLLWAY 329	<0.059	<0.131	3.58	<0.086	0.322	<0.00056	<0.017	<0.047	<0.0073	7.95	264	675	4.4	0.026	<0.06	0.16	143	0.10	112	12.0	10.5
12/28/09	890	7.69	OR3	TOLLWAY 344	<0.059	<0.131	3.37	<0.086	0.237	0.00068	<0.017	<0.047	<0.0073	7.65	216	544	6.0	0.067	<0.06	0.15	118	0.49	87.0	10.1	9.44
1/12/10	1109	7.43	OR3	TOLLWAY 360	<0.059	<0.131	3.65	<0.086	0.290	<0.00056	<0.017	<0.047	<0.0073	7.70	271	686	<3.0	0.023	0.07	0.17	150	0.14	124	8.64	7.68
1/26/10	863	7.89	OR3	TOLLWAY 376	<0.059	<0.131	3.58	<0.086	0.227	0.00082	0.017	<0.047	<0.0073	7.53	220	536	7.6	0.078	0.11	0.15	112	0.43	84.4	9.77	8.96
2/15/10	1260	7.68	OR3	TOLLWAY 397	<0.059	<0.131	4.50	<0.086	0.325	<0.00056	<0.017	<0.047	<0.0073	7.54	286	782	106	0.040	0.19	0.16	189	0.11	119	10.7	9.87
3/1/10	1495	7.45	OR3	TOLLWAY 412	<0.059	<0.131	4.70	<0.086	0.344	<0.00056	<0.017	<0.047	<0.0073	7.73	286	896	6.4	0.031	0.25	0.15	261	0.11	120	11.5	10.5
3/15/10	667	7.35	OR3	TOLLWAY 430	<0.059	<0.131	2.85	<0.086	0.149	0.00145	<0.017	<0.047	<0.0073	7.60	160	395	5.6	0.028	<0.06	0.11	87.1	0.33	62.8	9.53	8.23
3/29/10	1049	8.07	OR3	TOLLWAY 450	<0.059	<0.131	2.11	<0.086	0.252	<0.00056	<0.017	<0.047	<0.0073	8.25	221	715	5.2	0.010	<0.06	0.14	165	<0.07	110	8.36	7.34
4/12/10	1198	8.15	OR3	TOLLWAY 467	<0.059	<0.131	1.87	<0.086	0.280	<0.00056	<0.017	<0.047	<0.0073	8.20	251	702	4.4	0.014	<0.06	0.15	190	<0.07	99.0	9.32	8.71
4/26/10	1368	7.89	OR3	TOLLWAY 489	<0.059	<0.131	1.54	<0.086	0.314	<0.00056	<0.017	<0.047	<0.0073	8.07	266	886	4.8	0.022	<0.06	0.14	242	<0.07	94.0	8.96	8.18
5/10/10	1401	7.89	OR3	TOLLWAY 504	<0.059	<0.131	1.38	<0.086	0.322	<0.00056	<0.017	<0.047	<0.0073	8.20	274	875	16.8	0.020	0.06	0.17	248	<0.07	97.3	11.9	10.7
5/25/10	906	7.35	OR3	TOLLWAY 532	<0.059	<0.131	1.25	<0.086	0.232	0.00069	<0.017	<0.047	<0.0073	7.83	204	575	20.4	0.057	0.09	0.17	133	<0.07	62.7	11.8	10.2
6/9/10	1034	7.64	OR3	TOLLWAY 562	<0.059	<0.131	2.85	<0.086	0.301	<0.00056	<0.017	<0.047	<0.0073	7.85	216	630	13.2	0.044	0.13	0.10	148	<0.07	103	15.6	13.2
6/22/10	1160	7.13	OR3	TOLLWAY 572	<0.059	<0.131	2.81	<0.086	0.314	<0.00056	<0.017	<0.047	<0.0073	7.75	228	713	5.6	0.052	0.07	0.17	188	<0.07	94.7	11.0	14.5
7/7/10	1244	7.26	OR3	TOLLWAY 603	<0.059	<0.131	2.88	<0.086	0.314	<0.00056	<0.017	<0.047	<0.0073	7.91	246	804	<3.0	0.108	0.11	0.20	221	0.09	54.9	14.2	11.9
7/21/10	1395	7.31	OR3	TOLLWAY 622	<0.059	<0.131	3.54	<0.086	0.417	<0.00056	<0.017	<0.047	<0.0073	7.89	256	899	5.6	0.112	0.11	0.22	236	0.10	104	17.0	15.4
8/3/10	941	7.95	OR3	TOLLWAY 636	<0.059	<0.131	3.91	<0.086	0.275	<0.00056	<0.017	<0.047	<0.0073	7.85	205	603	8.0	0.051	<0.06	0.17	128	0.08	84.4	16.7	15.8
8/16/10	889	7.61	OR3	TOLLWAY 651	<0.059	<0.131	4.09	<0.086	0.237	<0.00056	<0.017	<0.047	<0.0073	7.98	213	577	4.4	0.069	<0.06	0.19	131	<0.07	44.1	16.5	17.2
8/30/10	1001	7.94	OR3	TOLLWAY 669	<0.059	<0.13	4.19	<0.086	0.273	<0.00056	<0.017	<0.047	<0.0073	8.02	242	637	<3.0	0.042	0.10	0.20	152	<0.07	42.8	16.3	15.9
9/13/10	1315	7.43	OR3	TOLLWAY 682	<0.059	<0.13	4.45	<0.086	0.525	<0.00056	<0.017	<0.047	<0.0073	7.87	253	820	4.0	0.026	0.23	0.19	179	0.14	171	15.7	14.7
9/28/10	1475	8.37	OR3	TOLLWAY 696	<0.059	<0.13	4.09	<0.086	0.595	<0.00056	<0.017	<0.047	<0.0073	7.81	275	919	11.2	0.032	0.76	0.23	192	0.29	236	12.8	11.6
10/11/10	1463	6.97	OR3	TOLLWAY 703	<0.059	<0.13	3.52	<0.086	0.508	<0.00056	<0.017	<0.047	<0.0073	7.87	287	961	7.6	0.032	0.17	0.22	207	0.22	169	13.7	13.6
10/26/10	1433	7.06	OR3	TOLLWAY 712	<0.059	<0.13	2.75	<0.086	0.480	<0.00056	<0.017	<0.047	<0.0073	7.88	285	944	12.4	0.037	0.13	0.19	211	<0.07	156	18.9	15.3
11/8/10	1528	7.35	OR3	TOLLWAY 718	<0.059	<0.13	2.76	<0.086	0.446	<0.00056	0.019	<0.047	<0.0073	7.90	324	997	6.4	0.017	0.25	0.18	233	<0.07	132	14.8	13.9
12/6/10	1639	6.61	OR3	TOLLWAY 725	<0.059	<0.13	2.78	<0.086	0.492	<0.00056	<0.017	<0.047	<0.0073	7.79	341	1145	<3.0	0.011	0.29	0.22	267	0.14	182	12.7	12.3
12/20/10	2070	6.97	OR3	TOLLWAY 738	<0.059	<0.13	3.07	<0.086	0.568	<0.00056	<0.017	<0.047	<0.0073	7.63	390	1394	4.0	0.009	0.33	0.19	319	0.18	277	9.75	9.91
1/3/11	1652	8.97	OR3	TOLLWAY 741	<0.059	<0.13	3.43	<0.086	0.468	<0.00056	<0.017	<0.047	<0.0073	7.68	273	1022	<3.0	0.008	0.17	0.15	252	0.51	221	7.51	7.09
1/19/11	1758	7.19	OR3	TOLLWAY 751	<0.059	<0.13	3.51	<0.086	0.573	<0.00056	<0.017	<0.047	<0.0073	7.86	323	1167	<3.0	<0.003	0.17	0.16	310	0.24	244	8.18	7.63
2/14/11	1722	7.03	OR3	TOLLWAY 757	<0.059	<0.13	3.40	<0.086	0.503	<0.00056	<0.017	<0.047	<0.0073	7.55	270	1081	<3.0	0.011	0.23	0.15	278	0.44	234	8.11	8.93
3/1/11	1316	7.65	OR3	TOLLWAY 771	<0.059	<0.13	3.24	<0.086	0.300	<0.00056	<0.017	<0.047	<0.0073	7.72	210	826	7.2	0.017	<0.03	0.12	230	0.32	122	17.8	15.5
3/29/11	1220	8.36	OR3	TOLLWAY 804	<0.059	<0.13	2.25	<0.086	0.278	<0.00056	<0.017	<0.047	<0.0097	7.92	218	757	5.2	0.008	<0.03	0.13	205	0.09	108	10.2	10.6
				MIN OR3	***0.00***	***0.00***	***1.25***	***0.00***	***0.15***	***0.00***	***0.02***	***0.00***	***0.00***	***7.53***	***160.06***	***395.00***	***4.00***	***0.01***	***0.06***	***0.10***	***87.09***	***0.07***	***42.82***	***7.51***	***7.09***
				MAX OR3	***0.000***	***0.000***	***4.696***	***0.000***	***0.595***	***0.001***	***0.019***	***0.000***	***0.000***	***8.251***	***389.700***	***1394.000***	***106.000***	***0.112***	***0.765***	***0.225***	***319.016***	***0.511***	***276.885***	***18.889***	***17.182***
				MEAN OR3	***NA***	***NA***	***3.165***	***NA***	***0.358***	***0.001***	***0.018***	***NA***	***NA***	***7.833***	***257.054***	***805.156***	***11.456***	***0.036***	***0.192***	***0.167***	***195.225***	***0.220***	***126.573***	***12.297***	***11.395***

Appendix Results of geochemical analysis of grab samples taken from January 19, 2011 through March 29, 2011 (continued)

date collected	field conductivity	field pH	sample location	Sample ID	Al mg/L	As mg/L	B mg/L	Ba mg/L	Be mg/L	Ca mg/L	Cd mg/L	Co mg/L	Cr mg/L	Cu mg/L	Fe mg/L	K mg/L	Li mg/L	Mg mg/L	Mn mg/L	Mo mg/L	Na mg/L	Ni mg/L	P mg/L	Pb mg/L	S mg/L
				MDL:	0.037	0.11	0.023	0.00085	0.00055	0.029	0.012	0.013	0.0058	0.00079	0.024	0.016	0.11	0.027	0.0015	0.022	0.026	0.043	0.073	0.041	0.22
1/19/11	1715	7.5	OR4u	TOLLWAY 752	<0.037	<0.11	0.074	0.0524	<0.00055	145	<0.012	<0.013	<0.0058	<0.00079	<0.0059	5.93	<0.11	74.8	0.123	<0.022	155	<0.014	<0.073	<0.041	86.5
2/15/11	1598	7.0	OR4u	TOLLWAY 761	<0.037	<0.11	0.075	0.0517	<0.00055	123	<0.012	<0.013	<0.0058	<0.00079	0.0121	5.84	<0.11	64.0	0.215	<0.022	180	<0.014	<0.073	<0.041	73.8
3/1/11	1294	7.7	OR4u	TOLLWAY 772	<0.037	<0.11	0.054	0.0408	<0.00055	90.1	<0.012	<0.013	<0.0058	0.00168	0.106	6.68	<0.11	44.7	0.166	<0.022	126	<0.014	<0.073	<0.041	47.0
3/29/11	1224	8.4	OR4u	TOLLWAY 809	<0.037	<0.11	0.062	0.0384	<0.00055	92.9	<0.012	<0.013	<0.0058	<0.00079	0.048	5.08	<0.11	46.3	0.111	<0.022	112	<0.043	0.155	<0.041	45.1
				MIN OR4u	***0.00***	***0.00***	***0.05***	***0.04***	***0.00***	***90.10***	***0.00***	***0.00***	***0.00***	***0.00***	***0.01***	***5.08***	***0.00***	***44.67***	***0.11***	***0.00***	***111.58***	***0.00***	***0.15***	***0.00***	***45.09***
				MAX OR4u	***0.000***	***0.000***	***0.075***	***0.052***	***0.000***	***144.891***	***0.000***	***0.000***	***0.000***	***0.002***	***0.106***	***6.683***	***0.000***	***74.808***	***0.215***	***0.000***	***180.253***	***0.000***	***0.155***	***0.000***	***86.518***
				MEAN OR4u	***NA***	***NA***	***0.066***	***0.046***	***NA***	***112.653***	***NA***	***NA***	***NA***	***0.002***	***0.055***	***5.884***	***NA***	***57.456***	***0.153***	***NA***	***143.109***	***NA***	***0.155***	***NA***	***63.099***

date collected	field conductivity	field pH	sample location	Sample ID	Sb mg/L	Se mg/L	Si mg/L	Sn mg/L	Sr mg/L	Ti mg/L	Tl mg/L	V mg/L	Zn mg/L	pH	alkalinity mg/L as $CaCO_3$	TDS, 180 C mg/L	TSS mg/L	oPO_4-P mg/L	NH_3-N mg/L	F mg/L	Cl mg/L	NO_3-N mg/L	SO_4 mg/L	total NVOC mg/L	dissolved NVOC mg/L
				MDL:	0.059	0.13	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0097		4	12	3.0	0.003	0.03	0.08	0.09	0.07	0.31	0.31	0.31
1/19/11	1715	7.5	OR4u	TOLLWAY 752	<0.059	<0.13	3.79	<0.086	0.506	<0.00056	<0.017	<0.047	<0.0073	8.02	318	1155	<3.0	0.003	0.15	0.13	285	0.23	237	6.83	6.56
2/15/11	1598	7.0	OR4u	TOLLWAY 761	<0.059	<0.13	3.70	<0.086	0.476	<0.00056	<0.017	<0.047	0.0077	7.55	264	1112	<3.0	0.016	0.18	0.13	329	0.51	205	7.88	7.70
3/1/11	1294	7.7	OR4u	TOLLWAY 772	<0.059	<0.13	3.37	<0.086	0.302	<0.00056	<0.017	<0.047	<0.0073	7.90	213	831	7.6	0.019	<0.03	0.15	224	0.29	129	13.0	12.1
3/29/11	1224	8.4	OR4u	TOLLWAY 809	<0.059	<0.13	2.06	<0.086	0.294	<0.00056	<0.017	<0.047	<0.0097	8.20	226	708	4.4	0.007	<0.03	0.15	193	<0.07	126	9.22	8.77
				MIN OR4u	***0.00***	***0.00***	***2.06***	***0.00***	***0.29***	***0.00***	***0.00***	***0.00***	***0.01***	***7.55***	***212.82***	***708.00***	***4.40***	***0.00***	***0.15***	***0.13***	***193.25***	***0.23***	***126.21***	***6.83***	***6.56***
				MAX OR4u	***0.000***	***0.000***	***3.785***	***0.000***	***0.506***	***0.000***	***0.000***	***0.000***	***0.008***	***8.195***	***317.698***	***1155.000***	***7.600***	***0.019***	***0.184***	***0.150***	***329.209***	***0.513***	***237.283***	***13.049***	***12.114***
				MEAN OR4u	***NA***	***NA***	***3.230***	***NA***	***0.394***	***NA***	***NA***	***NA***	***0.008***	***7.917***	***255.125***	***951.500***	***6.000***	***0.011***	***0.169***	***0.140***	***257.861***	***0.345***	***174.298***	***9.246***	***8.786***

Appendix Results of geochemical analysis of grab samples taken from November 30, 2009 through March 29, 2011 (continued)

date collected	field conductivity	field pH	sample location	Sample ID	Al mg/L	As mg/L	B mg/L	Ba mg/L	Be mg/L	Ca mg/L	Cd mg/L	Co mg/L	Cr mg/L	Cu mg/L	Fe mg/L	K mg/L	Li mg/L	Mg mg/L	Mn mg/L	Mo mg/L	Na mg/L	Ni mg/L	P mg/L	Pb mg/L	S mg/L
				MDL:	0.037	0.108	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.018	0.0025	0.0015	0.022	0.026	0.014	0.063	0.041	0.217
11/30/09	1027.00	7.76	OR4d	TOLLWAY 304	<0.037	<0.108	0.057	0.033	<0.00055	97.4	<0.012	<0.013	<0.0058	<0.00079	0.102	6.36	<0.058	43.2	0.137	<0.022	75.0	0.018	<0.063	<0.041	39.4
12/14/09	1132.00	7.88	OR4d	TOLLWAY 330	<0.037	<0.108	0.062	0.0365	<0.00055	95.8	<0.012	<0.013	<0.0058	0.00091	0.141	6.19	<0.058	48.3	0.237	<0.022	87.4	0.031	<0.063	<0.041	43.2
12/28/09	968.00	8.13	OR4d	TOLLWAY 343	0.040	<0.108	0.058	0.0354	<0.00055	74.6	<0.012	<0.013	<0.0058	0.00109	0.150	6.40	<0.058	36.9	0.170	<0.022	77.6	0.028	0.076	<0.041	34.0
1/12/10	1124.00	7.68	OR4d	TOLLWAY 361	<0.037	<0.108	0.066	0.0360	<0.00055	87.9	<0.012	<0.013	<0.0058	0.00081	0.133	5.13	<0.058	44.0	0.261	<0.022	86.4	0.025	<0.063	<0.041	41.0
1/26/10	950.00	8.08	OR4d	TOLLWAY 377	<0.037	<0.108	0.058	0.0359	<0.00055	71.8	<0.012	<0.013	<0.0058	0.00113	0.158	6.21	<0.058	35.0	0.199	<0.022	81.4	0.019	0.096	<0.041	32.9
2/15/10	1260.00	8.05	OR4d	TOLLWAY 398	<0.037	<0.108	0.061	0.0400	<0.00055	111	<0.012	<0.013	<0.0058	<0.00079	0.146	5.27	<0.058	52.9	0.290	<0.022	117	0.029	<0.063	<0.041	50.8
3/1/10	1435.00	7.72	OR4d	TOLLWAY 413	<0.037	<0.108	0.065	0.0419	<0.00055	112	<0.012	<0.013	<0.0058	<0.00079	0.0834	5.37	<0.058	53.5	0.386	<0.022	148	0.017	<0.063	<0.041	49.6
3/15/10	765.00	7.56	OR4d	TOLLWAY 432	<0.037	<0.108	0.049	0.0288	<0.00055	62.6	<0.012	<0.013	<0.0058	0.00094	0.0944	4.15	<0.058	30.2	0.0989	<0.022	63.2	<0.014	<0.063	<0.041	28.0
3/29/10	1077.00	7.95	OR4d	TOLLWAY 448	<0.037	<0.108	0.063	0.0300	<0.00055	92.2	<0.012	<0.013	<0.0058	<0.00079	0.0233	4.21	<0.058	42.9	0.108	<0.022	102	0.018	<0.063	<0.041	45.2
4/12/10	1181.00	8.21	OR4d	TOLLWAY 468	<0.037	<0.108	0.060	0.0314	<0.00055	90.4	<0.012	<0.013	<0.0058	0.00094	0.0210	3.95	<0.058	43.9	0.147	<0.022	99.1	0.023	<0.063	<0.041	38.8
4/26/10	1308.00	8.14	OR4d	TOLLWAY 490	<0.037	<0.108	0.054	0.0348	<0.00055	95.3	<0.012	<0.013	<0.0058	0.00113	0.0238	4.54	<0.058	45.7	0.178	<0.022	117	0.025	0.068	<0.041	37.2
5/10/10	1313.00	8.05	OR4d	TOLLWAY 505	<0.037	<0.108	0.069	0.0338	<0.00055	100	<0.012	<0.013	<0.0058	0.00113	0.0223	4.22	<0.058	48.1	0.147	<0.022	120	0.028	<0.063	<0.041	36.6
5/25/10	914.00	7.65	OR4d	TOLLWAY 533	0.055	<0.108	0.058	0.0393	<0.00055	67.2	<0.012	<0.013	<0.0058	<0.00079	0.123	4.77	<0.058	32.0	0.160	<0.022	74.7	0.019	0.084	<0.041	22.4
6/9/10	1039.00	7.81	OR4d	TOLLWAY 563	<0.037	<0.108	0.065	0.0418	<0.00055	78.0	<0.012	<0.013	<0.0058	<0.00079	0.127	4.77	<0.058	38.6	0.193	<0.022	92.3	0.025	<0.063	<0.041	33.5
6/22/10	1133.00	7.54	OR4d	TOLLWAY 573	<0.037	<0.108	0.078	0.0398	<0.00055	84.4	<0.012	<0.013	<0.0058	<0.00079	0.0531	5.05	<0.058	39.5	0.122	<0.022	98.9	0.027	0.079	<0.041	33.8
7/7/10	1058.00	7.68	OR4d	TOLLWAY 604	<0.037	<0.108	0.080	0.0394	<0.00055	75.2	<0.012	<0.013	<0.0058	0.00148	0.0417	5.41	<0.058	36.4	0.325	<0.022	96.8	<0.014	0.089	<0.041	16.8
7/21/10	1187.00	7.70	OR4d	TOLLWAY 623	<0.037	<0.108	0.073	0.0454	<0.00055	80.0	<0.012	<0.013	<0.0058	0.00122	0.0132	5.66	<0.058	45.5	0.354	<0.022	102	0.033	<0.063	<0.041	21.4
8/3/10	947.00	8.07	OR4d	TOLLWAY 637	<0.037	<0.108	0.098	0.039	<0.00055	76.5	<0.012	<0.013	<0.0058	<0.00079	0.091	5.77	<0.058	34.2	0.191	<0.022	76.9	0.020	0.065	<0.041	30.4
8/17/10	895.00	8.04	OR4d	TOLLWAY 652	<0.037	<0.108	0.074	0.033	<0.00055	71.0	<0.012	<0.013	<0.0058	0.001	0.062	6.78	<0.058	32.0	0.121	<0.022	73.1	<0.014	0.096	<0.041	16.6
8/31/10	950.00	8.09	OR4d	TOLLWAY 672	0.059	<0.11	0.072	0.0452	<0.00055	75.6	<0.012	<0.013	<0.0058	0.00100	0.0672	6.03	<0.11	35.8	0.189	<0.022	74.7	0.020	<0.073	<0.041	14.4
9/13/10	1209.00	7.83	OR4d	TOLLWAY 683	<0.037	<0.11	0.095	0.0466	<0.00055	95.8	<0.012	<0.013	<0.0058	0.00087	0.0171	6.79	<0.11	50.2	0.316	<0.022	96.5	0.040	<0.073	<0.041	35.8
9/28/10	1670.00	7.45	OR4d	TOLLWAY 697	<0.037	<0.11	0.139	0.0609	<0.00055	122	<0.012	<0.013	<0.0058	0.00087	0.0277	7.03	<0.11	68.0	0.767	<0.022	151	0.027	<0.073	<0.041	64.1
10/11/10	1772.00	7.51	OR4d	TOLLWAY 706	<0.037	<0.11	0.128	0.0674	<0.00055	124	<0.012	<0.013	<0.0058	<0.00079	0.0173	7.60	<0.11	67.8	1.26	<0.022	167	0.043	0.158	<0.041	64.1
10/26/10	1390.00	7.55	OR4d	TOLLWAY 716	<0.037	<0.11	0.114	0.0512	<0.00055	96.9	<0.012	<0.013	<0.0058	0.00106	0.225	8.60	<0.11	57.7	0.608	<0.022	119	0.030	0.225	<0.041	51.3
11/8/10	1566.00	7.76	OR4d	TOLLWAY 721	<0.037	<0.11	0.105	0.0518	<0.00055	115	<0.012	<0.013	<0.0058	0.00127	0.109	5.86	<0.11	64.1	0.260	<0.022	126	0.051	0.119	<0.041	58.3
12/6/10	1737.00	7.21	OR4d	TOLLWAY 728	<0.037	<0.11	0.088	0.0562	<0.00055	136	<0.012	<0.013	<0.0058	0.00107	0.0446	5.54	<0.11	73.3	0.309	<0.022	141	0.050	0.141	<0.041	73.8
12/20/10	2148.00	6.92	OR4d	TOLLWAY 739	<0.037	<0.11	0.082	0.0680	<0.00055	158	<0.012	<0.013	<0.0058	0.00082	0.609	5.11	<0.11	86.8	1.91	<0.022	182	0.039	0.228	<0.041	80.9
1/3/11	1511.00	8.39	OR4d	TOLLWAY 744	<0.037	<0.11	0.131	0.0518	<0.00055	121	<0.012	<0.013	<0.0058	<0.00079	0.0446	7.21	<0.11	57.5	0.166	<0.022	129	<0.014	<0.073	<0.041	80.0
1/19/11	1712.00	7.55	OR4d	TOLLWAY 753	<0.037	<0.11	0.080	0.0519	<0.00055	142	<0.012	<0.013	<0.0058	<0.00079	<0.0059	5.84	<0.11	73.4	0.143	<0.022	155	<0.014	<0.073	<0.041	85.5
2/15/11	568.00	7.47	OR4d	TOLLWAY 762	<0.037	<0.11	0.077	0.0538	<0.00055	124	<0.012	<0.013	<0.0058	0.00084	0.0257	5.87	<0.11	64.7	0.243	<0.022	186	<0.014	<0.073	<0.041	74.6
3/1/11	1307.00	7.68	OR4d	TOLLWAY 773	<0.037	<0.11	0.057	0.0425	<0.00055	90.9	<0.012	<0.013	0.0087	0.00194	0.161	6.85	<0.11	44.8	0.178	<0.022	131	<0.014	<0.073	<0.041	47.5
3/29/11	1219.00	8.32	OR4d	TOLLWAY 808	<0.037	<0.11	0.053	0.0379	<0.00055	89.8	<0.012	<0.013	<0.0058	0.00101	0.054	5.16	<0.11	45.6	0.112	<0.022	112	<0.043	0.111	<0.041	43.8
				MIN OR4d	***0.04***	***0.00***	***0.05***	***0.03***	***0.00***	***62.64***	***0.00***	***0.00***	***0.01***	***0.00***	***0.01***	***3.95***	***0.00***	***30.20***	***0.10***	***0.00***	***63.18***	***0.02***	***0.06***	***0.00***	***14.42***
				MAX OR4d	***0.059***	***0.000***	***0.139***	***0.068***	***0.000***	***157.521***	***0.000***	***0.000***	***0.009***	***0.002***	***0.609***	***8.596***	***0.000***	***86.796***	***1.915***	***0.000***	***185.646***	***0.051***	***0.228***	***0.000***	***85.536***
				MEAN OR4d	***0.051***	***NA***	***0.077***	***0.043***	***NA***	***97.349***	***NA***	***NA***	***0.009***	***0.001***	***0.097***	***5.740***	***NA***	***49.134***	***0.322***	***NA***	***111.247***	***0.029***	***0.117***	***NA***	***44.555***

date collected	field conductivity	field pH	sample location	Sample ID	Sb mg/L	Se mg/L	Si mg/L	Sn mg/L	Sr mg/L	Ti mg/L	Tl mg/L	V mg/L	Zn mg/L	pH	alkalinity mg/L as CaCO	TDS, 180 C mg/L	TSS mg/L	oPO_4-P mg/L	NH_3-N mg/L	F mg/L	Cl mg/L	NO_3-N mg/L	SO_4 mg/L	total NVOC mg/L	dissolved NVOC mg/L
				MDL:	0.059	0.131	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.01	0.06	0.08	0.09	0.07	0.31	0.31	0.31
11/30/09	1027.00	7.76	OR4d	TOLLWAY 304	<0.059	<0.131	3.76	<0.086	0.301	<0.00056	<0.017	<0.047	<0.0073	7.89	272	636	4.0	0.017	<0.06	0.15	126	0.08	107	11.5	8.41
12/14/09	1132.00	7.88	OR4d	TOLLWAY 330	<0.059	<0.131	3.87	<0.086	0.336	<0.00056	<0.017	<0.047	<0.0073	8.06	281	712	3.2	0.019	<0.06	0.16	152	0.10	122	10.4	8.90
12/28/09	968.00	8.13	OR4d	TOLLWAY 343	<0.059	<0.131	3.69	<0.086	0.260	0.00062	<0.017	<0.047	<0.0073	7.85	230	594	5.2	0.050	<0.06	0.14	134	0.45	99.9	9.61	8.62
1/12/10	1124.00	7.68	OR4d	TOLLWAY 361	<0.059	<0.131	3.87	<0.086	0.288	<0.00056	<0.017	<0.047	<0.0073	7.92	282	694	<3.0	0.019	0.07	0.16	148	0.13	127	7.28	6.64
1/26/10	950.00	8.08	OR4d	TOLLWAY 377	<0.059	<0.131	3.77	<0.086	0.245	<0.00056	<0.017	<0.047	<0.0073	7.74	232	585	7.2	0.062	0.09	0.13	127	0.41	95.6	8.38	8.53
2/15/10	1260.00	8.05	OR4d	TOLLWAY 398	<0.059	<0.131	5.00	<0.086	0.331	<0.00056	<0.017	<0.047	<0.0073	7.85	299	792	<3.0	0.026	0.16	0.16	181	0.13	129	9.05	8.41
3/1/10	1435.00	7.72	OR4d	TOLLWAY 413	<0.059	<0.131	4.47	<0.086	0.338	<0.00056	<0.017	<0.047	<0.0073	7.97	293	879	3.2	0.020	0.15	0.15	245	0.09	132	9.43	8.73
3/15/10	765.00	7.56	OR4d	TOLLWAY 432	<0.059	<0.131	3.23	<0.086	0.178	0.00064	<0.017	<0.047	<0.0073	7.85	180	458	6.4	0.025	<0.06	0.13	99.8	0.31	78.9	8.54	7.51
3/29/10	1077.00	7.95	OR4d	TOLLWAY 448	<0.059	<0.131	2.37	<0.086	0.276	<0.00056	0.030	<0.047	<0.0073	8.21	236	714	3.2	0.012	<0.06	0.14	161	<0.07	121	7.34	6.42
4/12/10	1181.00	8.21	OR4d	TOLLWAY 468	<0.059	<0.131	1.97	<0.086	0.279	<0.00056	<0.017	<0.047	<0.0073	8.23	265	702	8.0	0.014	<0.06	0.15	171	<0.07	109	8.60	7.53
4/26/10	1308.00	8.14	OR4d	TOLLWAY 490	<0.059	<0.131	2.09	<0.086	0.310	<0.00056	<0.017	<0.047	<0.0073	8.25	277	792	4.8	0.024	<0.06	0.16	208	<0.07	105	8.13	7.64
5/10/10	1313.00	8.05	OR4d	TOLLWAY 505	<0.059	<0.131	2.22	<0.086	0.324	<0.00056	<0.017	<0.047	<0.0073	8.26	289	858	17.6	0.020	<0.06	0.20	209	<0.07	108	10.8	9.67
5/25/10	914.00	7.65	OR4d	TOLLWAY 533	<0.059	<0.131	2.00	<0.086	0.232	0.00115	<0.017	<0.047	<0.0073	8.02	221	533	33.2	0.049	0.13	0.17	125	<0.07	66.9	11.3	9.80
6/9/10	1039.00	7.81	OR4d	TOLLWAY 563	<0.059	<0.131	3.66	<0.086	0.297	<0.00056	<0.017	<0.047	<0.0073	8.05	239	614	38.4	0.038	0.09	0.09	142	0.08	96.6	15.8	12.0
6/22/10	1133.00	7.54	OR4d	TOLLWAY 573	<0.059	<0.131	3.30	<0.086	0.309	<0.00056	<0.017	<0.047	<0.0073	8.05	245	706	17.2	0.052	<0.06	0.18	168	0.10	94.3	10.6	13.5
7/7/10	1058.00	7.68	OR4d	TOLLWAY 604	<0.059	<0.131	3.70	<0.086	0.278	0.00058	<0.017	<0.047	0.0104	8.27	266	631	45.2	0.084	<0.06	0.22	157	0.14	47.4	15.5	11.3
7/21/10	1187.00	7.70	OR4d	TOLLWAY 623	<0.059	<0.131	3.83	<0.086	0.317	<0.00056	<0.017	<0.047	<0.0073	8.16	292	760	20.8	0.082	0.08	0.23	182	0.22	60.7	16.2	14.7
8/3/10	947.00	8.07	OR4d	TOLLWAY 637	<0.059	<0.131	4.37	<0.086	0.279	<0.00056	<0.017	<0.047	<0.0073	8.08	224	602	8.8	0.046	<0.06	0.19	120	0.08	85.9	15.0	14.5
8/17/10	895.00	8.04	OR4d	TOLLWAY 652	<0.059	<0.131	4.20	<0.086	0.249	<0.00056	<0.017	<0.047	<0.0073	8.12	234	523	6.4	0.062	<0.06	0.20	123	0.07	48.6	14.4	15.0
8/31/10	950.00	8.09	OR4d	TOLLWAY 672	<0.059	<0.13	4.45	<0.086	0.258	0.00118	<0.017	<0.047	<0.0073	8.16	263	543	7.2	0.059	0.07	0.21	126	0.15	40.7	15.3	15.0
9/13/10	1209.00	7.83	OR4d	TOLLWAY 683	<0.059	<0.13	4.55	<0.086	0.341	<0.00056	<0.017	<0.047	<0.0073	8.00	296	773	3.2	0.046	<0.06	0.19	164	<0.07	103	12.6	12.5
9/28/10	1670.00	7.45	OR4d	TOLLWAY 697	<0.059	<0.13	4.41	<0.086	0.488	<0.00056	<0.017	<0.047	<0.0073	7.87	352	1001	3.2	0.026	<0.06	0.21	245	<0.07	183	11.9	11.0
10/11/10	1772.00	7.51	OR4d	TOLLWAY 706	<0.059	<0.13	3.22	<0.086	0.502	<0.00056	<0.017	<0.047	<0.0073	7.98	342	1027	6.8	0.026	0.10	0.22	277	<0.07	170	12.7	11.8
10/26/10	1390.00	7.55	OR4d	TOLLWAY 716	<0.059	<0.13	4.03	<0.086	0.429	<0.00056	<0.017	<0.047	<0.0073	7.77	288	827	12.8	0.073	<0.03	0.20	205	<0.07	142	20.3	19.1
11/8/10	1566.00	7.76	OR4d	TOLLWAY 721	<0.059	<0.13	3.57	<0.086	0.469	<0.00056	<0.017	<0.047	<0.0073	8.10	342	1019	<3.0	0.023	<0.03	0.18	227	<0.07	156	11.8	11.4
12/6/10	1737.00	7.21	OR4d	TOLLWAY 728	<0.059	<0.13	3.10	<0.086	0.500	<0.00056	<0.017	<0.047	<0.0073	7.80	356	1076	3.6	0.009	0.05	0.16	270	<0.07	196	11.3	10.9
12/20/10	2148.00	6.92	OR4d	TOLLWAY 739	<0.059	<0.13	4.58	<0.086	0.537	<0.00056	<0.017	<0.047	<0.0073	7.44	445	1435	3.2	0.009	0.05	0.15	343	<0.07	234	7.34	7.06
1/3/11	1511.00	8.39	OR4d	TOLLWAY 744	<0.059	<0.13	3.81	<0.086	0.789	<0.00056	<0.017	<0.047	<0.0073	7.79	276	926	<3.0	0.013	0.09	0.21	208	0.41	219	5.83	5.55
1/19/11	1712.00	7.55	OR4d	TOLLWAY 753	<0.059	<0.13	3.76	<0.086	0.502	<0.00056	<0.017	<0.047	<0.0073	8.02	317	1112	<3.0	<0.003	0.15	0.13	288	0.22	238	6.85	6.54
2/15/11	568.00	7.47	OR4d	TOLLWAY 762	<0.059	<0.13	3.74	<0.086	0.500	<0.00056	<0.017	<0.047	<0.0073	7.56	264	1144	10.8	0.017	0.21	0.11	334	0.50	204	9.51	7.38
3/1/11	1307.00	7.68	OR4d	TOLLWAY 773	<0.059	<0.13	3.43	<0.086	0.311	<0.00056	<0.017	<0.047	<0.0073	7.92	213	847	8.0	0.019	<0.03	0.14	228	0.29	129	13.2	12.0
3/29/11	1219.00	8.32	OR4d	TOLLWAY 808	<0.059	<0.13	2.03	<0.086	0.291	<0.00056	<0.017	<0.047	<0.0097	8.15	225	713	5.2	0.007	<0.03	0.14	194	<0.07	126	9.36	8.78
				MIN OR4d	***0.00***	***0.00***	***1.97***	***0.00***	***0.18***	***0.00***	***0.03***	***0.00***	***0.01***	***7.44***	***179.93***	***458.00***	***3.20***	***0.01***	***0.05***	***0.09***	***99.81***	***0.07***	***40.74***	***5.83***	***5.55***
				MAX OR4d	***0.000***	***0.000***	***5.004***	***0.000***	***0.789***	***0.001***	***0.030***	***0.000***	***0.010***	***8.272***	***445.079***	***1435.000***	***45.200***	***0.084***	***0.213***	***0.229***	***343.166***	***0.502***	***237.594***	***20.264***	***19.107***
				MEAN OR4d	***NA***	***NA***	***3.564***	***#DIV/0!***	***0.355***	***0.001***	***0.030***	***NA***	***0.010***	***7.981***	***276.109***	***788.375***	***10.993***	***0.034***	***0.108***	***0.168***	***190.207***	***0.209***	***124.210***	***11.123***	***10.217***

Appendix

Results of geochemical analysis of duplicate grab samples taken from December 14, 2009 through March 29, 2011

			Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb
		Sample ID	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
		MDL:	0.037	0.108	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.058	0.027	0.0015	0.022	0.026	0.014	0.063	0.041	0.217	0.059
12/14/09	OR-1	TOLLWAY 326	<0.037	<0.108	0.035	0.0459	<0.00055	76.6	<0.012	<0.013	<0.0058	0.00094	0.402	9.76	<0.058	33.7	0.888	<0.022	62.5	0.027	0.235	<0.041	9.65	<0.059
12/14/09	OR-1-dupe	TOLLWAY 327	<0.037	<0.108	0.033	0.0461	<0.00055	77.2	<0.012	<0.013	<0.0058	<0.00079	0.403	9.85	<0.058	34.8	0.883	<0.022	63.5	0.027	0.249	<0.041	9.51	<0.059
		difference	<MDL	<MDL	0.00179	0.00014	<MDL	0.66939	<MDL	<MDL	<MDL	<MDL	0.00098	0.09366	<MDL	1.06063	0.00437	<MDL	0.96207	0.00060	0.01321	<MDL	0.13615	<MDL
		% difference	<MDL	<MDL	5.16	0.30	<MDL	0.87	<MDL	<MDL	<MDL	<MDL	0.24	0.96	<MDL	3.14	0.49	<MDL	1.54	2.24	5.61	<MDL	1.41	<MDL
		> 20% ?																						
		Sample ID	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
		MDL:	0.037	0.108	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.058	0.027	0.0015	0.022	0.026	0.014	0.063	0.041	0.217	0.059
12/28/09	OR-2	TOLLWAY 346	0.067	<0.108	0.034	0.0333	<0.00055	53.0	<0.012	<0.013	<0.0058	0.00096	0.339	8.69	<0.058	24.4	0.360	<0.022	56.7	0.021	0.201	<0.041	10.8	<0.059
12/28/09	OR-2-dupe	TOLLWAY 347	0.068	<0.108	0.034	0.0338	<0.00055	55.4	<0.012	<0.013	<0.0058	0.00124	0.314	8.81	<0.058	25.5	0.363	<0.022	57.6	0.016	0.213	<0.041	11.0	<0.059
		difference	0.00138	<MDL	0.00047	0.00048	<MDL	2.40303	<MDL	<MDL	<MDL	0.00029	0.02474	0.12242	<MDL	1.09657	0.00312	<MDL	0.87082	0.00569	0.01268	<MDL	0.17423	<MDL
		% difference	2.06	<MDL	1.39	1.44	<MDL	4.54	<MDL	<MDL	<MDL	30.14	7.30	1.41	<MDL	4.49	0.87	<MDL	1.54	26.78	6.31	<MDL	1.61	<MDL
		> 20% ?										30.14								26.78				
		MDL:	0.037	0.108	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.058	0.027	0.0015	0.022	0.026	0.014	0.063	0.041	0.217	0.059
1/11/10	OR-1	TOLLWAY 357	0.051	<0.108	0.039	0.0467	<0.00055	68.7	<0.012	<0.013	<0.0058	<0.00079	1.01	8.25	<0.058	32.3	0.672	<0.022	77.2	0.015	0.436	<0.041	11.3	<0.059
1/11/10	OR-1-dupe	TOLLWAY 358	0.040	<0.108	0.037	0.0451	<0.00055	66.5	<0.012	<0.013	<0.0058	<0.00079	0.970	7.99	<0.058	30.0	0.658	<0.022	74.7	0.020	0.394	<0.041	11.0	<0.059
		difference	0.01061	<MDL	0.00205	0.00162	<MDL	2.25105	<MDL	<MDL	<MDL	<MDL	0.04018	0.26001	<MDL	2.26439	0.01405	<MDL	2.51878	0.00497	0.04200	<MDL	0.23587	<MDL
		% difference	20.79	<MDL	5.32	3.47	<MDL	3.28	<MDL	<MDL	<MDL	<MDL	3.98	3.15	<MDL	7.02	2.09	<MDL	3.26	33.69	9.63	<MDL	2.09	<MDL
		> 20% ?	20.79																	33.69				
		MDL:	0.037	0.108	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.058	0.027	0.0015	0.022	0.026	0.014	0.063	0.041	0.217	0.059
2/15/10	OR-2	TOLLWAY 394	<0.037	<0.108	0.042	0.0528	<0.00055	85.0	<0.012	<0.013	<0.0058	<0.00079	0.808	7.02	<0.058	35.4	0.745	<0.022	110	0.020	0.466	<0.041	11.2	<0.059
2/15/10	OR-2-dupe	TOLLWAY 395	<0.037	<0.108	0.040	0.0524	<0.00055	84.8	<0.012	<0.013	<0.0058	<0.00079	0.831	7.06	<0.058	37.3	0.738	<0.022	110	0.032	0.451	<0.041	11.1	<0.059
		difference	<MDL	<MDL	0.00215	0.00044	<MDL	0.17295	<MDL	<MDL	<MDL	<MDL	0.02234	0.03658	<MDL	1.88340	0.00653	<MDL	0.23549	0.01266	0.01476	<MDL	0.13377	<MDL
		% difference	<MDL	<MDL	5.10	0.84	<MDL	0.20	<MDL	<MDL	<MDL	<MDL	2.76	0.52	<MDL	5.31	0.88	<MDL	0.21	64.29	3.17	<MDL	1.19	<MDL
		> 20% ?																		64.29				
		MDL:	0.037	0.108	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.058	0.027	0.0015	0.022	0.026	0.014	0.063	0.041	0.217	0.059
3/1/10	OR-1	TOLLWAY 409	<0.037	<0.108	0.040	0.0540	<0.00055	89.2	<0.012	<0.013	<0.0058	<0.00079	0.677	7.27	<0.058	37.9	0.790	<0.022	119	0.017	0.550	<0.041	8.09	<0.059
3/1/10	OR-1-dupe	TOLLWAY 410	<0.037	<0.108	0.039	0.0539	<0.00055	89.2	<0.012	<0.013	<0.0058	<0.00079	0.687	7.21	<0.058	34.7	0.787	<0.022	118	0.020	0.523	<0.041	8.04	<0.059
		difference	<MDL	<MDL	0.00145	0.00007	<MDL	0.02618	<MDL	<MDL	<MDL	<MDL	0.01066	0.05637	<MDL	3.14370	0.00326	<MDL	1.03405	0.00270	0.02769	<MDL	0.05645	<MDL
		% difference	<MDL	<MDL	3.62	0.13	<MDL	0.03	<MDL	<MDL	<MDL	<MDL	1.58	0.78	<MDL	8.30	0.41	<MDL	0.87	15.70	5.03	<MDL	0.70	<MDL
		> 20% ?																						
		MDL:	0.037	0.108	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.058	0.027	0.0015	0.022	0.026	0.014	0.063	0.041	0.217	0.059
3/15/10	OR-2	TOLLWAY 427	0.046	<0.108	<0.023	0.0243	<0.00055	41.4	<0.012	<0.013	<0.0058	0.00103	0.206	4.72	<0.058	17.4	0.172	<0.022	42.0	<0.014	<0.063	<0.041	8.39	<0.059
3/15/10	OR-2-dupe	TOLLWAY 428	0.047	<0.108	<0.023	0.0240	<0.00055	41.0	<0.012	<0.013	<0.0058	<0.00079	0.201	4.69	<0.058	17.0	0.169	<0.022	41.6	<0.014	<0.063	<0.041	8.33	<0.059
		difference	0.00095	<MDL	<MDL	0.00024	<MDL	0.34840	<MDL	<MDL	<MDL	<MDL	0.00483	0.02349	<MDL	0.34972	0.00262	<MDL	0.41115	<MDL	<MDL	<MDL	0.05963	<MDL
		% difference	2.07	<MDL	<MDL	1.00	<MDL	0.84	<MDL	<MDL	<MDL	<MDL	2.35	0.50	<MDL	2.02	1.52	<MDL	0.98	<MDL	<MDL	<MDL	0.71	<MDL
		> 20% ?																						
		MDL:	0.037	0.108	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.058	0.027	0.0015	0.022	0.026	0.014	0.063	0.041	0.217	0.059
3/29/10	OR-4	TOLLWAY 448	<0.037	<0.108	0.063	0.0300	<0.00055	92.2	<0.012	<0.013	<0.0058	<0.00079	0.0233	4.21	<0.058	42.9	0.108	<0.022	102	0.018	<0.063	<0.041	45.2	<0.059
3/29/10	OR-4-dupe	TOLLWAY 449	<0.037	<0.108	0.059	0.0285	<0.00055	86.5	<0.012	<0.013	<0.0058	<0.00079	0.0172	3.99	<0.058	42.6	0.103	<0.022	95.5	0.018	<0.063	<0.041	42.9	<0.059
		difference	<MDL	<MDL	0.00440	0.00158	<MDL	5.70431	<MDL	<MDL	<MDL	<MDL	0.00609	0.21543	<MDL	0.22049	0.00467	<MDL	6.45505	0.00017	<MDL	<MDL	2.26855	<MDL
		% difference	<MDL	<MDL	6.94	5.25	<MDL	6.19	<MDL	<MDL	<MDL	<MDL	26.17	5.12	<MDL	0.51	4.34	<MDL	6.33	0.94	<MDL	<MDL	5.02	<MDL
		> 20% ?											26.17											
		MDL:	0.037	0.108	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.058	0.027	0.0015	0.022	0.026	0.014	0.063	0.041	0.217	0.059
5/25/10	OR-1	TOLLWAY 530	<0.037	<0.108	0.031	0.0374	<0.00055	53.3	<0.012	<0.013	<0.0058	<0.00079	0.257	6.02	<0.058	23.8	1.57	<0.022	72.7	<0.014	0.077	<0.041	6.84	<0.059
5/25/10	OR-1-dupe	TOLLWAY 531	<0.037	<0.108	0.028	0.0371	<0.00055	52.4	<0.012	<0.013	<0.0058	0.00117	0.257	5.97	<0.058	23.4	1.55	<0.022	71.9	<0.014	0.075	<0.041	6.73	<0.059
		difference	<MDL	<MDL	0.00243	0.00032	<MDL	0.85056	<MDL	<MDL	<MDL	<MDL	0.00028	0.04344	<MDL	0.38074	0.02176	<MDL	0.79855	<MDL	0.00157	<MDL	0.11444	<MDL
		% difference	<MDL	<MDL	7.90	0.85	<MDL	1.60	<MDL	<MDL	<MDL	<MDL	0.11	0.72	<MDL	1.60	1.39	<MDL	1.10	<MDL	2.04	<MDL	1.67	<MDL
		> 20% ?																						
		MDL:	0.037	0.108	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.058	0.027	0.0015	0.022	0.026	0.014	0.063	0.041	0.217	0.059
8/16/10	OR-1	TOLLWAY 649	<0.037	<0.108	0.053	0.037	<0.00055	55.6	<0.012	<0.013	<0.0058	<0.00079	0.199	7.33	<0.058	23.3	0.548	<0.022	64.6	<0.014	0.082	<0.041	4.79	<0.059
8/16/10	OR-1-dupe	TOLLWAY 650	<0.037	<0.108	0.052	0.037	<0.00055	54.7	<0.012	<0.013	<0.0058	<0.00079	0.191	7.17	<0.058	23.9	0.536	<0.022	63.1	<0.014	0.098	<0.041	4.73	<0.059
		difference	<MDL	<MDL	0.00097	0.00081	<MDL	0.90289	<MDL	<MDL	<MDL	<MDL	0.00809	0.15722	<MDL	0.60453	0.01206	<MDL	1.54872	<MDL	0.01679	<MDL	0.06049	<MDL
		% difference	<MDL	<MDL	1.85	2.17	<MDL	1.62	<MDL	<MDL	<MDL	<MDL	4.07	2.15	<MDL	2.59	2.20	<MDL	2.40	<MDL	20.57	<MDL	1.26	<MDL
		> 20% ?																			20.57			
		MDL:	0.037	0.11	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.11	0.027	0.0015	0.022	0.026	0.014	0.073	0.041	0.22	0.059
8/31/10	OR-2	TOLLWAY 670	<0.037	<0.11	0.047	0.0376	<0.00055	63.3	<0.012	<0.013	<0.0058	<0.00079	0.117	6.45	<0.11	27.2	0.293	<0.022	68.6	0.018	<0.073	<0.041	4.43	<0.059
8/31/10	OR-2-dupe	TOLLWAY 671	<0.037	<0.11	0.046	0.0379	<0.00055	63.7	<0.012	<0.013	<0.0058	<0.00079	0.116	6.58	<0.11	28.8	0.295	<0.022	70.1	0.016	<0.073	<0.041	4.45	<0.059
		difference	<MDL	<MDL	0.00078	0.00028	<MDL	0.40699	<MDL	<MDL	<MDL	<MDL	0.00066	0.12799	<MDL	1.62333	0.00225	<MDL	1.49796	0.00135	<MDL	<MDL	0.01096	<MDL
		% difference	<MDL	<MDL	1.66	0.75	<MDL	0.64	<MDL	<MDL	<MDL	<MDL	0.57	1.98	<MDL	5.97	0.77	<MDL	2.18	7.64	<MDL	<MDL	0.25	<MDL
		> 20% ?																						
		MDL:	0.037	0.11	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.11	0.027	0.0015	0.022	0.026	0.014	0.073	0.041	0.22	0.059
9/13/10	OR-2	TOLLWAY 679	<0.037	<0.11	0.058	0.0326	<0.00055	66.2	<0.012	<0.013	<0.0058	<0.00079	0.180	6.17	<0.11	29.8	0.0900	<0.022	78.0	0.020	<0.073	<0.041	3.58	<0.059
9/13/10	OR-2-dupe	TOLLWAY 681	<0.037	<0.11	0.057	0.0328	<0.00055	67.5	<0.012	<0.013	<0.0058	<0.00079	0.170	6.21	<0.11	30.2	0.0912	<0.022	78.2	0.022	<0.073	<0.041	3.69	<0.059
		difference	<MDL	<MDL	0.00144	0.00028	<MDL	1.32369	<MDL	<MDL	<MDL	<MDL	0.00934	0.03822	<MDL	0.39536	0.00115	<MDL	0.19267	0.00155	<MDL	<MDL	0.11444	<MDL
		% difference	<MDL	<MDL	2.49	0.85	<MDL	2.00	<MDL	<MDL	<MDL	<MDL	5.19	0.62	<MDL	1.33	1.28	<MDL	0.25	7.61	<MDL	<MDL	3.20	<MDL
		> 20% ?																						

Appendix

Results of geochemical analysis of duplicate grab samples taken from December 14, 2009 through March 29, 2011 (continued)

			Se	Si	Sn	Sr	Ti	Tl	V	Zn	pH	alkalinity	TDS, 180 C	TSS	oPO_4-P	NH_3-N	F	Cl	NO_3-N	SO_4	total NVOC	dissolved NVOC
		Sample ID	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L as CaCO	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
		MDL:	0.131	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.003	0.06	0.08	0.09	0.07	0.31	0.31	0.31
12/14/09	OR-1	TOLLWAY 326	<0.131	3.58	<0.086	0.233	<0.00056	<0.017	<0.047	<0.0073	7.72	260	577	7.2	0.172	<0.06	0.15	134	<0.07	26.7	17.6	16.1
12/14/09	OR-1-dupe	TOLLWAY 327	<0.131	3.56	<0.086	0.234	<0.00056	<0.017	<0.047	<0.0073	7.65	262	580		0.175	<0.06	0.15	135	<0.07	26.8	18.0	15.7
		difference	<MDL	0.02556	<MDL	0.00092	<MDL	<MDL	<MDL	<MDL	0.06600	2.19300	3.00000	NA	0.00298	<MDL	0.00320	0.79617	<MDL	0.12604	0.37838	0.35121
		% difference	<MDL	0.71	<MDL	0.39	<MDL	<MDL	<MDL	<MDL	0.86	0.84	0.52	NA	1.73	<MDL	2.18	0.59	<MDL	0.47	2.15	2.19
		> 20% ?																				
		Sample ID	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L as CaCO	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
		MDL:	0.131	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.003	0.06	0.08	0.09	0.07	0.31	0.31	0.31
12/28/09	OR-2	TOLLWAY 346	<0.131	3.20	<0.086	0.174	0.00201	<0.017	<0.047	<0.0073	7.32	190	423	10	0.172	0.11	0.15	106	0.45	32.4	13.3	12.1
12/28/09	OR-2-dupe	TOLLWAY 347	<0.131	3.24	<0.086	0.177	0.00261	<0.017	<0.047	<0.0073	7.39	190	446		0.179	0.10	0.13	108	0.43	32.5	13.6	12.4
		difference	<MDL	0.03700	<MDL	0.00268	0.00061	<MDL	<MDL	<MDL	0.06600	0.15400	23.00000	NA	0.00657	0.01056	0.01290	2.48530	0.01838	0.06530	0.35416	0.27940
		% difference	<MDL	1.16	<MDL	1.54	30.30	<MDL	<MDL	<MDL	0.90	0.08	5.44	NA	3.82	9.64	8.84	2.34	4.10	0.20	2.67	2.30
		> 20% ?					30.30															
		MDL:	0.131	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.003	0.06	0.08	0.09	0.07	0.31	0.31	0.31
1/11/10	OR-1	TOLLWAY 357	<0.131	3.90	<0.086	0.214	0.00176	<0.017	<0.047	<0.0073	7.16	247	540	4.4	0.309	0.27	0.16	141	<0.07	32.1	15.3	14.7
1/11/10	OR-1-dupe	TOLLWAY 358	<0.131	3.80	<0.086	0.209	0.00141	<0.017	<0.047	<0.0073	7.16	247	543		0.311	0.27	0.15	143	<0.07	32.7	14.7	14.3
		difference	<MDL	0.09557	<MDL	0.00516	0.00035	<MDL	<MDL	<MDL	0.00300	0.09100	3.00000	NA	0.00214	0.00254	0.00234	2.15723	<MDL	0.61776	0.57639	0.37510
		% difference	<MDL	2.45	<MDL	2.42	20.13	<MDL	<MDL	<MDL	0.04	0.04	0.56	NA	0.69	0.93	1.50	1.53	<MDL	1.92	3.77	2.55
		> 20% ?					20.13															
		MDL:	0.131	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.003	0.06	0.08	0.09	0.07	0.31	0.31	0.31
2/15/10	OR-2	TOLLWAY 394	<0.131	4.72	<0.086	0.246	0.00092	<0.017	<0.047	<0.0073	7.07	269	681	17.6	0.309	0.46	0.12	190	<0.07	31.0	17.7	16.3
2/15/10	OR-2-dupe	TOLLWAY 395	<0.131	4.70	<0.086	0.244	0.00083	<0.017	<0.047	<0.0073	7.07	267	644		0.311	0.46	0.12	191	<0.07	31.6	16.9	16.5
		difference	<MDL	0.01826	<MDL	0.00177	0.00009	<MDL	<MDL	<MDL	0.00700	1.18000	37.00000	NA	0.00135	0.00147	0.00021	0.45898	<MDL	0.60678	0.80114	0.19527
		% difference	<MDL	0.39	<MDL	0.72	9.95	<MDL	<MDL	<MDL	0.10	0.44	5.43	NA	0.44	0.32	0.17	0.24	<MDL	1.96	4.52	1.20
		> 20% ?																				
		MDL:	0.131	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.003	0.06	0.08	0.09	0.07	0.31	0.31	0.31
3/1/10	OR-1	TOLLWAY 409	<0.131	5.28	<0.086	0.244	0.00136	<0.017	<0.047	<0.0073	6.98	282	669	9.2	0.408	0.66	<0.08	211	<0.07	25.6	21.3	19.6
3/1/10	OR-1-dupe	TOLLWAY 410	<0.131	5.25	<0.086	0.242	0.00163	<0.017	<0.047	<0.0073	7.02	280	692		0.412	0.65	<0.08	211	<0.07	25.7	21.2	19.0
		difference	<MDL	0.02470	<MDL	0.00148	0.00027	<MDL	<MDL	<MDL	0.03200	1.75400	23.00000	NA	0.00345	0.01899	<MDL	0.00916	<MDL	0.14654	0.11112	0.56254
		% difference	<MDL	0.47	<MDL	0.61	20.10	<MDL	<MDL	<MDL	0.46	0.62	3.44	NA	0.84	2.86	<MDL	0.00	<MDL	0.57	0.52	2.88
		> 20% ?					20.10															
		MDL:	0.131	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.003	0.06	0.08	0.09	0.07	0.31	0.31	0.31
3/15/10	OR-2	TOLLWAY 427	<0.131	2.66	<0.086	0.102	0.00188	<0.017	<0.047	<0.0073	7.18	130	299	7.2	0.049	<0.06	0.12	76.4	0.28	23.0	10.8	9.83
3/15/10	OR-2-dupe	TOLLWAY 428	<0.131	2.65	<0.086	0.101	0.00195	<0.017	<0.047	<0.0073	7.22	130	297		0.047	<0.06	0.11	76.1	0.28	22.9	11.0	9.73
		difference	<MDL	0.01321	<MDL	0.00102	0.00008	<MDL	<MDL	<MDL	0.04700	0.17900	2.00000	NA	0.00166	<MDL	0.00707	0.23927	0.00166	0.04797	0.21419	0.09677
		% difference	<MDL	0.50	<MDL	1.00	4.02	<MDL	<MDL	<MDL	0.65	0.14	0.67	NA	3.40	<MDL	6.01	0.31	0.60	0.21	1.98	0.98
		> 20% ?																				
		MDL:	0.131	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.003	0.06	0.08	0.09	0.07	0.31	0.31	0.31
3/29/10	OR-4	TOLLWAY 448	<0.131	2.37	<0.086	0.276	<0.00056	0.030	<0.047	<0.0073	8.21	236	714	3.2	0.012	<0.06	0.14	161	<0.07	121	7.34	6.42
3/29/10	OR-4-dupe	TOLLWAY 449	<0.131	2.24	<0.086	0.261	<0.00056	<0.017	<0.047	<0.0073	8.23	234	719		0.012	<0.06	0.14	161	<0.07	121	7.45	6.54
		difference	<MDL	0.13890	<MDL	0.01445	<MDL	<MDL	<MDL	<MDL	0.02000	1.77500	5.00000	NA	0.00018	<MDL	0.00010	0.28662	<MDL	0.06822	0.10176	0.12133
		% difference	<MDL	5.85	<MDL	5.24	<MDL	<MDL	<MDL	<MDL	0.24	0.75	0.70	NA	1.53	<MDL	0.08	0.18	<MDL	0.06	1.39	1.89
		> 20% ?																				
		MDL:	0.131	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.003	0.06	0.08	0.09	0.07	0.31	0.31	0.31
5/25/10	OR-1	TOLLWAY 530	<0.131	0.489	<0.086	0.175	<0.00056	<0.017	<0.047	<0.0073	7.50	174	475	3.6	0.055	<0.06	0.17	135	<0.07	19.3	14.0	12.2
5/25/10	OR-1-dupe	TOLLWAY 531	<0.131	0.485	<0.086	0.173	<0.00056	<0.017	<0.047	<0.0073	7.52	174	493		0.056	0.07	0.16	135	<0.07	19.3	13.6	11.9
		difference	<MDL	0.00355	<MDL	0.00161	<MDL	<MDL	<MDL	<MDL	0.02000	0.42400	18.00000	NA	0.00142	<MDL	0.01025	0.37085	<MDL	0.02209	0.32975	0.24094
		% difference	<MDL	0.73	<MDL	0.92	<MDL	<MDL	<MDL	<MDL	0.27	0.24	3.79	NA	2.61	<MDL	6.04	0.27	<MDL	0.11	2.36	1.98
		> 20% ?																				
		MDL:	0.131	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.003	0.06	0.08	0.09	0.07	0.31	0.31	0.31
8/16/10	OR-1	TOLLWAY 649	<0.131	3.69	<0.086	0.202	<0.00056	<0.017	<0.047	<0.0073	7.21	188	467	6.0	0.039	<0.06	0.17	123	<0.07	12.7	19.5	19.3
8/16/10	OR-1-dupe	TOLLWAY 650	<0.131	3.59	<0.086	0.197	<0.00056	<0.017	<0.047	<0.0073	7.23	187	463		0.040	<0.06	0.17	122	<0.07	12.6	19.4	19.6
		difference	<MDL	0.09651	<MDL	0.00452	<MDL	<MDL	<MDL	<MDL	0.01400	0.80000	4.00000	NA	0.00046	<MDL	0.00156	0.87012	<MDL	0.08022	0.08798	0.31891
		% difference	<MDL	2.62	<MDL	2.24	<MDL	<MDL	<MDL	<MDL	0.19	0.42	0.86	NA	1.17	<MDL	0.91	0.71	<MDL	0.63	0.45	1.65
		> 20% ?																				
		MDL:	0.13	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.003	0.06	0.08	0.09	0.07	0.31	0.31	0.31
8/31/10	OR-2	TOLLWAY 670	<0.13	3.00	<0.086	0.224	<0.00056	<0.017	<0.047	<0.0073	7.59	214	465	<3.0	0.019	<0.06	0.18	130	<0.07	10.9	21.6	19.9
8/31/10	OR-2-dupe	TOLLWAY 671	<0.13	3.05	<0.086	0.227	<0.00056	<0.017	<0.047	<0.0073	7.60	213	500		0.020	<0.06	0.18	131	<0.07	10.9	21.1	19.7
		difference	<MDL	0.04521	<MDL	0.00283	<MDL	<MDL	<MDL	<MDL	0.00400	0.82900	35.00000	NA	0.00055	<MDL	0.00129	0.36182	<MDL	0.01051	0.51078	0.22575
		% difference	<MDL	1.51	<MDL	1.26	<MDL	<MDL	<MDL	<MDL	0.05	0.39	7.53	NA	2.84	<MDL	0.71	0.28	<MDL	0.10	2.37	1.13
		> 20% ?																				
		MDL:	0.13	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.003	0.06	0.08	0.09	0.07	0.31	0.31	0.31
9/13/10	OR-2	TOLLWAY 679	<0.13	2.69	<0.086	0.224	<0.00056	<0.017	<0.047	<0.0073	7.61	222	541	<3.0	0.020	0.07	0.18	150	<0.07	9.16	18.5	19.2
9/13/10	OR-2-dupe	TOLLWAY 681	<0.13	2.70	<0.086	0.226	<0.00056	<0.017	<0.047	<0.0073	7.62	221	534		0.021	0.08	0.18	149	<0.07	9.18	18.4	18.3
		difference	<MDL	0.01147	<MDL	0.00115	<MDL	<MDL	<MDL	<MDL	0.01600	0.18800	7.00000	NA	0.00065	0.00916	0.00616	1.20315	<MDL	0.02030	0.10837	0.86908
		% difference	<MDL	0.43	<MDL	0.51	<MDL	<MDL	<MDL	<MDL	0.21	0.08	1.29	NA	3.19	13.33	3.35	0.80	<MDL	0.22	0.58	4.54
		> 20% ?																				

Appendix Results of geochemical analysis of duplicate grab samples taken from December 14, 2009 through March 29, 2011 (continued)

			Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb
		MDL:	0.037	0.11	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.11	0.027	0.0015	0.022	0.026	0.014	0.073	0.041	0.22	0.059
9/27/10	OR-2	TOLLWAY 694	<0.037	<0.11	0.05452	0.0428655	<0.00055	70.92873	<0.012	<0.013	<0.0058	<0.00079	0.610651	6.318085	<0.11	31.07406	0.317227	<0.022	97.380653	0.02048	<0.073	<0.041	2.729181	<0.059
9/27/10	OR-2-dupe	TOLLWAY 695	<0.037	<0.11	0.054861	0.0426799	<0.00055	71.13103	<0.012	<0.013	<0.0058	<0.00079	0.610147	6.251206	<0.11	30.14757	0.315763	<0.022	96.713806	0.025626	<0.073	<0.041	2.736804	<0.059
		difference	<MDL	<MDL	0.00034	0.00019	<MDL	0.20230	<MDL	<MDL	<MDL	<MDL	0.00050	0.06688	<MDL	0.92649	0.00146	<MDL	0.66685	0.00515	<MDL	<MDL	0.00762	<MDL
		% difference	<MDL	<MDL	0.63	0.43	<MDL	0.29	<MDL	<MDL	<MDL	<MDL	0.08	1.06	<MDL	2.98	0.46	<MDL	0.68	25.13	<MDL	<MDL	0.28	<MDL
		> 20% ?																		25.130				
		MDL:	0.037	0.11	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.11	0.027	0.0015	0.022	0.026	0.014	0.073	0.041	0.22	0.059
10/11/10	OR-3	TOLLWAY 703	<0.037	<0.11	0.167546	0.0657639	<0.00055	111.0845	<0.012	<0.013	<0.0058	<0.00079	0.025748	6.87885	<0.11	57.96631	0.418513	<0.022	125.97024	0.041813	0.1240498	<0.041	63.29713	<0.059
10/11/10	OR-3-dupe	TOLLWAY 704	<0.037	<0.11	0.163864	0.0662118	<0.00055	111.2239	<0.012	<0.013	<0.0058	<0.00079	0.024316	6.845215	<0.11	57.8592	0.419702	<0.022	126.73582	0.040107	0.1765779	<0.041	63.55655	<0.059
		difference	<MDL	<MDL	0.00368	0.00045	<MDL	0.13940	<MDL	<MDL	<MDL	<MDL	0.00143	0.03363	<MDL	0.10711	0.00119	<MDL	0.76558	0.00171	<MDL	<MDL	0.25942	<MDL
		% difference	<MDL	<MDL	2.20	0.68	<MDL	0.13	<MDL	<MDL	<MDL	<MDL	5.56	0.49	<MDL	0.18	0.28	<MDL	0.61	4.08	<MDL	<MDL	0.41	<MDL
		> 20% ?																						
		MDL:	0.037	0.11	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.11	0.027	0.0015	0.022	0.026	0.014	0.073	0.041	0.22	0.059
10/26/10	OR-3	TOLLWAY 712	<0.037	<0.11	0.131447	0.0643879	<0.00055	106.1192	<0.012	<0.013	<0.0058	<0.00079	0.124779	7.922625	<0.11	53.57553	0.575783	<0.022	123.60593	0.03122	0.1672275	<0.041	56.97508	<0.059
10/26/10	OR-3-dupe	TOLLWAY 713	<0.037	<0.11	0.130923	0.064027	<0.00055	110.4503	<0.012	<0.013	<0.0058	<0.00079	0.125862	7.813187	<0.11	55.43787	0.581638	<0.022	122.20544	0.038988	0.1827979	<0.041	57.94929	<0.059
		difference	<MDL	<MDL	0.00052	0.00036	<MDL	4.33105	<MDL	<MDL	<MDL	<MDL	0.00108	0.10944	<MDL	1.86234	0.00585	<MDL	1.40049	0.00777	<MDL	<MDL	0.97421	<MDL
		% difference	<MDL	<MDL	0.40	0.56	<MDL	4.08	<MDL	<MDL	<MDL	<MDL	0.87	1.38	<MDL	3.48	1.02	<MDL	1.13	24.88	<MDL	<MDL	1.71	<MDL
		> 20% ?																		24.880				
		MDL:	0.037	0.11	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.11	0.027	0.0015	0.022	0.026	0.014	0.073	0.041	0.22	0.059
11/8/10	OR-3	TOLLWAY 718	<0.037	<0.11	0.096166	0.0619632	<0.00055	112.5168	<0.012	<0.013	<0.0058	0.002353	0.039923	5.696803	<0.11	57.26353	0.356253	<0.022	124.41344	0.043104	0.1109039	<0.041	49.20075	<0.059
11/8/10	OR-3-dupe	TOLLWAY 719	<0.037	<0.11	0.09379	0.0615885	<0.00055	111.3042	<0.012	<0.013	<0.0058	<0.00079	0.038313	5.71001	<0.11	57.12986	0.354979	<0.022	123.66311	0.046659	0.1559847	<0.041	48.97608	<0.059
		difference	<MDL	<MDL	0.00238	0.00037	<MDL	1.21261	<MDL	<MDL	<MDL	<MDL	0.00161	0.01321	<MDL	0.13367	0.00127	<MDL	0.75034	0.00355	<MDL	<MDL	0.22467	<MDL
		% difference	<MDL	<MDL	2.47	0.60	<MDL	1.08	<MDL	<MDL	<MDL	<MDL	4.03	0.23	<MDL	0.23	0.36	<MDL	0.60	8.25	<MDL	<MDL	0.46	<MDL
		> 20% ?																						
		MDL:	0.037	0.11	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.11	0.027	0.0015	0.022	0.026	0.014	0.073	0.041	0.22	0.059
12/6/10	OR-2	TOLLWAY 726	<0.037	<0.11	0.037303	0.0614187	<0.00055	118.6654	<0.012	<0.013	<0.0058	<0.00079	0.06906	5.427563	<0.11	52.09461	1.0652	<0.022	174.53548	0.045723	0.0831987	<0.041	4.71913	<0.059
12/6/10	OR-2 dupe	TOLLWAY 727	<0.037	<0.11	0.037061	0.0601874	<0.00055	114.0551	<0.012	<0.013	<0.0058	<0.00079	0.071316	5.322372	<0.11	51.20207	1.044411	<0.022	169.66225	0.038419	0.1146289	<0.041	4.595317	<0.059
		difference	<MDL	<MDL	0.00024	0.00123	<MDL	4.61031	<MDL	<MDL	<MDL	<MDL	0.00226	0.10519	<MDL	0.89254	0.02079	<MDL	4.87323	0.00730	<MDL	<MDL	0.12381	<MDL
		% difference	<MDL	<MDL	0.65	2.00	<MDL	3.89	<MDL	<MDL	<MDL	<MDL	3.27	1.94	<MDL	1.71	1.95	<MDL	2.79	15.97	<MDL	<MDL	2.62	<MDL
		> 20% ?																						
		MDL:	0.037	0.11	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.11	0.027	0.0015	0.022	0.026	0.014	0.073	0.041	0.22	0.059
12/20/10	OR-1	TOLLWAY 735	<0.037	<0.11	0.035413	0.0823192	<0.00055	134.8712	<0.012	<0.013	<0.0058	<0.00079	0.295662	6.726971	<0.11	62.39223	2.562176	<0.022	190.54456	0.031839	0.1397253	<0.041	4.891472	<0.059
12/20/10	OR-1 dupe	TOLLWAY 736	<0.037	<0.11	0.046795	0.084244	<0.00055	139.0147	<0.012	<0.013	<0.0058	<0.00079	0.279727	6.867887	<0.11	64.0137	2.642722	<0.022	195.42957	0.028689	0.1855481	<0.041	5.159084	<0.059
		difference	<MDL	<MDL	0.01138	0.00192	<MDL	4.14355	<MDL	<MDL	<MDL	<MDL	0.01594	0.14092	<MDL	1.62147	0.08055	<MDL	4.88501	0.00315	<MDL	<MDL	0.26761	<MDL
		% difference	<MDL	<MDL	32.14	2.34	<MDL	3.07	<MDL	<MDL	<MDL	<MDL	5.39	2.09	<MDL	2.60	3.14	<MDL	2.56	9.89	<MDL	<MDL	5.47	<MDL
		> 20% ?			32.14																			
		MDL:	0.037	0.11	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.11	0.027	0.0015	0.022	0.026	0.014	0.073	0.041	0.22	0.059
1/3/11	OR-2	TOLLWAY 742	<0.037	<0.11	0.035681	0.0498551	<0.00055	98.38253	<0.012	<0.013	<0.0058	<0.00079	0.566148	8.173203	<0.11	46.58397	0.898024	<0.022	147.44781	<0.014	0.0839114	<0.041	14.11256	<0.059
1/3/11	OR-2 dupe	TOLLWAY 743	<0.037	<0.11	0.035233	0.0541136	<0.00055	105.1604	<0.012	<0.013	<0.0058	<0.00079	0.602521	8.82581	<0.11	49.959	0.975852	<0.022	160.3665	<0.014	0.0877307	<0.041	15.43638	<0.059
		difference	<MDL	<MDL	0.00045	0.00426	<MDL	6.77783	<MDL	<MDL	<MDL	<MDL	0.03637	0.65261	<MDL	3.37503	0.07783	<MDL	12.91869	<MDL	<MDL	<MDL	1.32382	<MDL
		% difference	<MDL	<MDL	1.26	8.54	<MDL	6.89	<MDL	<MDL	<MDL	<MDL	6.42	7.98	<MDL	7.25	8.67	<MDL	8.76	<MDL	<MDL	<MDL	9.38	<MDL
		> 20% ?																						
		MDL:	0.037	0.11	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.11	0.027	0.0015	0.022	0.026	0.014	0.073	0.041	0.22	0.059
1/19/11	OR-1	TOLLWAY 748	<0.037	<0.11	0.03768	0.083752	<0.00055	152.1173	<0.012	<0.013	<0.0058	<0.00079	3.180503	8.088603	<0.11	71.38911	1.572604	<0.022	169.61153	<0.014	0.5344102	<0.041	13.53506	<0.059
1/19/11	OR-1 dupe	TOLLWAY 749	<0.037	<0.11	0.036481	0.08511	<0.00055	154.4127	<0.012	<0.013	<0.0058	<0.00079	3.21667	8.244667	<0.11	72.7235	1.592973	<0.022	170.8557	<0.014	0.5560803	<0.041	13.7596	<0.059
		difference	<MDL	<MDL	0.00120	0.00136	<MDL	2.29533	<MDL	<MDL	<MDL	<MDL	0.03617	0.15606	<MDL	1.33440	0.02037	<MDL	1.24417	<MDL	<MDL	<MDL	0.22454	<MDL
		% difference	<MDL	<MDL	3.18	1.62	<MDL	1.51	<MDL	<MDL	<MDL	<MDL	1.14	1.93	<MDL	1.87	1.30	<MDL	0.73	<MDL	<MDL	<MDL	1.66	<MDL
		> 20% ?																						
		MDL:	0.037	0.11	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.11	0.027	0.0015	0.022	0.026	0.014	0.073	0.041	0.22	0.059
2/14/11	OR-2	TOLLWAY 758	<0.037	<0.11	0.035302	0.1039974	<0.00055	165.7934	<0.012	<0.013	<0.0058	<0.00079	2.915602	8.101048	<0.11	73.81097	1.655861	<0.022	324.62753	<0.014	0.7816369	<0.041	10.41865	<0.059
2/14/11	OR-2 dupe	TOLLWAY 759	<0.037	<0.11	0.034166	0.102755	<0.00055	163.9034	<0.012	<0.013	<0.0058	<0.00079	2.893188	8.018749	<0.11	72.68815	1.632989	<0.022	319.62415	<0.014	0.7360099	<0.041	10.39906	<0.059
		difference	<MDL	<MDL	0.00114	0.00124	<MDL	1.88992	<MDL	<MDL	<MDL	<MDL	0.02241	0.08230	<MDL	1.12282	0.02287	<MDL	5.00339	<MDL	<MDL	<MDL	0.01959	<MDL
		% difference	<MDL	<MDL	3.22	1.19	<MDL	1.14	<MDL	<MDL	<MDL	<MDL	0.77	1.02	<MDL	1.52	1.38	<MDL	1.54	<MDL	<MDL	<MDL	0.19	<MDL
		> 20% ?																						
		MDL:	0.037	0.11	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.11	0.027	0.0015	0.022	0.026	0.014	0.073	0.041	0.22	0.059
3/1/11	OR-2	TOLLWAY 767	0.113411	<0.11	0.03606	0.0413835	<0.00055	69.65353	<0.012	<0.013	<0.0058	0.002241	0.388818	10.15379	<0.11	32.26628	0.258737	<0.022	129.30812	<0.014	0.1123821	<0.041	16.09228	<0.059
3/1/11	OR-2 dupe	TOLLWAY 768	0.059484	<0.11	0.034712	0.0403988	<0.00055	68.58203	<0.012	<0.013	<0.0058	0.002062	0.319559	9.882336	<0.11	32.12991	0.25558	<0.022	127.88908	<0.014	0.1070828	<0.041	15.8528	<0.059
		difference	<MDL	<MDL	0.00135	0.00098	<MDL	1.07150	<MDL	<MDL	<MDL	<MDL	0.06926	0.27146	<MDL	0.13637	0.00316	<MDL	1.41904	<MDL	<MDL	<MDL	0.23948	<MDL
		% difference	<MDL	<MDL	3.74	2.38	<MDL	1.54	<MDL	<MDL	<MDL	<MDL	17.81	2.67	<MDL	0.42	1.22	<MDL	1.10	<MDL	<MDL	<MDL	1.49	<MDL
		> 20% ?																						
		MDL:	0.037	0.11	0.023	0.00085	0.00055	0.029	0.012	0.013	0.0058	0.00079	0.024	0.016	0.11	0.027	0.0015	0.022	0.026	0.043	0.073	0.041	0.22	0.059
3/29/11	OR-3	TOLLWAY 804	<0.037	<0.11	0.053391	0.0392427	<0.00055	85.77014	<0.012	<0.013	<0.0058	<0.00079	0.088615	5.817227	<0.11	41.30542	0.115393	<0.022	118.20419	<0.043	0.1267387	<0.041	37.41804	<0.059
3/29/11	OR-3 dupe	TOLLWAY 805	<0.037	<0.11	0.052193	0.0398696	<0.00055	85.82401	<0.012	<0.013	<0.0058	<0.00079	0.092301	5.675356	<0.11	41.68164	0.116439	<0.022	116.88779	<0.043	0.1248033	<0.041	37.81717	<0.059
		difference	<MDL	<MDL	0.00120	0.00063	<MDL	0.05387	<MDL	<MDL	<MDL	<MDL	0.00369	0.14187	<MDL	0.37622	0.00105	<MDL	1.31641	<MDL	0.00194	<MDL	0.39913	<MDL
		% difference	<MDL	<MDL	2.24	1.60	<MDL	0.06	<MDL	<MDL	<MDL	<MDL	4.16	2.44	<MDL	0.91	0.91	<MDL	1.11	<MDL	1.53	<MDL	1.07	<MDL
		> 20% ?																						

Appendix

Results of geochemical analysis of duplicate grab samples taken from December 14, 2009 through March 29, 2011 (continued)

			Se	Si	Sn	Sr	Ti	Tl	V	Zn	pH	alkalinity	TDS, 180 C	TSS	oPO_4-P	NH_3-N	F	Cl	NO_3-N	SO_4	total NVOC	dissolved NVOC
		MDL:	0.13	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3	0.003	0.06	0.08	0.09	0.07	0.31	0.31	0.31
9/27/10	OR-2	TOLLWAY 694	<0.13	2.9342	<0.086	0.23621	<0.00056	<0.017	<0.047	<0.0073	7.56	231.874	585	2.4	0.03689	0.14781	0.19669	186.314	<0.07	6.37286	18.801975	18.30334693
9/27/10	OR-2-dupe	TOLLWAY 695	<0.13	2.92624	<0.086	0.23466	<0.00056	<0.017	<0.047	<0.0073	7.583	233.265	552		0.03637	0.1482	0.19904	184.964	<0.07	6.40389	19.580074	18.43970169
		difference	<MDL	0.00796	<MDL	0.00155	<MDL	<MDL	<MDL	<MDL	0.02300	1.39100	33.00000	NA	0.00053	0.00038	0.00235	1.35039	<MDL	0.03103	0.77810	0.13635
		% difference	<MDL	0.27	<MDL	0.65	<MDL	<MDL	<MDL	<MDL	0.30	0.60	5.64	NA	1.43	0.26	1.20	0.72	<MDL	0.49	4.14	0.74
		> 20% ?																				
		MDL:	0.13	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3	0.003	0.03	0.08	0.09	0.07	0.31	0.31	0.31
10/11/10	OR-3	TOLLWAY 703	<0.13	3.51558	<0.086	0.50828	<0.00056	<0.017	<0.047	<0.0073	7.866	287.207	961	7.6	0.0325	0.17273	0.22374	206.518	0.22416	169.47	13.74122	13.61021453
10/11/10	OR-3-dupe	TOLLWAY 704	<0.13	3.52662	<0.086	0.51103	<0.00056	<0.017	<0.047	<0.0073	7.872	287.953	940		0.03315	0.17868	0.2191	206.331	0.2317	169.295	13.827168	13.23482819
		difference	<MDL	0.01104	<MDL	0.00275	<MDL	<MDL	<MDL	<MDL	0.00600	0.74600	21.00000	NA	0.00065	0.00596	0.00463	0.18700	0.00754	0.17448	0.08595	0.37539
		% difference	<MDL	0.31	<MDL	0.54	<MDL	<MDL	<MDL	<MDL	0.08	0.26	2.19	NA	2.00	3.45	2.07	0.09	3.36	0.10	0.63	2.76
		> 20% ?																				
		MDL:	0.13	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3	0.003	0.03	0.08	0.09	0.07	0.31	0.31	0.31
10/26/10	OR-3	TOLLWAY 712	<0.13	2.74992	<0.086	0.48031	<0.00056	<0.017	<0.047	<0.0073	7.876	285.276	944	12.4	0.03749	0.12579	0.19434	211.228	<0.07	156.077	18.888873	15.27382669
10/26/10	OR-3-dupe	TOLLWAY 713	<0.13	2.76481	<0.086	0.47697	<0.00056	<0.017	<0.047	<0.0073	7.864	282.78	920		0.03997	0.12823	0.18978	212.565	<0.07	154.079	19.093915	15.07336338
		difference	<MDL	0.01489	<MDL	0.00334	<MDL	<MDL	<MDL	<MDL	0.01200	2.49600	24.00000	NA	0.00248	0.00244	0.00456	1.33666	<MDL	1.99773	0.20504	0.20046
		% difference	<MDL	0.54	<MDL	0.70	<MDL	<MDL	<MDL	<MDL	0.15	0.87	2.54	NA	6.61	1.94	2.35	0.63	<MDL	1.28	1.09	1.31
		> 20% ?																				
		MDL:	0.13	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3	0.003	0.03	0.08	0.09	0.07	0.31	0.31	0.31
11/8/10	OR-3	TOLLWAY 718	<0.13	2.76453	<0.086	0.44617	<0.00056	0.01884	<0.047	<0.0073	7.895	324.105	997	6.4	0.01741	0.24725	0.1799	233.337	<0.07	132.414	14.803008	13.92817711
11/8/10	OR-3-dupe	TOLLWAY 719	<0.13	2.76255	<0.086	0.44412	<0.00056	<0.017	<0.047	<0.0073	7.91	323.938	989		0.01707	0.24951	0.17558	233.574	<0.07	132.438	14.494013	14.01886464
		difference	<MDL	0.00198	<MDL	0.00205	<MDL	<MDL	<MDL	<MDL	0.01500	0.16700	8.00000	NA	0.00033	0.00226	0.00432	0.23747	<MDL	0.02428	0.30900	0.09069
		% difference	<MDL	0.07	<MDL	0.46	<MDL	<MDL	<MDL	<MDL	0.19	0.05	0.80	NA	1.92	0.91	2.40	0.10	<MDL	0.02	2.09	0.65
		> 20% ?																				
		MDL:	0.13	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3	0.003	0.03	0.08	0.09	0.07	0.31	0.31	0.31
12/6/10	OR-2	TOLLWAY 726	<0.13	3.44202	<0.086	0.4036	<0.00056	<0.017	<0.047	<0.0073	7.619	334.443	977	24	0.00741	0.10608	0.19259	384.763	<0.07	11.1116	21.820149	19.64999593
12/6/10	OR-2 dupe	TOLLWAY 727	<0.13	3.37195	<0.086	0.39737	<0.00056	<0.017	<0.047	<0.0073	7.615	333.994	965		0.00731	0.11655	0.19579	377.743	<0.07	11.1403	21.70622	19.67765663
		difference	<MDL	0.07007	<MDL	0.00623	<MDL	<MDL	<MDL	<MDL	0.00400	0.44900	12.00000	NA	0.00010	0.01047	0.00320	7.02073	<MDL	0.02869	0.11393	0.02766
		% difference	<MDL	2.04	<MDL	1.54	<MDL	<MDL	<MDL	<MDL	0.05	0.13	1.23	NA	1.35	9.87	1.66	1.82	<MDL	0.26	0.52	0.14
		> 20% ?																				
		MDL:	0.13	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3	0.003	0.03	0.08	0.09	0.07	0.31	0.31	0.31
12/20/10	OR-1	TOLLWAY 735	<0.13	5.04085	<0.086	0.44189	<0.00056	<0.017	<0.047	<0.0073	7.253	414.266	1201	17.2	0.01025	0.28669	0.23203	436.544	<0.07	12.9952	24.097577	19.04292837
12/20/10	OR-1 dupe	TOLLWAY 736	<0.13	5.14761	<0.086	0.45281	<0.00056	<0.017	<0.047	<0.0073	7.277	413.776	1211		0.01023	0.29029	0.19023	438.959	<0.07	13.0182	24.767046	18.66278768
		difference	<MDL	0.10676	<MDL	0.01092	<MDL	<MDL	<MDL	<MDL	0.02400	0.49000	10.00000	NA	0.00002	0.00359	0.04180	2.41433	<MDL	0.02307	0.66947	0.38014
		% difference	<MDL	2.12	<MDL	2.47	<MDL	<MDL	<MDL	<MDL	0.33	0.12	0.83	NA	0.20	1.25	18.02	0.55	<MDL	0.18	2.78	2.00
		> 20% ?																				
		MDL:	0.13	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3	0.003	0.03	0.08	0.09	0.07	0.31	0.31	0.31
1/3/11	OR-2	TOLLWAY 742	<0.13	4.12357	<0.086	0.33038	<0.00056	<0.017	<0.047	<0.0073	7.143	312.977	958	16.8	0.05623	0.50807	0.1864	294.575	0.18331	41.5183	21.862276	19.26610092
1/3/11	OR-2 dupe	TOLLWAY 743	<0.13	4.42411	<0.086	0.35988	<0.00056	<0.017	<0.047	<0.0073	7.152	312.407	939		0.05359	0.50373	0.20602	290.116	0.18512	41.8399	21.636373	18.12842188
		difference	<MDL	0.30055	<MDL	0.02950	<MDL	<MDL	<MDL	<MDL	0.00900	0.57000	19.00000	NA	0.00264	0.00434	0.01962	4.45869	<MDL	0.32158	0.22590	1.13768
		% difference	<MDL	7.29	<MDL	8.93	<MDL	<MDL	<MDL	<MDL	0.13	0.18	1.98	NA	4.69	0.85	10.52	1.51	<MDL	0.77	1.03	5.91
		> 20% ?																				
		MDL:	0.13	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3	0.003	0.03	0.08	0.09	0.07	0.31	0.31	0.31
1/19/11	OR-1	TOLLWAY 748	<0.13	7.10214	<0.086	0.4697	<0.00056	<0.017	<0.047	<0.0073	7.075	473.989	1128	18.5	0.42453	0.86662	0.13624	368.886	<0.07	35.9284	26.706543	24.54353408
1/19/11	OR-1 dupe	TOLLWAY 749	<0.13	7.20826	<0.086	0.47741	<0.00056	<0.017	<0.047	<0.0073	7.085	476.778	1147		0.4276	0.86985	0.14908	371.61	<0.07	35.9607	26.290615	24.55110152
		difference	<MDL	0.10612	<MDL	0.00771	<MDL	<MDL	<MDL	<MDL	0.01000	2.78900	19.00000	NA	0.00307	0.00323	0.01284	2.72448	<MDL	0.03231	0.41593	0.00757
		% difference	<MDL	1.49	<MDL	1.64	<MDL	<MDL	<MDL	<MDL	0.14	0.59	1.68	NA	0.72	0.37	9.42	0.74	<MDL	0.09	1.56	0.03
		> 20% ?																				
		MDL:	0.13	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3	0.003	0.03	0.08	0.09	0.07	0.31	0.31	0.31
2/14/11	OR-2	TOLLWAY 758	<0.13	7.33051	<0.086	0.53619	<0.00056	<0.017	<0.047	<0.0073	6.931	455.157	1580	95.3	0.58929	1.92025	0.15639	629.81	<0.07	25.4053	29.115515	27.68334078
2/14/11	OR-2 dupe	TOLLWAY 759	<0.13	7.25372	<0.086	0.5302	<0.00056	<0.017	<0.047	<0.0073	6.956	480.328	1576		0.58811	1.9193	0.17834	629.436	<0.07	25.4475	29.277219	27.12434031
		difference	<MDL	0.07679	<MDL	0.00599	<MDL	<MDL	<MDL	<MDL	0.02500	25.17100	4.00000	NA	0.00118	0.00095	0.02196	0.37322	<MDL	0.04220	0.16170	0.55900
		% difference	<MDL	1.05	<MDL	1.12	<MDL	<MDL	<MDL	<MDL	0.36	5.53	0.25	NA	0.20	0.05	14.04	0.06	<MDL	0.17	0.56	2.02
		> 20% ?																				
		MDL:	0.13	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3	0.003	0.03	0.08	0.09	0.07	0.31	0.31	0.31
3/1/11	OR-2	TOLLWAY 767	<0.13	3.42991	<0.086	0.20979	0.00325	<0.017	<0.047	<0.0073	7.433	180.42	711	18.8	0.03852	0.04432	0.13413	240.643	0.10897	43.3121	23.942826	19.79268922
3/1/11	OR-2 dupe	TOLLWAY 768	<0.13	3.24325	<0.086	0.20683	0.00147	<0.017	<0.047	<0.0073	7.339	181.22	705		0.04052	0.04708	0.12434	242.291	0.1048	43.3288	22.764607	21.61543131
		difference	<MDL	0.18666	<MDL	0.00297	<MDL	<MDL	<MDL	<MDL	0.09400	0.80000	6.00000	NA	0.00200	0.00276	0.00978	1.64719	0.00417	0.01666	1.17822	1.82274
		% difference	<MDL	5.44	<MDL	1.41	<MDL	<MDL	<MDL	<MDL	1.26	0.44	0.84	NA	5.20	6.22	7.29	0.68	3.82	0.04	4.92	9.21
		> 20% ?																				
		MDL:	0.13	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0097		4	12	3	0.003	0.03	0.08	0.09	0.07	0.31	0.31	0.31
3/29/11	OR-3	TOLLWAY 804	<0.13	2.24803	<0.086	0.27786	<0.00056	<0.017	<0.047	<0.0097	7.923	217.868	757	5.2	0.00758	<0.03	0.13371	205.359	0.08904	108.223	10.154126	10.55164262
3/29/11	OR-3 dupe	TOLLWAY 805	<0.13	2.24878	<0.086	0.27979	<0.00056	<0.017	<0.047	<0.0097	7.938	219.096	707		0.00735	<0.03	0.148	207.916	0.08959	108.588	10.445689	10.07000432
		difference	<MDL	0.00076	<MDL	0.00192	<MDL	<MDL	<MDL	<MDL	0.01500	1.22800	50.00000	NA	0.00022	<MDL	0.01430	2.55715	0.00055	0.36535	0.29156	0.48164
		% difference	<MDL	0.03	<MDL	0.69	<MDL	<MDL	<MDL	<MDL	0.19	0.56	6.61	NA	2.93	<MDL	10.69	1.25	0.62	0.34	2.87	4.56
		> 20% ?																				

Appendix Results of geochemical analysis of blank grab samples taken from December 3, 2009 through March 29, 2011

Date collected	Sample location	Sample ID	Al mg/L	As mg/L	B mg/L	Ba mg/L	Be mg/L	Ca mg/L	Cd mg/L	Co mg/L	Cr mg/L	Cu mg/L	Fe mg/L	K mg/L	Li mg/L	Mg mg/L	Mn mg/L	Mo mg/L	Na mg/L	Ni mg/L	P mg/L	Pb mg/L	S mg/L
		MDL:	0.037	0.108	0.023	0.00085	0.00055	0.012	0.012	0.013	0.0058	0.00079	0.0059	0.016	0.018	0.0025	0.0015	0.022	0.026	0.014	0.063	0.041	0.217
12/3/09	blank	TOLLWAY 321	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.017	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.058	<0.027	<0.0015	<0.022	<0.026	<0.014	<0.063	<0.041	<0.217
12/17/09	blank	TOLLWAY 341	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.133	<0.012	<0.013	<0.0058	<0.00079	0.0109	0.028	<0.058	<0.027	<0.0015	<0.022	0.149	<0.014	<0.063	<0.041	<0.217
12/30/09	blank	TOLLWAY 356	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.026	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.058	<0.027	<0.0015	<0.022	0.032	<0.014	<0.063	<0.041	<0.217
1/14/10	blank	TOLLWAY 370	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.150	<0.012	<0.013	<0.0058	<0.00079	0.0077	<0.016	<0.058	<0.027	<0.0015	<0.022	0.052	0.015	<0.063	<0.041	<0.217
1/28/10	blank	TOLLWAY 390	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.117	<0.012	<0.013	<0.0058	<0.00079	0.0107	<0.016	<0.058	<0.027	<0.0015	<0.022	0.214	<0.014	<0.063	<0.041	<0.217
2/18/10	blank	TOLLWAY 407	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.489	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.058	0.128	<0.0015	<0.022	0.039	<0.014	<0.063	<0.041	<0.217
2/18/10	blank 2	TOLLWAY 408	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.289	<0.012	<0.013	<0.0058	<0.00079	0.0097	0.037	<0.058	0.032	<0.0015	<0.022	0.107	<0.014	<0.063	<0.041	<0.217
3/4/10	blank	TOLLWAY 425	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.085	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.058	<0.027	<0.0015	<0.022	<0.026	<0.014	<0.063	<0.041	<0.217
3/4/10	blank 2	TOLLWAY 426	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.139	<0.012	<0.013	<0.0058	<0.00079	0.0077	<0.016	<0.058	<0.027	<0.0015	<0.022	0.043	<0.014	<0.063	<0.041	<0.217
3/18/10	blank	TOLLWAY 445	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.175	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.058	0.046	<0.0015	<0.022	0.113	<0.014	<0.063	<0.041	0.217
4/1/10	blank	TOLLWAY 464	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.072	<0.012	<0.013	<0.0058	<0.00079	<0.0059	0.094	<0.058	0.087	<0.0015	<0.022	1.38	0.017	<0.063	<0.041	<0.217
4/15/10	blank	TOLLWAY 487	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.119	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.058	0.029	<0.0015	<0.022	0.109	<0.014	<0.063	<0.041	<0.217
4/28/10	blank	TOLLWAY 502	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.081	<0.012	<0.013	<0.0058	<0.00079	<0.0059	0.069	<0.058	<0.027	<0.0015	<0.022	0.436	<0.014	<0.063	<0.041	<0.217
5/13/10	blank	TOLLWAY 525	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.138	<0.012	<0.013	<0.0058	<0.00079	0.0138	<0.016	<0.058	0.031	<0.0015	<0.022	<0.026	<0.014	<0.063	<0.041	<0.0217
5/27/10	blank	TOLLWAY 545	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.121	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.058	<0.027	<0.0015	<0.022	0.036	<0.014	<0.063	<0.041	<0.217
6/10/10	blank	TOLLWAY 570	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.095	<0.012	<0.013	<0.0058	<0.00079	0.0078	0.039	<0.058	<0.027	<0.0015	<0.022	<0.026	<0.014	<0.063	<0.041	<0.217
6/24/10	blank	TOLLWAY 590	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.061	<0.012	<0.013	<0.0058	<0.00079	0.0123	<0.016	<0.058	<0.027	<0.0015	<0.022	<0.026	<0.014	<0.063	<0.041	<0.217
7/8/10	blank	TOLLWAY 612	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.111	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.058	<0.027	<0.0015	<0.022	<0.026	<0.014	<0.063	<0.041	<0.217
7/22/10	blank	TOLLWAY 629	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.133	<0.012	<0.013	<0.0058	<0.00079	0.0092	<0.016	<0.058	<0.027	<0.0015	<0.022	<0.026	<0.014	<0.063	<0.041	<0.217
8/5/10	blank	TOLLWAY 648	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.141	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.058	0.032	<0.0015	<0.022	0.072	<0.014	<0.063	<0.041	<0.217
8/18/10	blank	TOLLWAY 664	<0.037	<0.108	<0.023	<0.00085	<0.00055	0.129	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.058	<0.027	<0.0015	<0.022	0.060	<0.014	<0.063	<0.041	<0.217
8/31/10	blank	TOLLWAY 678	<0.037	<0.11	<0.023	0.0129	<0.00055	0.280	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.11	0.032	<0.0015	<0.022	0.104	<0.014	<0.073	<0.041	<0.22
9/13/10	blank	TOLLWAY 680	<0.037	<0.11	<0.023	<0.00085	<0.00055	0.170	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.11	0.029	<0.0015	<0.022	0.179	<0.014	<0.073	<0.041	<0.22
9/29/10	blank	TOLLWAY 701	<0.037	<0.11	<0.023	<0.00085	<0.00055	0.160	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.11	0.080	<0.0015	<0.022	<0.026	<0.014	<0.073	<0.041	<0.22
10/13/10	blank	TOLLWAY 710	<0.037	<0.11	<0.023	<0.00085	<0.00055	0.059	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.11	0.032	<0.0015	<0.022	<0.026	<0.014	<0.073	<0.041	<0.22
10/26/10	blank	TOLLWAY 715	<0.037	<0.11	<0.023	<0.00085	<0.00055	0.134	<0.012	<0.013	<0.0058	<0.00079	0.0060	<0.016	<0.11	0.040	0.0020	<0.022	<0.026	<0.014	0.082	<0.041	<0.22
11/9/10	blank	TOLLWAY 724	<0.037	<0.11	<0.023	<0.00085	<0.00055	0.080	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.11	0.067	<0.0015	<0.022	0.159	<0.014	<0.073	<0.041	<0.22
12/8/10	blank	TOLLWAY 732	<0.037	<0.11	<0.023	<0.00085	<0.00055	0.083	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.11	<0.027	<0.0015	<0.022	0.047	<0.014	<0.073	<0.041	<0.22
1/5/11	blank	TOLLWAY 747	<0.037	<0.11	<0.023	<0.00085	<0.00055	0.083	<0.012	<0.013	<0.0058	<0.00079	0.0064	<0.016	<0.11	<0.027	<0.0015	<0.022	<0.026	<0.014	<0.073	<0.041	<0.22
1/20/11	blank	TOLLWAY 756	<0.037	<0.11	<0.023	<0.00085	<0.00055	0.274	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.11	0.065	<0.0015	<0.022	0.069	<0.014	<0.073	<0.041	<0.22
2/16/11	blank	TOLLWAY 766	<0.037	<0.11	<0.023	<0.00085	<0.00055	0.211	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.11	0.039	<0.0015	<0.022	<0.026	<0.014	<0.073	<0.041	<0.22
3/1/11	blank	TOLLWAY 769	<0.037	<0.11	<0.023	<0.00085	<0.00055	0.147	<0.012	<0.013	<0.0058	<0.00079	<0.0059	<0.016	<0.11	0.099	<0.0015	<0.022	0.090	<0.014	<0.073	<0.041	<0.22
3/14/11	blank	TOLLWAY 784	<0.037	<0.11	<0.023	0.001479905	<0.00055	1.49534	<0.012	<0.013	<0.0058	0.0008	<0.024	0.042676821	<0.11	1.1403	<0.0015	<0.022	0.67525	<0.043	<0.073	<0.041	0.22148554
3/29/11	blank	TOLLWAY 810	<0.037	<0.11	<0.023	<0.00085	<0.00055	0.112	<0.012	<0.013	<0.0058	<0.00079	<0.024	<0.016	<0.11	<0.027	<0.0015	<0.022	0.035	<0.043	<0.073	<0.041	<0.22
		# detects	***0.00***	***0.00***	***0.00***	***2.00***	***0.00***	***34.00***	***0.00***	***0.00***	***0.00***	***1.00***	***11.00***	***6.00***	***0.00***	***17.00***	***1.00***	***0.00***	***22.00***	***2.00***	***1.00***	***0.00***	***2.00***
		min	***0.000***	***0.000***	***0.000***	***0.001***	***0.000***	***0.017***	***0.000***	***0.000***	***0.000***	***0.001***	***0.006***	***0.028***	***0.000***	***0.029***	***0.002***	***0.000***	***0.032***	***0.015***	***0.082***	***0.000***	***0.217***
		max	***0.000***	***0.000***	***0.000***	***0.013***	***0.000***	***1.495***	***0.000***	***0.000***	***0.000***	***0.001***	***0.014***	***0.094***	***0.000***	***1.140***	***0.002***	***0.000***	***1.378***	***0.017***	***0.082***	***0.000***	***0.221***
		mean	***NA***	***NA***	***NA***	***0.007***	***NA***	***0.180***	***NA***	***NA***	***NA***	***0.001***	***0.009***	***0.052***	***NA***	***0.118***	***0.002***	***NA***	***0.191***	***0.016***	***0.082***	***NA***	***0.219***

Date collected	Sample location	Sample ID	Sb mg/L	Se mg/L	Si mg/L	Sn mg/L	Sr mg/L	Ti mg/L	Tl mg/L	V mg/L	Zn mg/L	pH	alkalinity mg/L as $CaCO_3$	TDS, 180 C mg/L	TSS mg/L	oPO_4-P mg/L	NH_3-N mg/L	F mg/L	Cl mg/L	NO_3-N mg/L	SO_4 mg/L	total NVOC mg/L	dissolved NVOC mg/L		
		MDL:	0.059	0.131	0.066	0.086	0.00037	0.00056	0.017	0.047	0.0073		4	12	3.0	0.01	0.06	0.08	0.09	0.07	0.31	0.31	0.31		
12/3/09	blank	TOLLWAY 321	<0.059	<0.131	<0.066	<0.086	<0.00037	<0.00056	<0.017	<0.047	<0.0073	5.55	<4	<12	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	0.65	0.78		
12/17/09	blank	TOLLWAY 341	<0.059	<0.131	<0.066	<0.086	0.00067	<0.00056	<0.017	<0.047	<0.0073	5.47	<4	<12	no sample	<0.003	<0.06	<0.08	0.65	<0.07	<0.31	0.59	0.44		
12/30/09	blank	TOLLWAY 356	<0.059	<0.131	<0.066	<0.086	<0.00037	<0.00056	<0.017	<0.047	<0.0073	5.69	<4	<12	no sample	<0.003	<0.06	<0.08	0.09	<0.07	<0.31	0.54	0.64		
1/14/10	blank	TOLLWAY 370	<0.059	<0.131	<0.066	<0.086	0.00045	<0.00056	<0.017	<0.047	<0.0073	6.01	<4	<12	no sample	<0.003	<0.06	<0.08	0.13	<0.07	<0.31	0.37	0.73		
1/28/10	blank	TOLLWAY 390	<0.059	<0.131	<0.066	<0.086	<0.00037	<0.00056	0.021	<0.047	<0.0073	6.68	<4	<12	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	<0.31	0.62		
2/18/10	blank	TOLLWAY 407	<0.059	<0.131	<0.066	<0.086	0.00200	<0.00056	<0.017	<0.047	<0.0073	6.34	<4	<12	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	<0.31	<0.31		
2/18/10	blank 2	TOLLWAY 408	<0.059	<0.131	17.9	<0.086	0.00065	0.00073	<0.017	<0.047	<0.0073	6.32	<4	<12	no sample	<0.003	<0.06	<0.08	0.20	<0.07	<0.31	0.72	0.42		
3/4/10	blank	TOLLWAY 425	<0.059	<0.131	<0.066	<0.086	<0.00037	<0.00056	<0.017	<0.047	<0.0073	6.35	<4	<12	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	0.48	0.42		
3/4/10	blank 2	TOLLWAY 426	<0.059	<0.131	<0.066	<0.086	0.00049	<0.00056	<0.017	<0.047	<0.0073	6.21	<4	<12	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	0.48	<0.31		
3/18/10	blank	TOLLWAY 445	<0.059	<0.131	<0.066	<0.086	0.00089	<0.00056	<0.017	<0.047	<0.0073	6.91	5	<12	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	0.45	0.61		
4/1/10	blank	TOLLWAY 464	<0.059	<0.131	<0.066	<0.086	0.00120	<0.00056	<0.017	<0.047	<0.0073	6.18	<4	<12	no sample	<0.003	<0.06	<0.08	0.46	<0.07	<0.31	<0.31	0.62		
4/15/10	blank	TOLLWAY 487	<0.059	<0.131	<0.066	<0.086	0.00088	<0.00056	<0.017	<0.047	<0.0073	6.06	<4	<12	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	0.61	0.52		
4/28/10	blank	TOLLWAY 502	<0.059	<0.131	<0.066	<0.086	0.00100	<0.00056	<0.017	<0.047	<0.0073	5.89	<4	<12	no sample	<0.003	<0.06	<0.08	0.20	<0.07	<0.31	0.70	1.14		
5/13/10	blank	TOLLWAY 525	<0.059	<0.131	<0.066	<0.086	0.00096	<0.00056	<0.017	<0.047	<0.0073	5.61	<4	<12	no sample	<0.003	<0.06	<0.08	<0.9	<0.07	<0.31	1.53	1.96		
5/27/10	blank	TOLLWAY 545	<0.059	<0.131	<0.066	<0.086	0.00071	<0.00056	<0.017	<0.047	<0.0073	6.15	<4	<12	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	1.19	0.78		
6/10/10	blank	TOLLWAY 570	<0.059	<0.131	<0.066	<0.086	0.00096	<0.00056	<0.017	<0.047	<0.0073	6.18	<4	<12	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	0.62	0.55		
6/24/10	blank	TOLLWAY 590	<0.059	<0.131	<0.066	<0.086	<0.00037	<0.00056	<0.017	<0.047	<0.0073	5.73	<4	<12	no sample	0.002	<0.06	<0.08	<0.09	<0.07	<0.31	0.83	1.20		
7/8/10	blank	TOLLWAY 612	<0.059	<0.131	<0.066	<0.086	0.00057	<0.00056	<0.017	<0.047	<0.0073	5.81	<4	<12	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	0.78	1.17		
7/22/10	blank	TOLLWAY 629	<0.059	<0.131	<0.066	<0.086	0.00064	<0.00056	<0.017	<0.047	<0.0073	5.80	<4	<12	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	1.00	0.88		
8/5/10	blank	TOLLWAY 648	<0.059	<0.131	<0.066	<0.086	0.001	<0.00056	<0.017	<0.047	<0.0073	5.76	<4	<12	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	1.07	1.20		
8/18/10	blank	TOLLWAY 664	<0.059	<0.131	<0.066	<0.086	0.001	<0.00056	<0.017	<0.047	<0.0073	5.49	<4	<12	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	0.83	0.94		
8/31/10	blank	TOLLWAY 678	<0.059	<0.13	<0.066	<0.086	0.00098	<0.00056	<0.017	<0.047	<0.0073	5.51	<4	2	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	1.65	1.59		
9/13/10	blank	TOLLWAY 680	<0.059	<0.13	<0.066	<0.086	0.00056	<0.00056	<0.017	<0.047	<0.0073	5.22	<4	<12	no sample	<0.003	<0.06	<0.08	<0.09	<0.07	<0.31	2.02	2.36		
9/29/10	blank	TOLLWAY 701	<0.059	<0.13	<0.066	<0.086	0.00143	<0.00056	<0.017	<0.047	0.0076	5.73	<4	<12	no sample	<0.003	<0.06	<0.08	0.83	<0.07	0.62	1.14	0.53		
10/13/10	blank	TOLLWAY 710	<0.059	<0.13	<0.066	<0.086	<0.00037	<0.00056	<0.017	<0.047	<0.0073	5.92	<4	<12	no sample	<0.003	<0.03	<0.08	<0.09	<0.07	<0.31	<0.31	0.36		
10/26/10	blank	TOLLWAY 715	<0.059	<0.13	<0.066	<0.086	<0.00037	<0.00056	<0.017	<0.047	<0.0073	5.80	<4	<12	no sample	<0.003	<0.03	<0.08	<0.09	<0.07	<0.31	1.09	1.19		
11/9/10	blank	TOLLWAY 724	<0.059	<0.13	<0.066	<0.086	0.00028	<0.00056	<0.017	<0.047	<0.0073	5.98	<4	<12	no sample	<0.003	<0.03	<0.08	<0.09	<0.07	<0.31	0.43	0.54		
12/8/10	blank	TOLLWAY 732	<0.059	<0.13	<0.066	<0.086	<0.00037	<0.00056	<0.017	<0.047	<0.0073	5.73	<4	<12	no sample	<0.003	<0.03	<0.08	<0.09	<0.07	<0.31	0.66	0.79		
1/5/11	blank	TOLLWAY 747	<0.059	<0.13	<0.066	<0.086	<0.00037	<0.00056	<0.017	<0.047	<0.0073	4.99	<4	<12	no sample	<0.003	<0.03	<0.08	<0.09	<0.07	<0.31	0.99	1.06		
1/20/11	blank	TOLLWAY 756	<0.059	<0.13	<0.066	<0.086	0.00092	<0.00056	<0.017	<0.047	<0.0073	5.69	<4	<12	no sample	<0.003	<0.03	<0.08	<0.09	<0.07	<0.31	1.52	1.34		
2/16/11	blank	TOLLWAY 766	<0.059	<0.13	<0.066	<0.086	0.00131	<0.00056	<0.017	<0.047	<0.0073	5.92	<4	<12	no sample	<0.003	<0.03	<0.08	<0.09	<0.07	<0.31	0.63	0.86		
3/1/11	blank	TOLLWAY 769	<0.059	<0.13	<0.066	<0.086	<0.00037	<0.00056	<0.017	<0.047	<0.0073	5.35	<4	<12	no sample	<0.003	<0.03	<0.08	<0.09	<0.07	<0.31	0.67	0.96		
3/14/11	blank	TOLLWAY 784	<0.059	<0.13	<0.066	<0.086	0.0152556	<0.00056	<0.017	<0.047	<0.0097	5.35	<4	<12	no sample	<0.003	<0.03	<0.08	2.11754	<0.07	<0.31	0.6443099	0.638691441		
3/29/11	blank	TOLLWAY 810	<0.059	<0.13	<0.066	<0.086	0.00054	<0.00056	<0.017	<0.047	<0.0097	5.84	<4	<12	no sample	<0.003	<0.03	<0.08	<0.09	<0.07	<0.31	0.59	0.58		
		# detects	***0.00***	***0.00***	***1.00***	***0.00***	***24.00***	***1.00***	***1.00***	***0.00***	***1.00***	***34.00***	***1.00***	***1.00***	***0.00***	***1.00***	***0.00***	***0.00***	***8.00***	***0.00***	***1.00***	***30.00***	***32.00***	***4.714***	***ave #***
		min	***0.000***	***0.000***	***17.922***	***0.000***	***0.000***	***0.001***	***0.021***	***0.000***	***0.008***	***4.986***	***4.859***	***2.000***	***0.000***	***0.002***	***0.000***	***0.000***	***0.091***	***0.000***	***0.618***	***0.374***	***0.360***	***0.000***	***min of mins***
		max	***0.000***	***0.000***	***17.922***	***0.000***	***0.015***	***0.001***	***0.021***	***0.000***	***0.008***	***6.911***	***4.859***	***2.000***	***0.000***	***0.002***	***0.000***	***0.000***	***2.118***	***0.000***	***0.618***	***2.021***	***2.361***	***1.495***	***max of maxes***
		mean	***NA***	***NA***	***17.922***	***NA***	***0.001***	***0.001***	***0.021***	***NA***	***0.008***	***5.859***	***4.859***	***2.000***	***NA***	***0.002***	***NA***	***NA***	***0.583***	***NA***	***0.618***	***0.850***	***0.888***	***NA***	***mean of means***

Appendix (con't). Nickel Calculated Standards

OR1

acute	e[A+B(ln(h))]*0.998								chronic	e[A+B(ln(h))]*0.998							
hardness=ca*2.5+mg*4.12				A	B	calculated standard (ug/l)	calculated standard (mg/l)						A	B	calculated standard (ug/L)	calculated standard (mg/l)	
	hard	ln(H)	[A+B(ln[H])]*.998	0.5173	0.846	e		actual		hard	ln(H)	[A+B(ln[H])]*.998	-2.286	0.846	e		actual
11/30/2009	312.1042621	5.743337305	5.365411034	0.5173	0.846	213.8791281	0.213879128	<0.014	11/30/2009	312.1042621	5.743337305	2.567717634	-2.286	0.846	13.03603745	0.013036037	<0.014
12/14/2009	330.4087054	5.800330389	5.41353075	0.5173	0.846	224.4225706	0.224422571	0.026637593	12/14/2009	330.4087054	5.800330389	2.61583735	-2.286	0.846	13.67866542	0.013678665	**0.026637593**
12/28/2009	213.9438059	5.365713391	5.046580142	0.5173	0.846	155.4898011	0.155489801	0.023974598	12/28/2009	213.9438059	5.365713391	2.248886742	-2.286	0.846	9.477179415	0.009477179	**0.023974598**
1/11/2010	304.7651895	5.71954161	5.345320137	0.5173	0.846	209.6249826	0.209624983	0.014741431	1/11/2010	304.7651895	5.71954161	2.547626737	-2.286	0.846	12.7776452	0.012776745	**0.014741431**
1/25/2010	229.5050446	5.43592501	5.105860373	0.5173	0.846	164.985959	0.164985959	0.017093604	1/25/2010	229.5050446	5.43592501	2.308166973	-2.286	0.846	10.05597488	0.010055975	**0.017093604**
2/15/2010	356.5402186	5.876447049	5.477796655	0.5173	0.846	239.3188241	0.239318824	0.02132614	2/15/2010	356.5402186	5.876447049	2.680103255	-2.286	0.846	14.58659936	0.014586599	**0.02132614**
3/1/2010	378.9031837	5.937280721	5.529159011	0.5173	0.846	251.9319498	0.25193195	0.01722113	3/1/2010	378.9031837	5.937280721	2.731465611	-2.286	0.846	15.35537554	0.015355376	**0.01722113**
3/15/2010	183.985922	5.214859244	4.919212778	0.5173	0.846	136.8948042	0.136894804	<0.014	3/15/2010	183.985922	5.214859244	2.121519378	-2.286	0.846	8.343805259	0.008343805	<0.014
3/30/2010	269.7808501	5.597609963	5.242372273	0.5173	0.846	189.1182107	0.189118211	<0.014	3/30/2010	269.7808501	5.597609963	2.444678873	-2.286	0.846	11.52684742	0.011526847	<0.014
4/12/2010	320.5855032	5.770149022	5.38804838	0.5173	0.846	218.776001	0.218776001	<0.014	4/12/2010	320.5855032	5.770149022	2.59035498	-2.286	0.846	13.33450425	0.013334504	<0.014
4/26/2010	357.2847621	5.878533117	5.479557939	0.5173	0.846	239.7407039	0.239740704	0.029846447	4/26/2010	357.2847621	5.878533117	2.681864539	-2.286	0.846	14.61231314	0.014612313	**0.029846447**
5/10/2010	388.3052252	5.961791693	5.549853821	0.5173	0.846	257.1999559	0.257199956	<0.014	5/10/2010	388.3052252	5.961791693	2.752160421	-2.286	0.846	15.67646309	0.015676463	<0.014
5/25/2010	231.2283462	5.443405734	5.112176408	0.5173	0.846	166.0313139	0.166031314	<0.014	5/25/2010	231.2283462	5.443405734	2.314483008	-2.286	0.846	10.11968977	0.01011969	<0.014
12/20/2010	594.2338787	6.387272977	5.909091073	0.5173	0.846	368.3711806	0.368371181	0.031838901	12/20/2010	594.2338787	6.387272977	3.111397673	-2.286	0.846	22.45240359	0.022452404	**0.031838901**
1/19/2011	674.4164701	6.513847828	6.015959232	0.5173	0.846	409.9188577	0.409918858	<0.014	1/19/2011	674.4164701	6.513847828	3.218265832	-2.286	0.846	24.98475483	0.024984755	<0.014
2/14/2011	626.8101552	6.440643712	5.954152411	0.5173	0.846	385.3501537	0.385350154	<0.014	2/14/2011	626.8101552	6.440643712	3.156459011	-2.286	0.846	23.48728031	0.02348728	<0.014
3/1/2011	297.316464	5.694797107	5.324428156	0.5173	0.846	205.2909324	0.205290932	<0.014	3/1/2011	297.316464	5.694797107	2.526734756	-2.286	0.846	12.51258272	0.012512583	<0.014
3/29/2011	307.7960873	5.729437509	5.353675325	0.5173	0.846	211.3837759	0.211383776	<0.043	3/29/2011	307.7960873	5.729437509	2.555981925	-2.286	0.846	12.88394451	0.012883945	<0.043

OR2

acute	e[A+B(ln(h))]*0.998								chronic	e(A=B(lnH)*0.998							
hardness=ca*2.5+mg*4.12				A	B	calculated standard (ug/l)	calculated standard (mg/l)					[A+B(ln(h))]*0.998	A	B	calculated standard (ug/l)	calculated standard (mg/l)	
	hard	ln(H)	[A+B(ln[H])]*.998	0.517	0.846	*e*		*actual*		hard	ln(H)		-2.286	0.846	e		*actual*
11/30/09	421.212237	6.043	5.6185	0.517	0.846	275.485	0.2755	<0.014	11/30/09	421.2122369	6.043	2.821	-2.286	0.846	16.791	0.016790962	<0.014
12/14/09	465.513464	6.143	5.7030	0.517	0.846	299.756	0.2998	0.025	12/14/09	465.5134639	6.143	2.905	-2.286	0.846	18.270	0.018270269	**0.03**
12/28/09	366.087444	5.903	5.5001	0.517	0.846	244.718	0.2447	0.021	12/28/09	366.0874438	5.903	2.702	-2.286	0.846	14.916	0.014915698	**0.02**
1/11/10	502.841401	6.220	5.7681	0.517	0.846	319.927	0.3199	<0.014	1/11/10	502.8414008	6.220	2.970	-2.286	0.846	19.500	0.019499714	*<0.014*
1/25/10	368.226321	5.909	5.5050	0.517	0.846	245.925	0.2459	0.014	1/25/10	368.2263207	5.909	2.707	-2.286	0.846	14.989	0.014989243	*0.01*
2/15/10	667.429701	6.503	6.0072	0.517	0.846	406.330	0.4063	0.020	2/15/10	667.4297005	6.503	3.209	-2.286	0.846	24.766	0.024766041	0.020
3/1/10	887.450253	6.788	6.2477	0.517	0.846	516.836	0.5168	0.022	3/1/10	887.4502529	6.788	3.450	-2.286	0.846	31.501	0.03150141	0.022
3/15/10	276.551204	5.622	5.2633	0.517	0.846	193.118	0.1931	<0.014	3/15/10	276.5512036	5.622	2.466	-2.286	0.846	11.771	0.011770612	<0.014
3/30/10	552.860519	6.315	5.8482	0.517	0.846	346.596	0.3466	0.019	3/30/10	552.8605193	6.315	3.050	-2.286	0.846	21.125	0.021125193	0.01850981
6/9/10	504.132321	6.223	5.7703	0.517	0.846	320.620	0.3206	0.021	6/9/10	504.1323211	6.223	2.973	-2.286	0.846	19.542	0.019541972	**0.02**
6/22/10	549.862014	6.310	5.8436	0.517	0.846	345.008	0.3450	0.024	6/22/10	549.8620145	6.310	3.046	-2.286	0.846	21.028	0.021028415	0.02
7/7/10	556.451739	6.322	5.8536	0.517	0.846	348.496	0.3485	<0.014	7/7/10	556.4517385	6.322	3.056	-2.286	0.846	21.241	0.021240993	*<0.014*
7/21/10	652.903611	6.481	5.9886	0.517	0.846	398.851	0.3989	0.027	7/21/10	652.9036109	6.481	3.191	-2.286	0.846	24.310	0.02431017	***0.03***
8/3/10	390.5534	5.968	5.5547	0.517	0.846	258.457	0.2585	<0.014	8/3/10	390.5534	5.968	2.757	-2.286	0.846	15.753	0.01575306	*<0.014*
8/16/10	405.363973	6.005	5.5862	0.517	0.846	266.708	0.2667	<0.014	8/16/10	405.3639733	6.005	2.788	-2.286	0.846	16.256	0.016255972	<0.014
8/31/10	440.780977	6.089	5.6569	0.517	0.846	286.253	0.2863	0.018	8/31/10	440.7809766	6.089	2.859	-2.286	0.846	17.447	0.017447247	**0.01772603**
9/13/10	486.880734	6.188	5.7409	0.517	0.846	311.332	0.3113	0.020	9/13/10	486.8807341	6.188	2.943	-2.286	0.846	18.976	0.018975831	**0.02039756**
9/27/10	578.530127	6.360	5.8865	0.517	0.846	360.135	0.3601	0.020	9/27/10	578.5301265	6.360	3.089	-2.286	0.846	21.950	0.021950395	0.02048015
10/11/2010	620.710545	6.43086486	5.9459	0.517	0.846	382.182	0.3822	0.024	10/11/2010	620.7105453	6.430864863	3.148	-2.286	0.846	23.294	0.023294159	**0.02350961**
10/26/2010	631.933879	6.44878477	5.9610	0.517	0.846	388.008	0.3880	0.025	10/26/2010	631.9338789	6.448784767	3.163	-2.286	0.846	23.649	0.023649278	**0.02458837**
11/8/2010	825.926202	6.71650543	6.1871	0.517	0.846	486.416	0.4864	0.040	11/8/2010	825.9262018	6.716505425	3.389	-2.286	0.846	29.647	0.029647306	**0.03985917**
12/6/2010	1015.74968	6.92338222	6.3617	0.517	0.846	579.249	0.5792	0.046	12/6/2010	1015.749677	6.923382217	3.564	-2.286	0.846	35.306	0.035305508	**0.04572332**
12/20/2010	1130.06568	7.03003103	6.4518	0.517	0.846	633.828	0.6338	0.038	12/20/2010	1130.065676	7.030031031	3.654	-2.286	0.846	38.632	0.038632096	0.03781987
1/3/2011	853.441323	6.74927679	6.2147	0.517	0.846	500.063	0.5001	<0.014	1/3/2011	853.4413229	6.749276791	3.417	-2.286	0.846	30.479	0.030479075	<0.014
1/19/2011	1143.04516	7.04145118	6.4614	0.517	0.846	639.969	0.6400	<0.014	1/19/2011	1143.045165	7.041451177	3.664	-2.286	0.846	39.006	0.039006393	<0.014
2/14/2011	1751.94881	7.46848405	6.8220	0.517	0.846	917.788	0.9178	<0.014	2/14/2011	1751.948811	7.468484054	4.024	-2.286	0.846	55.940	0.055939617	<0.014
3/1/2011	706.883292	6.56086558	6.0557	0.517	0.846	426.519	0.4265	<0.014	3/1/2011	706.8832921	6.560865577	3.258	-2.286	0.846	25.997	0.025996536	<0.014
3/29/2011	604.264805	6.40401252	5.9232	0.517	0.846	373.614	0.3736	<0.043	3/29/2011	604.2648048	6.40401252	3.126	-2.286	0.846	22.772	0.022771984	<0.043

OR3

acute	e[A+B(ln(h))]*0.998								chronic	e(A=B(lnH)*0.998							
hardness=ca*2.5+mg*4.12				A	B	calculated standard (ug/l)	calculated standard (mg/l)					e[A+B(ln(h))]*0.998	A	B	calculated standard (ug/l)	calculated standard (mg/l)	
	hard	ln(H)	[A+B(ln[H])]*.998	0.517	0.846	*e*		*actual*		hard	ln(H)		-2.286	0.846	e		*actual*
11/30/09	399.582564	5.990	5.5740	0.517	0.846	263.493	0.2635	0.015	11/30/09	399.5825639	5.990	2.776	-2.286	0.846	16.060	0.016060003	0.015
12/14/09	408.05734	6.011	5.5917	0.517	0.846	268.203	0.2682	0.026	12/14/09	408.0573403	6.011	2.794	-2.286	0.846	16.347	0.016347118	**0.026**
12/28/09	318.147416	5.763	5.3816	0.517	0.846	217.370	0.2174	0.032	12/28/09	318.1474164	5.763	2.584	-2.286	0.846	13.249	0.013248832	**0.032**
1/12/10	393.081836	5.974	5.5602	0.517	0.846	259.869	0.2599	0.023	1/12/10	393.0818359	5.974	2.762	-2.286	0.846	15.839	0.015839123	**0.023**
1/26/10	306.105473	5.724	5.3490	0.517	0.846	210.403	0.2104	0.023	1/26/10	306.1054727	5.724	2.551	-2.286	0.846	12.824	0.01282417	**0.023**
2/15/10	476.222231	6.166	5.7222	0.517	0.846	305.568	0.3056	0.038	2/15/10	476.2222314	6.166	2.924	-2.286	0.846	18.624	0.018624496	**0.038**
3/1/10	490.736763	6.196	5.7475	0.517	0.846	313.412	0.3134	0.016	3/1/10	490.7367627	6.196	2.950	-2.286	0.846	19.103	0.019102641	0.016
3/15/10	241.022149	5.485	5.1472	0.517	0.846	171.950	0.1719	<0.014	3/15/10	241.0221491	5.485	2.350	-2.286	0.846	10.480	0.010480407	<0.014
3/29/10	385.189794	5.954	5.5431	0.517	0.846	255.457	0.2555	0.022	3/29/10	385.1897944	5.954	2.745	-2.286	0.846	15.570	0.015570204	**0.022**
4/12/10	413.124088	6.024	5.6022	0.517	0.846	271.012	0.2710	<0.014	4/12/10	413.1240881	6.024	2.804	-2.286	0.846	16.518	0.016518329	<0.014
4/26/10	429.506551	6.063	5.6350	0.517	0.846	280.058	0.2801	0.020	4/26/10	429.5065509	6.063	2.837	-2.286	0.846	17.070	0.017069699	**0.020**
5/10/10	443.43609	6.095	5.6619	0.517	0.846	287.708	0.2877	0.025	5/10/10	443.4360903	6.095	2.864	-2.286	0.846	17.536	0.017535939	**0.025**
5/25/10	299.677599	5.703	5.3311	0.517	0.846	206.667	0.2067	0.023	5/25/10	299.6775987	5.703	2.533	-2.286	0.846	12.596	0.012596429	**0.023**
6/9/10	334.349783	5.812	5.4235	0.517	0.846	226.681	0.2267	<0.014	6/9/10	334.3497827	5.812	2.626	-2.286	0.846	13.816	0.013816293	<0.014
6/22/10	367.285397	5.906	5.5029	0.517	0.846	245.394	0.2454	0.031	6/22/10	367.2853967	5.906	2.705	-2.286	0.846	14.957	0.014956898	**0.031**
7/7/10	364.476167	5.898	5.4964	0.517	0.846	243.809	0.2438	<0.014	7/7/10	364.4761668	5.898	2.699	-2.286	0.846	14.860	0.014860251	<0.014
7/21/10	415.682764	6.030	5.6074	0.517	0.846	272.429	0.2724	0.030	7/21/10	415.6827638	6.030	2.810	-2.286	0.846	16.605	0.016604665	**0.030**
8/3/10	312.31323	5.744	5.3660	0.517	0.846	214.000	0.2140	<0.014	8/3/10	312.3132304	5.744	2.568	-2.286	0.846	13.043	0.013043406	<0.014
8/16/2010	290.300302	5.67091591	5.3043	0.517	0.846	201.193	0.2012	0.017	8/16/2010	290.3003018	5.670915911	2.507	-2.286	0.846	12.263	0.012262817	**0.017**
8/30/2010	342.279815	5.83562858	5.4433	0.517	0.846	231.212	0.2312	0.021	8/30/2010	342.2798152	5.835628576	2.646	-2.286	0.846	14.092	0.01409246	**0.021**
9/13/2010	466.414434	6.14507458	5.7046	0.517	0.846	300.246	0.3002	0.037	9/13/2010	466.4144335	6.145074581	2.907	-2.286	0.846	18.300	0.01830012	**0.037**
9/28/2010	548.973	6.30804926	5.8422	0.517	0.846	344.537	0.3445	0.038	9/28/2010	548.9730004	6.308049261	3.045	-2.286	0.846	21.000	0.020999706	**0.038**
10/11/2010	516.532526	6.24713826	5.7908	0.517	0.846	327.266	0.3273	0.042	10/11/2010	516.5325256	6.24713826	2.993	-2.286	0.846	19.947	0.019947041	**0.042**

10/26/2010	486.029211	6.18626873	5.7394	0.517	0.846	310.872	0.3109	0.031
11/8/2010	517.217861	6.24846418	5.7919	0.517	0.846	327.633	0.3276	0.043
12/6/2010	601.969246	6.40020636	5.9200	0.517	0.846	372.416	0.3724	0.049
12/20/2010	735.864777	6.60104638	6.0896	0.517	0.846	441.237	0.4412	0.040
1/3/2011	579.799819	6.3626829	5.8883	0.517	0.846	360.802	0.3608	<0.014
1/19/2011	689.80822	6.54	6.0350	0.517	0.846	417.804	0.4178	<0.014
2/14/2011	591.847456	6.38	5.9057	0.517	0.846	367.122	0.3671	<0.014
3/1/2011	396.265055	5.98	5.5670	0.517	0.846	261.644	0.2616	<0.014
3/29/2011	384.6037	5.95	5.5418	0.517	0.846	255.128	0.2551	<0.043

10/26/2010	486.029211	6.186268727	2.942	-2.286	0.846	18.948	0.018947807	**0.031**
11/8/2010	517.2178609	6.24846418	2.994	-2.286	0.846	19.969	0.019969384	**0.043**
12/6/2010	601.9692459	6.400206358	3.122	-2.286	0.846	22.699	0.022698922	**0.049**
12/20/2010	735.8647771	6.601046375	3.292	-2.286	0.846	26.894	0.026893598	**0.040**
1/3/2011	579.7998191	6.362682905	3.091	-2.286	0.846	21.991	0.021991062	<0.014
1/19/2011	689.8082196	6.536413616	3.237	-2.286	0.846	25.465	0.02546534	<0.014
2/14/2011	591.8474561	6.383248926	3.108	-2.286	0.846	22.376	0.02237625	<0.014
3/1/2011	396.2650551	5.982083318	2.769	-2.286	0.846	15.947	0.015947352	<0.014
3/29/2011	384.6036998	5.952213453	2.744	-2.286	0.846	15.550	0.015550199	<0.043

OR4u

acute	e[A+B(ln(h))]*0.998							
hardness=ca*2.5+mg*4.12				A	B	calculated standard (ug/l)	calculated standard (mg/l)	
	hard	ln(H)	[A+B(ln[H])*.998	0.517	0.846	*e*		*actual*
1/19/11	670.436192	6.508	6.0110	0.517	0.846	407.875	0.4079	<0.014
2/15/11	570.770489	6.347	5.8751	0.517	0.846	356.052	0.3561	<0.014
3/1/11	409.26893	6.014	5.5942	0.517	0.846	268.875	0.2689	<0.014
3/29/11	422.922763	6.047	5.6220	0.517	0.846	276.430	0.2764	<0.043

chronic	e(A=B(lnH)*0.998							
			e[A+B(ln(h))]*0.998	A	B	calculated standard (ug/l)	calculated standard (mg/l)	
	hard	ln(H)		-2.286	0.846	e		*actual*
1/19/11	670.4361918	6.508	3.213	-2.286	0.846	24.860	0.0248602	<0.014
2/15/11	570.7704894	6.347	3.077	-2.286	0.846	21.702	0.021701558	<0.014
3/1/11	409.2689302	6.014	2.797	-2.286	0.846	16.388	0.016388089	<0.014
3/29/11	422.9227628	6.047	2.824	-2.286	0.846	16.849	0.016848515	<0.043

OR4d

acute	e[A+B(ln(h))]*0.998							
hardness=ca*2.5+mg*4.12				A	B	calculated standard (ug/l)	calculated standard (mg/l)	
	hard	ln(H)	[A+B(ln[H])*.998	0.517	0.846	*e*		*actual*
11/30/09	421.405062	6.044	5.6189	0.517	0.846	275.592	0.2756	0.018
12/14/09	438.406639	6.083	5.6523	0.517	0.846	284.950	0.2850	0.031
12/28/09	338.428714	5.824	5.4338	0.517	0.846	229.013	0.2290	0.028
1/12/10	400.8214	5.994	5.5766	0.517	0.846	264.182	0.2642	0.025
1/26/10	323.830412	5.780	5.3966	0.517	0.846	220.644	0.2206	0.019
2/15/10	495.182497	6.205	5.7551	0.517	0.846	315.808	0.3158	0.029
3/1/10	501.506957	6.218	5.7658	0.517	0.846	319.210	0.3192	0.017
3/15/10	281.023097	5.638	5.2768	0.517	0.846	195.751	0.1958	<0.014
3/29/10	407.04712	6.009	5.5897	0.517	0.846	267.643	0.2676	0.018
4/12/10	406.746133	6.008	5.5890	0.517	0.846	267.475	0.2675	0.023
4/26/10	426.376172	6.055	5.6288	0.517	0.846	278.334	0.2783	0.025
5/10/10	448.238382	6.105	5.6710	0.517	0.846	290.336	0.2903	0.028
5/25/10	299.869905	5.703	5.3316	0.517	0.846	206.779	0.2068	0.019
6/9/10	354.153182	5.870	5.4721	0.517	0.846	237.965	0.2380	0.025
6/22/10	373.751055	5.924	5.5176	0.517	0.846	249.037	0.2490	0.027
7/7/10	337.98354	5.823	5.4327	0.517	0.846	228.759	0.2288	<0.014
7/21/10	387.427501	5.960	5.5479	0.517	0.846	256.709	0.2567	0.033
8/3/10	332.071722	5.805	5.4178	0.517	0.846	225.376	0.2254	0.020
8/17/2010	309.140569	5.73379609	5.3574	0.517	0.846	212.163	0.2122	<0.014
8/31/2010	336.384243	5.81825409	5.4287	0.517	0.846	227.845	0.2278	0.020
9/13/2010	446.399053	6.10121329	5.6676	0.517	0.846	289.330	0.2893	0.040
9/28/2010	585.761012	6.37291188	5.8970	0.517	0.846	363.932	0.3639	0.027
10/11/2010	589.218719	6.37879745	5.9019	0.517	0.846	365.745	0.3657	0.043
10/26/2010	479.997913	6.17378176	5.7288	0.517	0.846	307.612	0.3076	0.030
11/8/2010	552.691267	6.31479956	5.8479	0.517	0.846	346.506	0.3465	0.051
12/6/2010	641.836403	6.46433345	5.9742	0.517	0.846	393.135	0.3931	0.050
12/20/2010	751.399313	6.62193722	6.1072	0.517	0.846	449.088	0.4491	0.039
1/3/2011	539.928619	6.29143694	5.8282	0.517	0.846	339.738	0.3397	<0.014
1/19/2011	656.973099	6.49	5.9938	0.517	0.846	400.949	0.4009	<0.014
2/15/2011	577.23927	6.36	5.8846	0.517	0.846	359.456	0.3595	<0.014
3/1/2011	411.952784	6.02	5.5998	0.517	0.846	270.363	0.2704	<0.014
3/29/2011	412.602366	6.02	5.6011	0.517	0.846	270.723	0.2707	<0.043

chronic	e(A=B(lnH)*0.998							
				A	B		calculated standard (ug/l)	calculated standard
	hard	ln(H)	[A+B(ln[H])*.998	-2.286	0.846	e		*actual*
11/30/09	421.4050618	6.044	2.821	-2.286	0.846	16.797	0.016797452	**0.018**
12/14/09	438.4066391	6.083	2.855	-2.286	0.846	17.368	0.017367864	**0.031**
12/28/09	338.4287143	5.824	2.636	-2.286	0.846	13.958	0.01395847	**0.028**
1/12/10	400.8214004	5.994	2.779	-2.286	0.846	16.102	0.016102032	**0.025**
1/26/10	323.8304117	5.780	2.599	-2.286	0.846	13.448	0.013448371	**0.019**
2/15/10	495.1824975	6.205	2.957	-2.286	0.846	19.249	0.019248651	**0.029**
3/1/10	501.5069574	6.218	2.968	-2.286	0.846	19.456	0.019456013	0.017
3/15/10	281.0230969	5.638	2.479	-2.286	0.846	11.931	0.011931111	<0.014
3/29/10	407.0471201	6.009	2.792	-2.286	0.846	16.313	0.016312942	**0.018**
4/12/10	406.7461333	6.008	2.791	-2.286	0.846	16.303	0.016302757	**0.023**
4/26/10	426.3761723	6.055	2.831	-2.286	0.846	16.965	0.0169646	**0.025**
5/10/10	448.238382	6.105	2.873	-2.286	0.846	17.696	0.017696146	**0.028**
5/25/10	299.8699049	5.703	2.534	-2.286	0.846	12.603	0.012603253	**0.019**
6/9/10	354.1531824	5.870	2.674	-2.286	0.846	14.504	0.014504103	**0.025**
6/22/10	373.7510549	5.924	2.720	-2.286	0.846	15.179	0.015178901	**0.027**
7/7/10	337.9835395	5.823	2.635	-2.286	0.846	13.943	0.013942965	<0.014
7/21/10	387.4275008	5.960	2.750	-2.286	0.846	15.647	0.01564654	**0.033**
8/3/10	332.0717224	5.805	2.620	-2.286	0.846	13.737	0.013736771	**0.020**
8/17/2010	309.140569	5.733796089	2.560	-2.286	0.846	12.931	0.012931445	<0.014
8/31/2010	336.3842425	5.818254086	2.631	-2.286	0.846	13.887	0.013887241	**0.020**
9/13/2010	446.3990526	6.101213289	2.870	-2.286	0.846	17.635	0.017634817	**0.040**
9/28/2010	585.7610121	6.372911877	3.099	-2.286	0.846	22.182	0.022181808	**0.027**
10/11/2010	589.2187193	6.378797455	3.104	-2.286	0.846	22.292	0.022292309	**0.043**
10/26/2010	479.9979129	6.173781756	2.931	-2.286	0.846	18.749	0.018749092	**0.030**
11/8/2010	552.6912673	6.314799559	3.050	-2.286	0.846	21.120	0.021119732	**0.051**
12/6/2010	641.8364026	6.464333447	3.176	-2.286	0.846	23.962	0.023961789	**0.050**
12/20/2010	751.3993135	6.621937219	3.310	-2.286	0.846	27.372	0.027372164	**0.039**
1/3/2011	539.9286185	6.291436943	3.030	-2.286	0.846	20.707	0.020707222	<0.014
1/19/2011	656.9730991	6.487643073	3.196	-2.286	0.846	24.438	0.02443804	<0.014
2/15/2011	577.2392705	6.358256861	3.087	-2.286	0.846	21.909	0.021909036	<0.014
3/1/2011	411.9527841	6.020908741	2.802	-2.286	0.846	16.479	0.016478779	<0.014
3/29/2011	412.6023663	6.022484336	2.803	-2.286	0.846	16.501	0.016500715	<0.043