# KLAMATH RIVER BASELINE WATER QUALITY SAMPLING
# – 2009 ANNUAL REPORT –


**Prepared for the**
**KHSA Water Quality Monitoring Group**

**Prepared by**
**Watercourse Engineering, Inc.**
**February 10, 2011**

PACIFICORP
A MIDAMERICAN ENERGY HOLDINGS COMPANY

# 1. Introduction

On November 13, 2008, the United States, the states of California and Oregon, and PacifiCorp executed an Agreement in Principle (AIP) describing a framework for possible removal of several PacifiCorp's dams on the Klamath River. Interim Measure 12 of the AIP stipulated a water quality monitoring program, including on-going monitoring of blue-green algae (cyanobacteria) and associated toxins. Water quality monitoring conducted in 2009 was conducted under the plan: AIP Interim Measure 12: Water Quality Monitoring Activities, Monitoring Year 2009.

The Klamath Hydroelectric Settlement Agreement (KHSA) signed on February 18, 2010, supersedes the AIP. Interim Measure 15 of KHSA states that PacifiCorp shall fund long-term baseline water quality monitoring to support dam removal, nutrient removal, and permitting studies, and also will fund blue-green algae (BGA) and BGA toxin monitoring as necessary to protect public health. PacifiCorp provides funding of $500,000 per year for this measure, and the monitoring is performed by an entity or entities agreed upon by the parties to the KHSA and in consultation with the appropriate water quality agencies.

The monitoring program is a cooperative effort termed the KHSA Monitoring group[1]. Actual monitoring is completed by a sub-set of the group, and includes the Yurok Tribe, Karuk Tribe, PacifiCorp, and the U.S. Bureau of Reclamation. The program collects data from approximately 254 miles of river and reservoirs, from Link Dam near Klamath Falls, Oregon to the Klamath River Estuary, near Klamath, California. Annual planning and coordination meetings, as well as interim reporting meetings during the sampling season include the monitoring entities as well as stakeholders, the North Coast Regional Water Quality Control Board and the Oregon Department of Environmental Quality, and the U.S. Environmental Protection Agency. This group, termed the KHSA monitoring group for purposes of this report, ensures that the intent of the Interim Measure is met, that appropriate quality assurance protocols and standard operating procedures are in place, water quality conditions and sampling matters are tracked in a timely fashion, and process transparency.

This summary report focuses on the grab sampling data collection. Even though the KHSA was signed after the 2009 sampling year, the monitoring program initiated under the AIP is referred to herein as the 2009 KHSA program for consistency. Two appendices accompany the report, presenting field data from the 2009 program and the Technical Memorandum presenting laboratory comparison findings.

[1] The KHSA Monitoring Group consists of representatives from the North Coast Regional Water Quality Control Board; Oregon Department of Environmental Quality; U.S. Environmental Protection Agency, Region IX; Karuk Tribe; Yurok Tribe; PacifiCorp; and U.S. Bureau of Reclamation.

# 2. Program Elements

The 2009 KHSA monitoring program occurred from May through December of 2009 and included several monitoring elements. The primary elements included baseline monitoring and public health monitoring. The baseline water quality monitoring element included water quality grab sample data, physical observations associated with these grab samples, water quality probe data and algae data. This report focuses on the grab sample data and associated physical observations in the baseline monitoring element. The data collected using water quality probes recorded observations at hourly or sub-hourly intervals. Parameters sampled by probes included water temperature, dissolved oxygen, conductivity, and pH at specific locations in the Klamath River (identified in Table 1). The algae data in the baseline monitoring element included algae species identification and quantification samples collected at each sampling location. The water quality probe data and algae species and quantification data are not presented herein due to the extensive quantity of information. However, these data are available in electronic form and the KHSA monitoring group is exploring methods of summarizing these data, as well as other data from special studies, for incorporation in future annual reports

The public health monitoring program data consisted of algae species at specific sites within reservoirs and river reaches and focused on algae species and algal toxin sampling. These results are not discussed herein, but rather are reported separately as a compilation of summary reports presented through the 2009 season. These frequent reports were used to track phytoplankton and toxin conditions that supported management decisions to post and de-post reservoir and river reaches.

In addition to the baseline and public health monitoring elements, the KHSA monitoring program provided an opportunity to develop additional special studies to support the baseline or public health monitoring elements, or other identified data gaps. In 2009 additional studies implemented under the sampling program included public health related fish and mussel tissue sampling, algae speciation in Keno Reservoir, and the use of temperature loggers in different portions of the river.

A database through the Klamath Basin Monitoring Program (KBMP) is being developed to store information collected under the KHSA program, including the baseline monitoring and the public health monitoring elements. These data are accessible via the KBMP website (http://kbmp.net/) that includes links to quality assurance plans, associated program documents, and other materials and features that provide transparency to the KBMP process that are directly transferable to the KHSA monitoring program.

Finally, there are also other Klamath River monitoring efforts outside of the KHSA program sponsored by individual entities which can provide additional data related to Klamath River water quality and other aquatic system information.

# 3. Baseline Program Water Quality Sampling

## *3.1. Site Locations and Frequency*

In 2009 sampling was conducted at twenty-four sites along the Klamath River and its tributaries, from Link Dam to the Klamath River Estuary by the four different sampling crews. Sixteen of those sites were located on the mainstem of the Klamath River, four of the sites were located in the reservoirs on the Klamath River, and four of those sites were located on the main tributaries of the Klamath River (Figure 1). Physical parameters (water temperature, dissolved oxygen, conductivity, pH) were collected at all sites during the sampling event. Grab samples for analysis of all other baseline water quality constituents were collected monthly, except at Link Dam and below Iron Gate Dam, where samples were collected bi-monthly from May through October and monthly for the remainder of the sampling season. Site locations, sampling frequency and sampling crew are presented in Table 1.


**Figure 1. 2009 mainstem Klamath River KHSA sampling sites (KR2460 is also a vertical profile site).**

**Table 1. 2009 Baseline monitoring locations, constituents, frequency, and sampling entity**

| Monitoring Location | | Temperature (°C) | Dissolved Oxygen (mg/l) | pH (log[H+]) | Conductance (uS/cm) | Inorganic/Organic N (mg/l) | Inorganic/Organic P (mg/l) | Particulate and Dissolved C (mg/l) | TSS/VSS (mg/l) | Alkalinity (mg/l) | Water Column chl_a/Pheo (ug/l) | Phytoplankton species | Microcystin (ug/l) | LCMS confirmation of Microcystin | CBOD, mg/l | Sampling Entity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site ID** | *Sampling Method:* | *T,P* | *P* | *P* | *P* | *G* | *G* | *G* | *G* | *G* | *G* | *G* | *G* | | *G* | |
| **KR2544** | Link Dam | **H/VP** | **H/VP** | **H/VP** | **H/VP** | **M/ BM** | **M/ BM** | **M/ BM** | **M/ BM** | **M/ BM** | **M/ BM** | **M/ BM** | **M/ BM** | **M** | **M2/ BM2** | **USBR** |
| **KR2460** | Keno Reservoir at Miller Island | **H/VP** | **H/VP** | **H/VP** | **H/VP** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **USBR** |
| **KR2334** | Klamath River below Keno Dam | **VP** | **VP** | **VP** | **VP** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **M2/BM2** | **USBR** |
| **KR2282** | Klamath River above J.C. Boyle Reservoir | **H** | **-** | **-** | **-** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **-** | **PacifiCorp** |
| **KR2260** | J.C. Boyle Reservoir[a] | **VP** | **VP** | **VP** | **VP** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **PacifiCorp** |
| **KR2240** | Klamath River below J.C. Boyle Dam | **H** | **-** | **-** | **-** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **-** | **PacifiCorp** |
| **KR2195** | Klamath River below USGS Gage | **H** | **H** | **H** | **H** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **PacifiCorp** |
| **KR2064** | KR above Shovel Creek (Stateline) | **H** | **-** | **-** | **-** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **M2/BM2** | **PacifiCorp** |
| **KR1990** | Copco Reservoir[b] | **VP** | **VP** | **VP** | **VP** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **PacifiCorp** |
| **KR1950** | Klamath River below Copco Dam | **H** | **-** | **-** | **-** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **PacifiCorp** |
| **KR1920** | Iron Gate Reservoir[c] | **VP** | **VP** | **VP** | **VP** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **PacifiCorp** |
| **KR1897** | Klamath River below Iron Gate Dam | **H** | **H** | **H** | **H** | **M/ BM** | **M/ BM** | **M/ BM** | **M/ BM** | **M/ BM** | **M/ BM** | **M/B M** | **W/ S** | **M** | **M2/ BM2** | **PacifiCorp** |
| **KR1560** | Klamath River at Walker Bridge Road | **H** | **-** | **-** | **-** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **Karuk** |
| **KR1285** | Klamath River below Seiad | **H** | **H** | **H** | **H** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **Karuk** |
| **KR0935** | Klamath River at Clear Creek | **H** | **-** | **-** | **-** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **Karuk** |
| **KR0591** | Klamath River at Orleans (USGS) | **H** | **H** | **H** | **H** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **Karuk** |
| **KR0435** | Klamath River At Weitchpec | **H** | **H** | **H** | **H** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **-** | **Yurok** |
| **KR0385** | Klamath River below Trinity River | **H** | **-** | **-** | **-** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **Yurok** |
| **KR0060** | Klamath River near Klamath | **H** | **H** | **H** | **H** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **Yurok** |
| **KR0005** | Klamath River Estuary | **-** | **-** | **-** | **-** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **Yurok** |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

| Monitoring Location | | Temperature (°C) | Dissolved Oxygen (mg/l) | pH (log[H+]) | Conductance (uS/cm) | Inorganic/Organic N (mg/l) | Inorganic/Organic P (mg/l) | Particulate and Dissolved C (mg/l) | TSS/VSS (mg/l) | Alkalinity (mg/l) | Water Column chl_a/Pheo (ug/l) | Phytoplankton species | Microcystin (ug/l) | LCMS confirmation of Microcystin | CBOD, mg/l | Sampling Entity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site ID** | *Sampling Method:* | *T,P* | *P* | *P* | *P* | *G* | *G* | *G* | *G* | *G* | *G* | *G* | *G* | | *G* | |
| **SHR00** | Shasta River near mouth | **H** | **H** | **H** | **H** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **-** | **Karuk** |
| **SCR00** | Scott River near mouth | **H** | **H** | **H** | **H** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **-** | **Karuk** |
| **SAR00** | Salmon River near mouth | **H** | **H** | **H** | **H** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **-** | **Karuk** |
| **TRR00** | Trinity River near mouth | **H** | **-** | **-** | **-** | **M** | **M** | **M** | **M** | **M** | **M** | **M** | **-** | **-** | **-** | **Yurok** |

**Notes:**

[a] Sampling at two depths in J.C. Boyle reservoir (0.5 m and 1 m off bottom)

[b] Sampling at three depths in Copco reservoir (0.5 m, mid-depth, and 1 m off bottom)

[c] Sampling at four depths in Iron Gate reservoir (0.5 m and two intermediate depths, and 1 m off bottom)

**Key:**

Sampling Method

T – thermistor

P – probe or data sonde (minimum seasonal deployment – April to November)

G – grab sample

Sampling Frequency Codes

H – hourly measurements (in some instances sub-hourly data may be desired)

VP – vertical profile at stated sampling frequency

M – monthly sampling

M/BM – Bi-monthly sampling May - October and monthly sampling the remainder of the year

M2/BM2 - Bi-monthly sampling June -September and monthly sampling the remainder of the year

## *3.2. Water Quality Sample Collection*

Water samples were collected by the KHSA baseline water quality monitoring program participants (Table 1). The physical constituents of temperature, dissolved oxygen, conductivity, and pH were collected by participant field crews. Analytical samples (i.e., other physical constituents and chemical constituents listed in Table 1) were sent to laboratories for analysis.

### 3.2.1. Analytical Samples

Grab water samples were collected for analytical determination for a variety of water quality constituents, including:

- Nitrogen (ammonia, nitrate+nitrite, total Kjeldahl nitrogen (TKN), , and total nitrogen),
- Phosphorus (orthophosphate and total phosphorus),
- Carbon (dissolved organic carbon (DOC) and particulate organic carbon (POC)),
- Solids (total suspended solids (TSS) and volatile suspended solids (VSS)),
- Alkalinity,
- Algae (chlorophyll-a and pheophytin),
- Microcystin,
- Carbonaceous biological oxygen demand (CBOD).

Additional microcystin grab samples were collected for the analysis using liquid chromatography tandem mass spectrometry (LCMS). Not all constituents were sampled at all locations. All data are included in Appendix A.

A total of seven laboratories completed the analytical work for the participating program agencies:

- Basic Laboratories (Basic) in Redding, California,
- CH2MHill Applied Sciences Laboratory (CH2MHill) in Corvalis, Oregon,
- Aquatic Research in Seattle, Washington,
- Chesapeake Bay Laboratories (CBL) in Solomons, Maryland,
- EPA Region 9 (EPA) laboratory in Richmond, California,
- California Department of Fish and Game Water Pollution Control (DFG) Laboratory in Rancho Cordova, California ,
- Aquatic Analysts in Friday Harbor, Washington.

### 3.2.2. Physical Measurements

The physical parameters measured in the 2009 program included water temperature, pH, specific conductivity, and dissolved oxygen.

Physical measurements were recorded at each site using either thermistors, or water quality probes that were maintained and calibrated by each sampling entity. In

addition to the vertical profiles in reservoirs and continuous time series monitoring (see Table 1), physical parameters were also measured when grab samples were collected. Not all parameters were collected by all program participants at all locations or times. Physical measurements that were collected during grab sampling are included in the field data (see Appendix A), while time series monitoring data are maintained (and available) from each sampling entity.

### 3.2.3. Quality Assurance

Program samples were collected under individual entity Quality Assurance Project Plans, Standard operating Procedures, and/or Sampling Analysis Plans (Karuk 2009, PacifiCorp 2008, USBR 2005, Yurok 2008). More recently these methods have been compared and reviewed by the KHSA working group to ensure consistent sampling techniques are applied (KHSA-WG 2010).

### 3.2.4. Laboratory Comparison

Because several laboratories are used by the various sampling parties, samples were collected in triplicate and submitted for analysis to Aquatic Research, Basic, and CH2MHill laboratories (KHSA-WG 2009). Overall, differences were distributed among various constituents, although ammonium and total nitrogen (as TN or total Kjeldahl nitrogen) and total suspended solids (TSS) were more prone to vary. Inter-laboratory comparisons were likewise variable among the three laboratories. In general, the laboratory comparison, coupled with quality assurance samples (e.g., duplicates), illustrates the range of potential results from individual and multiple laboratories that can be incorporated into data interpretation. Such comparisons were implemented in 2010 as well. More details on the 2009 laboratory comparison are presented in Appendix B.

## *3.3. Water Quality Analytical Methods*

Basic, CH2MHill, Aquatic Research, and Chesapeake Bay laboratories used either Standard Methods or EPA analytical methods for analysis of nutrients, dissolved and particulate carbon, alkalinity, carbonaceous biological oxygen demand, total suspended solids and volatile suspended solids (Table 2). Method detection limits (MDL) and reporting limits (RL) varied among the laboratories and in certain cases were not presented.

Analysis of chlorophyll-a and pheophytin was performed by a variety of laboratories. Samples collected by the USBR were analyzed by Aquatic Analysts in Friday Harbor, Washington. Samples collected by the PacifiCorp sampling crew were analyzed by CBL. Samples collected by the Karuk tribe and Yurok tribe were analyzed by Aquatic Research. All microcystin analysis was performed using the enzyme-linked immunosorbent assay (ELISA) method at the EPA laboratory and the additional microcystin analysis was done by the DFG laboratory used LCMS at selected locations.

**Table 2. Analyzing laboratories with method references, method detection limits and method reporting limits for water quality constituents**

| | | Basic | | | CH2MHill | | | Aquatic Research | | | CBL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Constituent Name** | **Constituent ID** | **Method** | **MDL** | **RL** | **Method** | **MDL** | **RL** | **Method** | **MDL** | **RL** | **Method** | **MDL** | **RL** |
| **Alkalinity** | Alk | SM 2320B | 1.0 | 5.00 | EPA 310.1 | 0.55 | 5.00 | SM182320 B | 1.0 | - | - | - | - |
| **Ammonia** | NH3 or NH4 | EPA 350.1 | 0.02 | 0.05 | EPA 350.1 | 0.0087 | 0.050 | SM184500 NH3H | 0.01 | - | - | - | - |
| **Carbonaceous Biological Oxygen Demand – 5 day** | CBOD5 | SM 5210 | 3.00 | 3.00 | SM5210B | 2.00 | 2.00 | SM205210 B | 2.0 | - | - | - | - |
| **Dissolved Organic Carbon** | DOC | SM5310C | 0.3 | 0.50 | EPA 415.1 | 0.052 | 0.50 | SM205310 B | 0.25 | - | - | - | - |
| **Nitrate + Nitrite** | NO3+NO2 | EPA 353.2 | 0.01 | 0.05 | EPA 353.2 | 0.0017 | 0.010 | SM184500 N03F | 0.01 | - | - | - | - |
| **Total Nitrogen** | TN | EPA 351.2 | (calc) | 0.20 | SM4500-N C | 0.020 | 0.020 | SM204500 NC | 0.05 | - | - | - | - |
| **Ortho-phosphate** | OPO4 | SM 4500P-E | 0.01 | 0.05 | EPA 365.1 | 0.0018 | 0.010 | SM18 4500PF | 0.001 | - | - | - | - |
| **Total Phosphorus** | TP | SM 4500P-BE | 0.02 | 0.05 | EPA 365.4 | 0.0078 | 0.050 | SM18 4500PF | 0.002 | - | - | - | - |
| **Total Kjeldahl Nitrogen** | TKN | EPA 351.2 | 0.1 | 0.20 | EPA 351.2 | 0.038 | 0.20 | EPA 351.1 | 0.2 | - | - | - | - |
| **Total Suspended Solids** | TSS | SM 2540D | 2.0 | 6.00 | EPA 160.2 | 0.87 | 2.00 | SM20 2540D | 0.5 | - | - | - | - |
| **Volatile Suspended Solids** | VSS | SM 2540D | 2.0 | 6.00 | EPA 160.4 | 0.87 | 2.00 | SM20 2540E | 0.5 | - | - | - | - |
| **Filtered Ammonia** | NH43 filtered or NH4 filtered | EPA 350.1 | 0.02 | 0.05 | EPA 350.1 | 0.0087 | 0.050 | SM184500 NH3H | 0.01 | - | - | - | - |
| **Filtered Nitrate + Nitrite** | NO3+NO2 filtered | EPA 353.2 | 0.01 | 0.05 | EPA 353.2 | 0.0017 | 0.010 | SM184500 N03F | 0.01 | - | - | - | - |
| **Particulate Carbon** | PC | - | - | - | - | - | - | - | - | - | EPA 440.0 | - | 0.0633 |
| **Particulate Inorganic Carbon** | PIC | - | - | - | - | - | - | - | - | - | EPA 440.0 | - | 0.0633 |
| **Particulate Organic Carbon** | POC | - | - | - | - | - | - | - | - | - | EPA 440.0 | - | 0.0633 |
| **Particulate Nitrogen** | PN | - | - | - | - | - | - | - | - | - | EPA 440.0 | - | 0.0633 |
| **MDL – method detection limit**<br>**RL – method reporting limit** | | | | | | | | | | | | | |

# 4. Baseline Program Water Quality Data

Water quality samples for the 2009 KHSA baseline water quality monitoring program were collected during 8 periods (approximately monthly) from May through December in 2009. Sampling crews among the various entities worked to sample within a few days of each other, but sampling on the same day throughout the basin was infeasible due to other obligations, shipping constraints, travel considerations, and other factors. In most cases all twenty-four sites were sampled each month, though there are periods when one or more sites were omitted or one or more constituents were not sampled. Notable exceptions include:

- Sampling did not occur at the Klamath River above J.C. Boyle site (river mile (RM) 228.2) in October or December.
- Sampling did not occur at the Klamath River below Copco (RM 195.0) in May or August.
- For the sites from the Klamath River at Walker Bridge (RM 156.0) to the Estuary (RM 0.5) and in all four tributaries, particulate organic carbon, CBOD, particulate nitrogen, and TKN were not collected.
- For sites from J.C. Boyle Reservoir to Iron Gate Reservoir, chlorophyll-a, pheophytin, particulate organic carbon, CBOD, particulate nitrogen, and TKN were not collected in June.
- Due to laboratory error, no pheophytin analysis was performed from samples collected at Link River, Miller Island, and Keno Dam sites.

All data are included in Appendix A.

## *Data Summary*

Physical measurements collected included water temperature, pH, specific conductivity, and dissolved oxygen. Water quality measurements included two types of algae (chlorophyll-a and pheophytin), alkalinity, two forms of carbon (dissolved organic and particulate), carbonaceous biological oxygen demand, five forms of nitrogen (ammonia, nitrate+nitrite, , total Kjeldahl, and total), two forms of phosphorus (orthophosphate and total), total and volatile suspended solids, and microcystin.

Selected data are summarized herein to illustrate general spatial and temporal patterns during the 2009 sampling period. Data are presented in two formats: longitudinal patterns based on seasonal data collection and time series at specific locations. Longitudinal patterns are presented as box and whisker plots[2] and encompass all data at each mainstem Klamath River

[2] A box-and-whisker plot is a graphical way presenting statistical parameters including median, mean, lower and upper quartiles, and outliers. Herein, the median value is represented by a horizontal black line; the box (gray) is formed by the 25th quartile and 75th quartile and represents the inter-quartile range (IQR); the mean is represented as a blue diamond symbol [◇]; the whiskers extend beyond the 1.5*IQR above and below the quartiles; and, points beyond the whiskers are termed outliers, represented by red circles [○].

site. The major tributaries (Shasta, Scott, Salmon, and Trinity Rivers) are graphed separately. Constituents presented include dissolved oxygen, total dissolved carbon, total nitrogen, total phosphorus, and microcystin.

Time series data are presented for individual constituents at locations where USGS flow gages (http://water.usgs.gov/) occur on the Klamath River (including Link River near Klamath Falls) (Locations presented in Table 3).

**Table 3. USGS flow gage locations for which time series constituent data is presented within this report.**

| Location | USGS Gage Number |
|---|---|
| LINK RIVER AT KLAMATH FALLS, OR | 11507500 |
| KLAMATH RIVER AT KENO, OR | 11509500 |
| KLAMATH RIVER BLW JOHN C.BOYLE PWRPLNT, NR KENO,OR | 11510700 |
| KLAMATH R BL IRON GATE DAM CA | 11516530 |
| KLAMATH R NR SEIAD VALLEY CA | 11520500 |
| KLAMATH R A ORLEANS | 11523000 |
| KLAMATH R NR KLAMATH CA | 11530500 |

Figure 2 through Figure 9 represent grab sample data and/or the associated physical measurements made at the time of the grab sample (e.g., temperature and dissolved oxygen). Not all measurements for individual constituents occur on the same date or time. These illustrations are not intended to be comprehensive. The complete data set (Appendix A) is available at the KBMP website (http://www.kbmp.net/) for agencies, stakeholders, analysts, and interested parties.

# 5. Summary

The KHSA baseline water quality sampling program is an interagency cooperative effort to characterize water quality conditions in the Klamath Basin to support ongoing and future measures to support restoration, dam removal studies, public health, and other factors. The program has been successfully implemented and first year monitoring completed during 2009, as exhibited by a wide range of constituents sampled over the entire Klamath River reach from near Klamath Falls to the Klamath River estuary, including major tributary contributions. Quality assurance measures have been incorporated into the process and final data sets are available to the agencies, stakeholders, interested parties and the public. The 2009 planning and monitoring effort has laid the groundwork for continued cooperation and high quality data collection in the Klamath River basin.

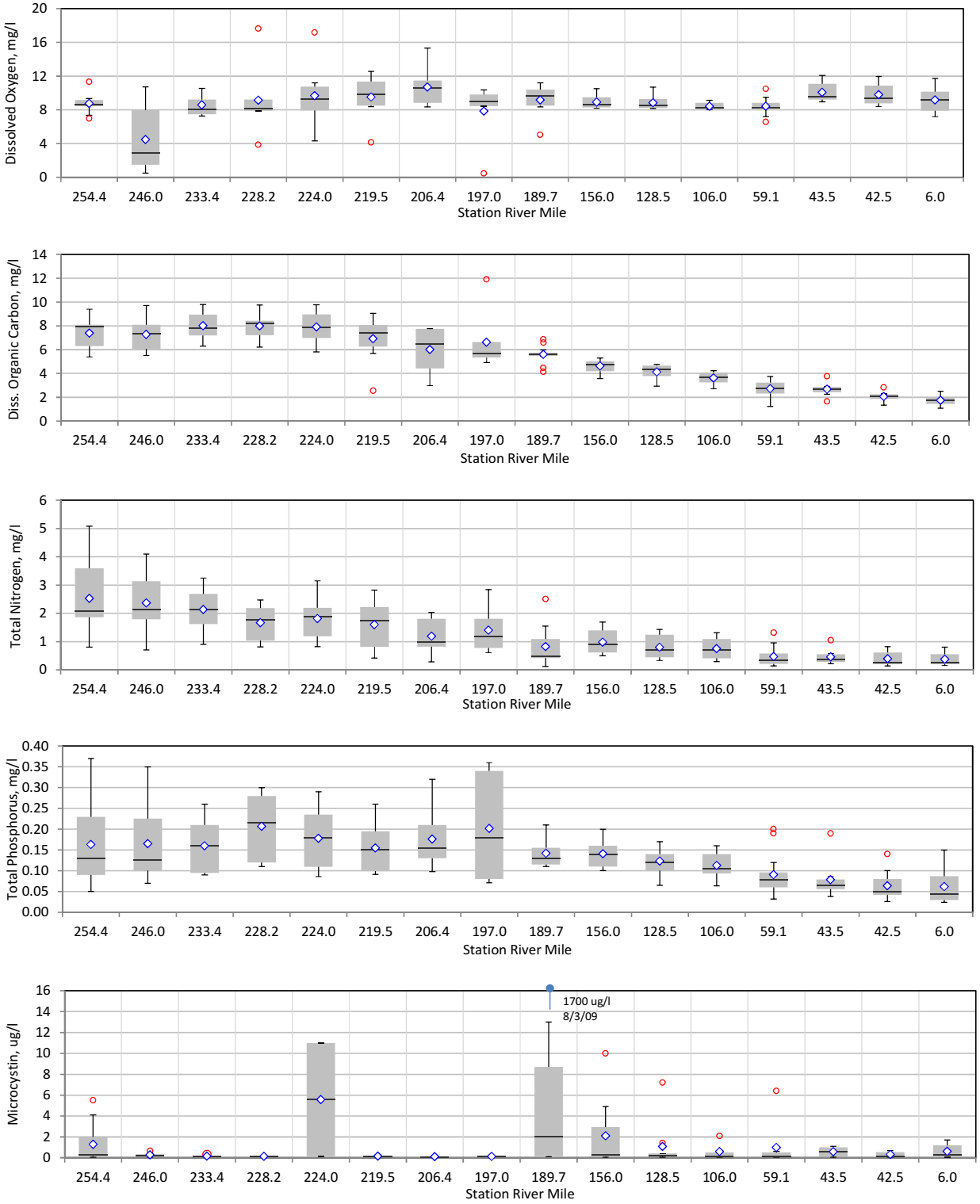


**Figure 2. Baseline water quality program data for dissolved oxygen, dissolved organic carbon, total nitrogen, total phosphorus, and microcystin concentration (top to bottom) in the Klamath River from Link River to Klamath. May 2009 – December 2009). Note that the microcystin data do not include public health monitoring data.**

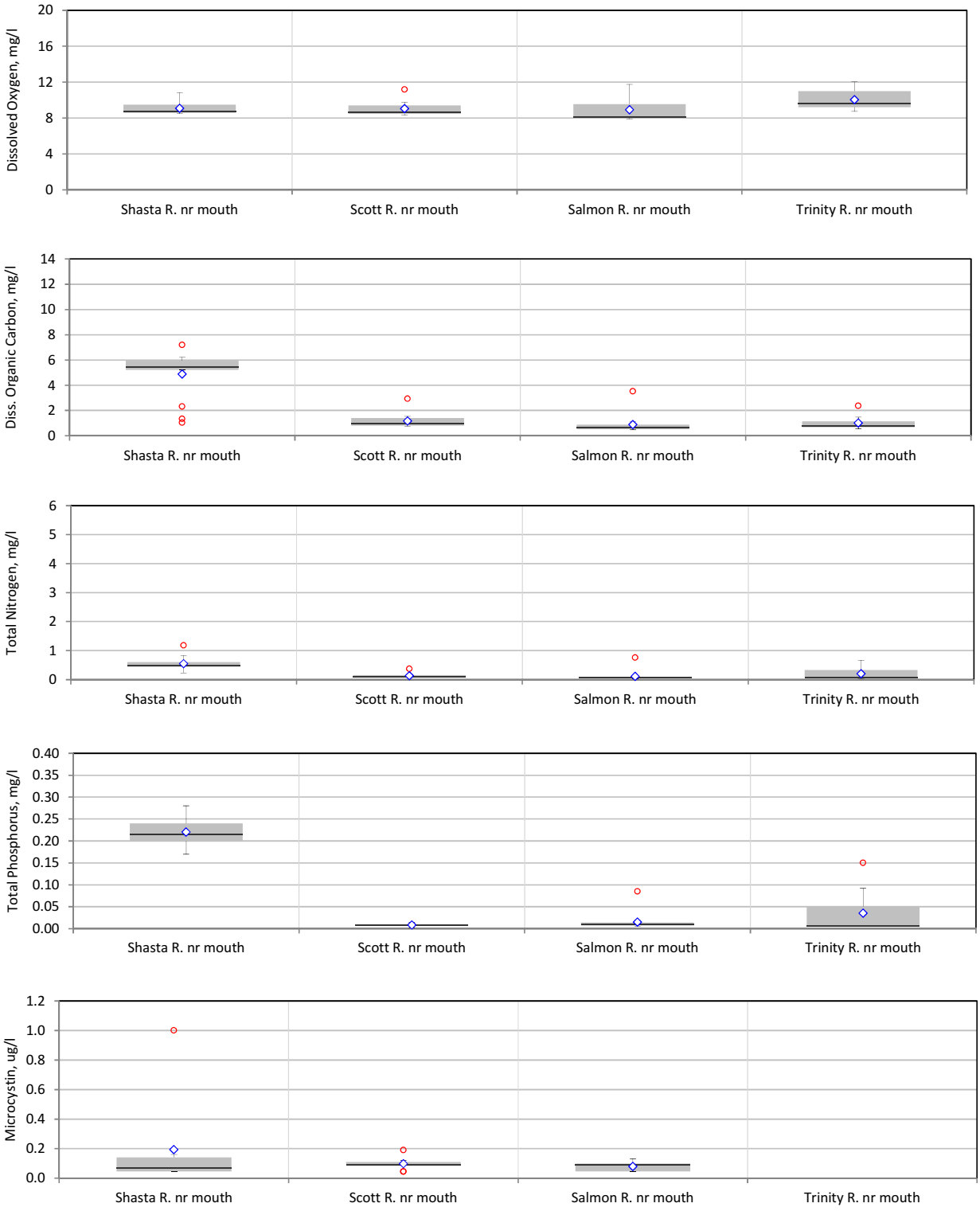


**Figure 3. Baseline water quality program data for dissolved oxygen, dissolved organic carbon, total nitrogen, total phosphorus, and microcystin concentration (top to bottom) in the Shasta, Scott, Salmon, and Trinity Rivers. May 2009 – December 2009). Note that the microcystin data do not include public health monitoring data.**

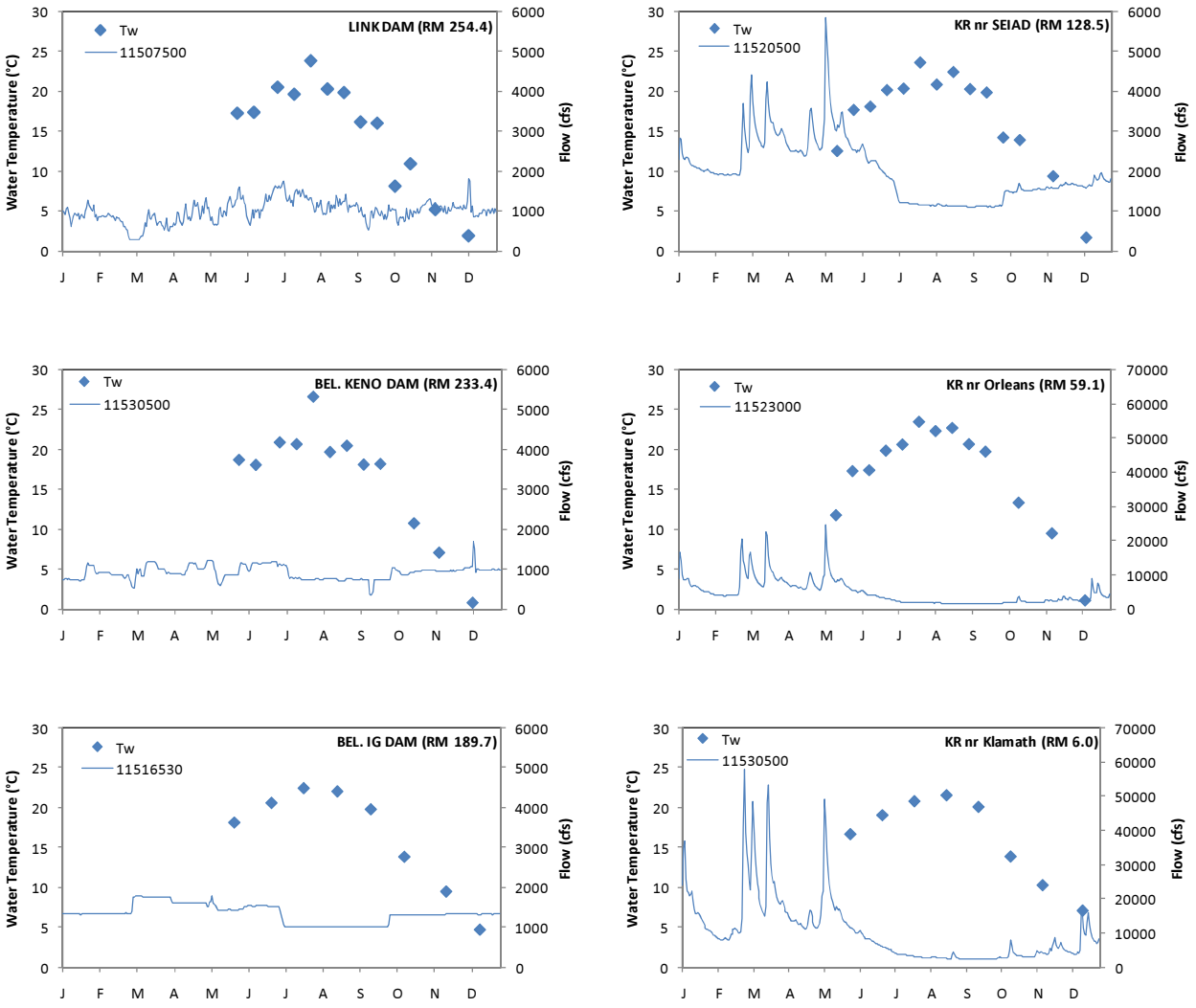


**Figure 4. 2009 KHSA sampling program water temperature and flow at USGS flow gage locations (station number provided in legend) for the mainstem Klamath and Link Rivers. Note that the flow scale on the right hand side is not the same for each graph.**

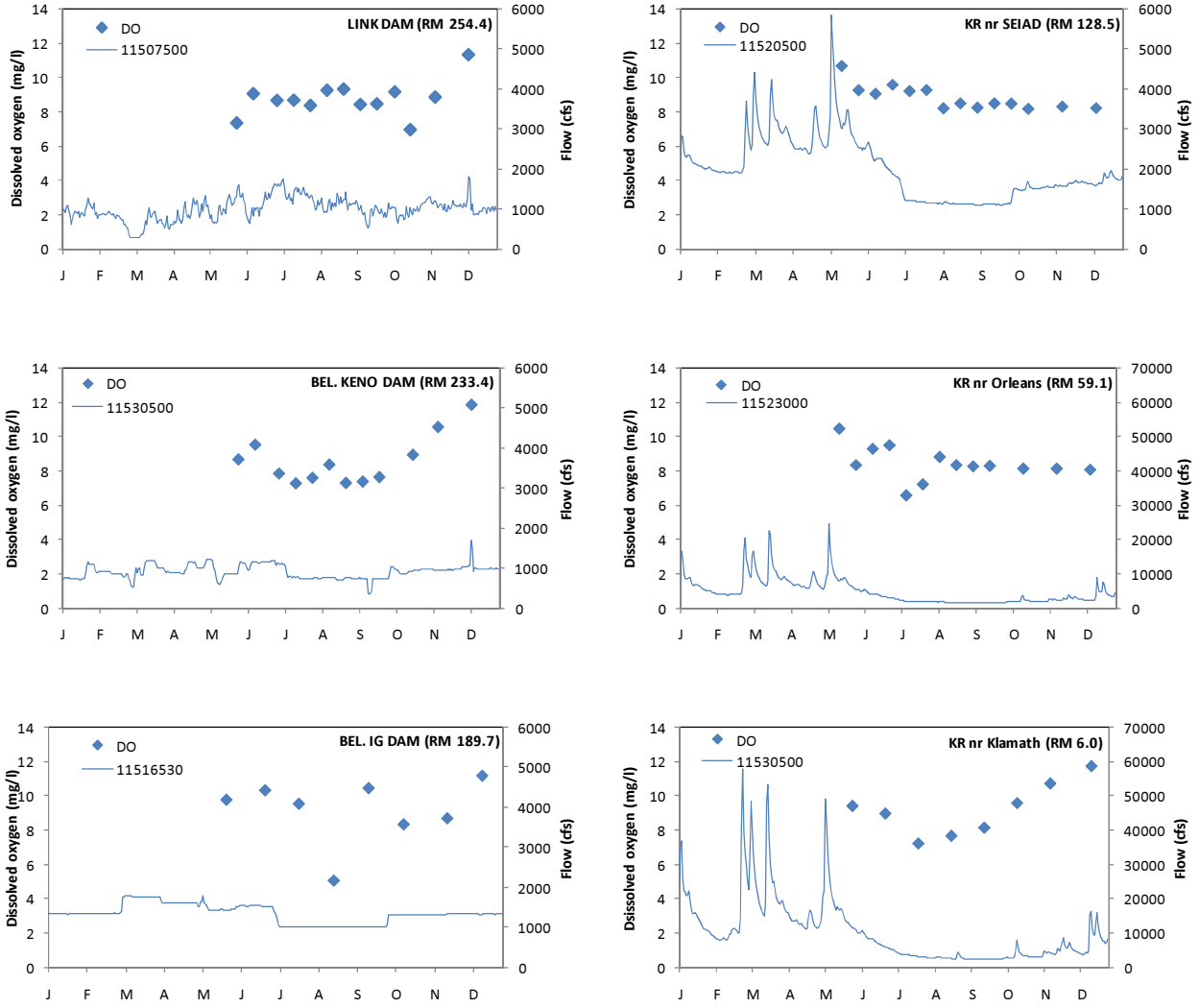


**Figure 5. 2009 KHSA sampling program dissolved oxygen and flow at USGS flow gage locations (station number provided in legend) for the mainstem Klamath and Link Rivers. Note that the flow scale on the right hand side is not the same for each graph.**

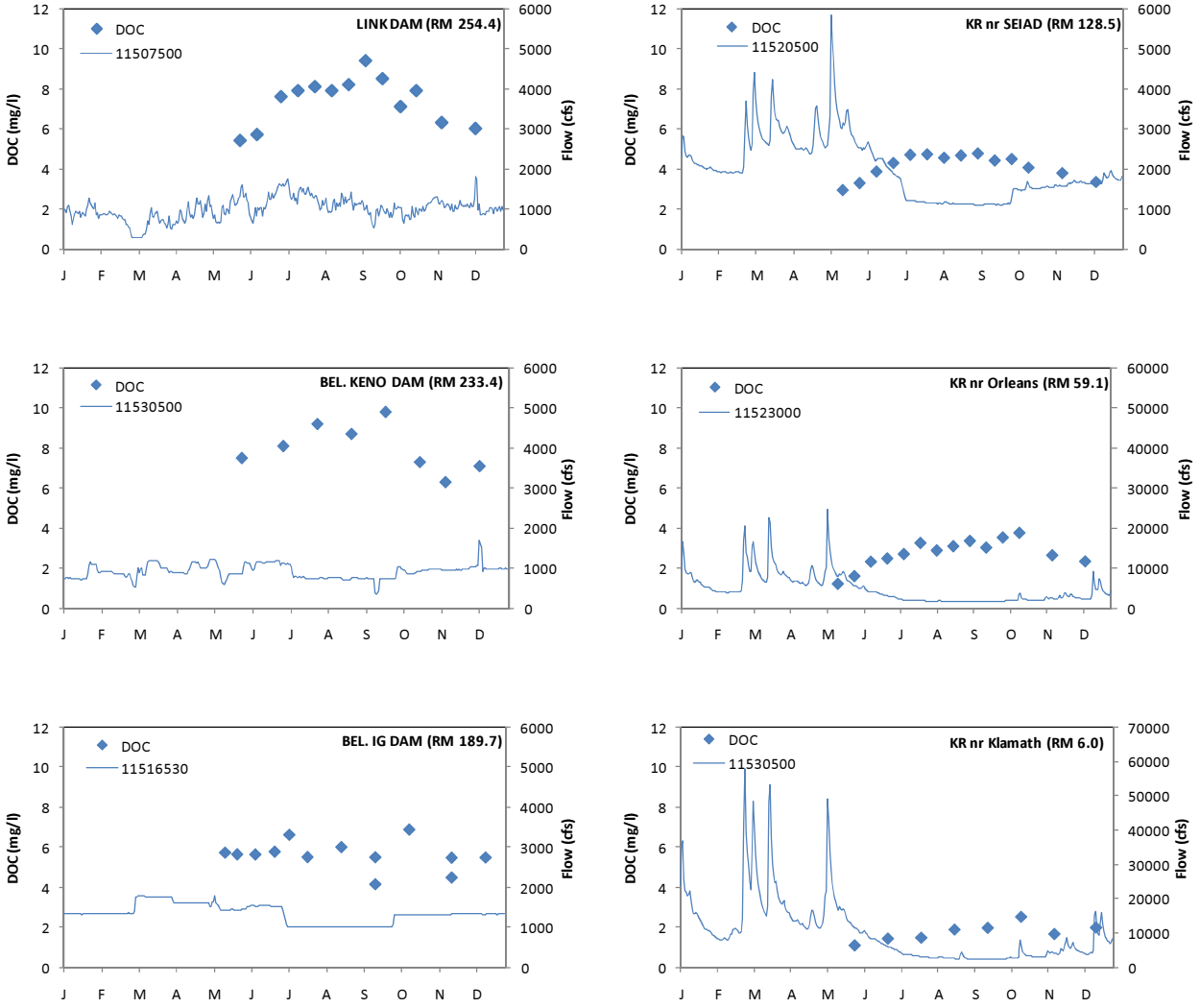


**Figure 6. 2009 KHSA sampling program dissolved organic carbon and flow at USGS flow gage locations (station number provided in legend) for the mainstem Klamath and Link Rivers. Note that the flow scale on the right hand side is not the same for each graph.**

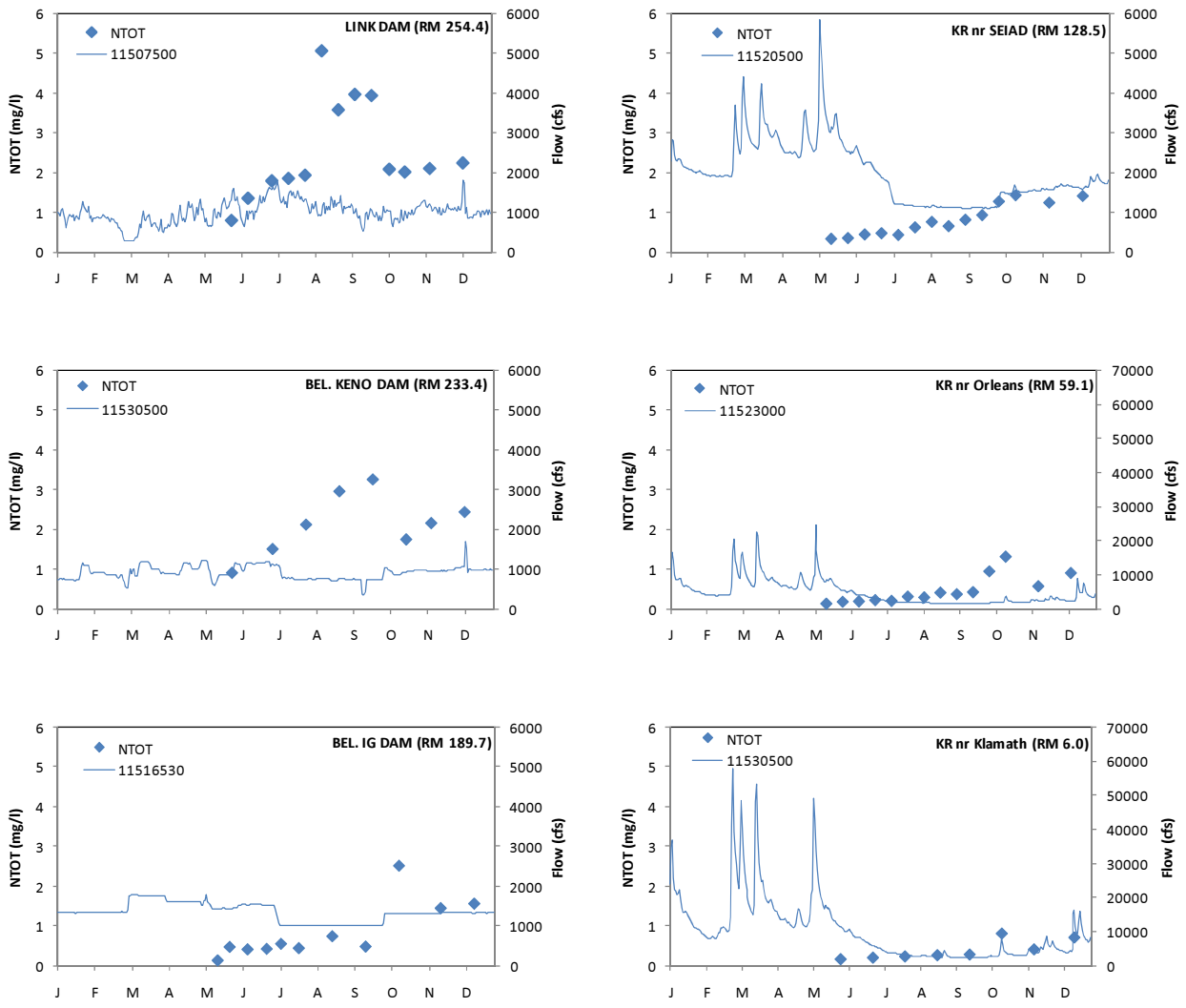


**Figure 7. 2009 KHSA sampling program total nitrogen and flow at USGS flow gage locations (station number provided in legend) for the mainstem Klamath and Link Rivers. Note that the flow scale on the right hand side is not the same for each graph.**

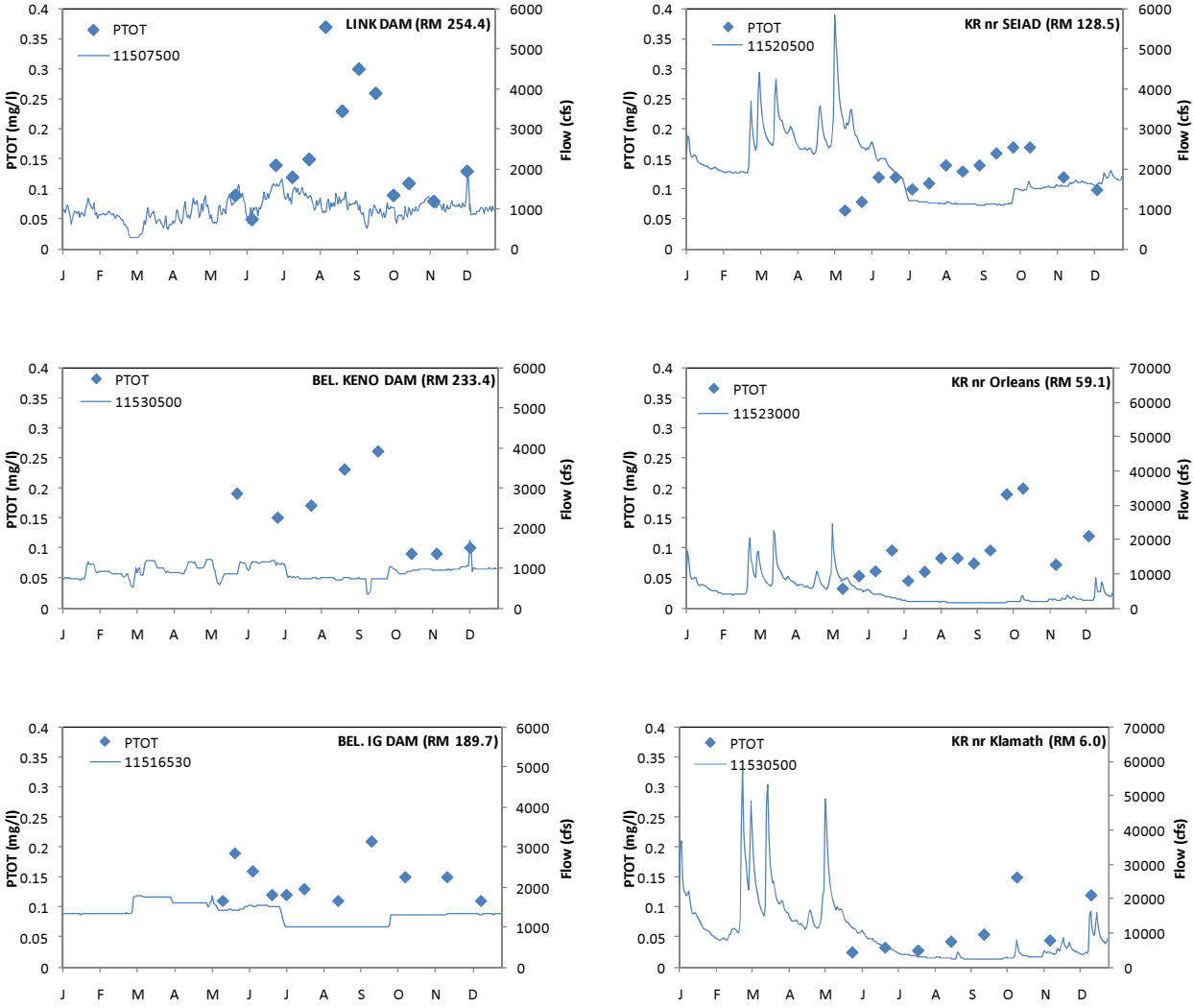


**Figure 8. 2009 KHSA sampling program total phosphorus and flow at USGS flow gage locations (station number provided in legend) for the mainstem Klamath and Link Rivers. Note that the flow scale on the right hand side is not the same for each graph.**

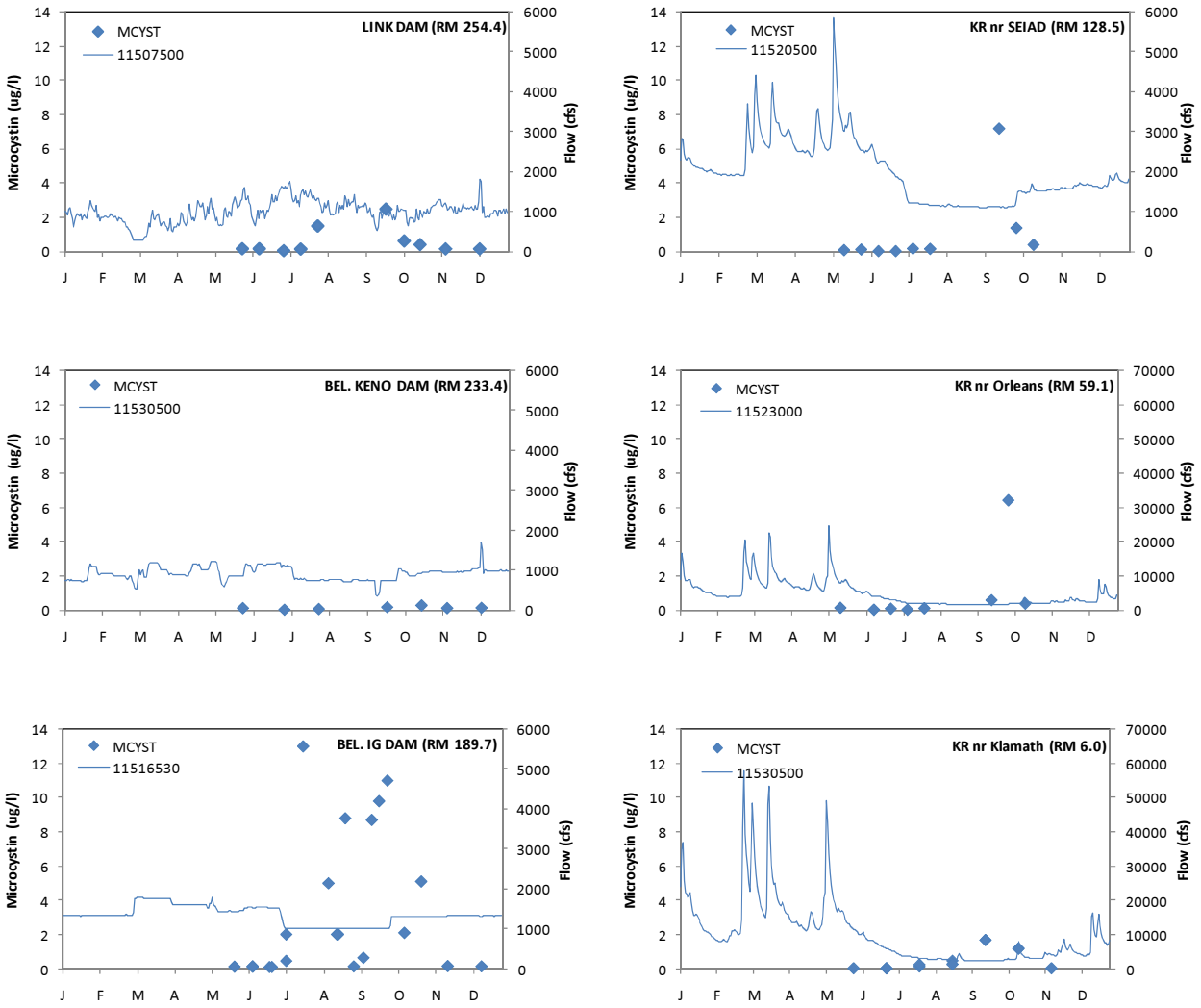


**Figure 9. 2009 KHSA baseline sampling program microcystin and flow at USGS flow gage locations (station number provided in legend) for the mainstem Klamath and Link Rivers. Note that the flow scale on the right hand side is not the same for each graph; also, the microcystin data presented herein do not include public health monitoring data.**

# 6. References

Karuk Tribe (Karuk). 2009. Mid-Klamath River Nutrient, Periphyton, Phytoplankton and Algal Toxin Sampling Analysis Plan (SAP). February.

KHSA Working Group (KHSA-WG). 2010. Klamath River Baseline Sampling Program QA Comparison. Prepared for the KHSA Water Quality Program Working Group by M. Deas, Watercourse Engineering, Inc. and K. Fetcho, Yurok Tribe Environmental Program. May 4.

KHSA Working Group (KHSA-WG). 2009. 2009 Klamath River AIP Sampling Lab Cross Comparison (DRAFT). Prepared for the KHSA Water Quality Program Working Group Prepared by M. Deas and J. Vaughn, Watercourse Engineering, Inc. April 2.

PacifiCorp. 2008. Quality Assurance Project Plan. 2009 Baseline Water Quality Monitoring by PacifiCorp, Interim Measure 12, Part 2.

United States Bureau of Reclamation (USBR). 2005. Standard Operating Procedures for Quality Assurance. Revision 2005-01. Prepared by Environmental Monitoring Branch. January.

Yurok Tribe (Yurok). 2008. Lower Klamath River Nutrient, Periphyton, Phytoplankton and Algal Toxin Sampling Analysis Plan (SAP). June

# 7. Appendices

## *Appendix A: Sampling Location and Data Summary*

**Table 4. Klamath River mainstem and tributary sampling locations**

| Site ID | Sampling Method: | Site Type | River Mile | Sampling Entity |
|---|---|---|---|---|
| **KR2544** | Link Dam | Mainstem | 254.4 | USBR |
| **KR2460** | Keno Reservoir at Miller Island | Mainstem | 246.0 | USBR |
| **KR2334** | Klamath River below Keno Dam | Mainstem | 233.4 | USBR |
| **KR2282** | Klamath River above J.C. Boyle Reservoir | Mainstem | 228.2 | PacifiCorp |
| **KR2260** | J.C. Boyle Reservoir | Reservoir | - | PacifiCorp |
| **KR2240** | Klamath River below J.C. Boyle Dam | Mainstem | 224.0 | PacifiCorp |
| **KR2195** | Klamath River below USGS Gage | Mainstem | 219.5 | PacifiCorp |
| **KR2064** | KR above Shovel Creek (Stateline) | Mainstem | 206.4 | PacifiCorp |
| **KR1990** | Copco Reservoir | Reservoir | - | PacifiCorp |
| **KR1950** | Klamath River below Copco Dam | Mainstem | 195.0 | PacifiCorp |
| **KR1920** | Iron Gate Reservoir | Reservoir | - | PacifiCorp |
| **KR1897** | Klamath River below Iron Gate Dam | Mainstem | 189.7 | PacifiCorp |
| **KR1560** | Klamath River at Walker Bridge Road | Mainstem | 156.0 | Karuk |
| **KR1285** | Klamath River below Seiad | Mainstem | 128.5 | Karuk |
| **KR1060** | Klamath River at Happy Camp | Mainstem | 106.0 | Karuk |
| **KR0591** | Klamath River at Orleans (USGS) | Mainstem | 59.1 | Karuk |
| **KR0435** | Klamath River At Weitchpec | Mainstem | 43.5 | Yurok |
| **KR0385** | Klamath River below Trinity River | Mainstem | 42.5 | Yurok |
| **KR0060** | Klamath River near Klamath | Mainstem | 6.0 | Yurok |
| **KR0005** | Klamath River Estuary | Mainstem | 0.5 | Yurok |
| **SHR00** | Shasta River near mouth | Tributary | - | Karuk |
| **SCR00** | Scott River near mouth | Tributary | - | Karuk |
| **SAR00** | Salmon River near mouth | Tributary | - | Karuk |
| **TRR00** | Trinity River near mouth | Tributary | - | Yurok |

# *Sampling Data – KHSA 2009*

| Date | Time | Sample ID | Site ID | Site Name | Agency | Depth | Water Temp. | pH | Specific Cond. | Diss. Oxygen | Algae, Chloroph-a | Algae, Pheophytin | Alkalinity | Carbon, Diss. Organic Carbon | Carbon, Particulate Carbon | Demand, Carbonaceous Biological Oxygen Demand | Nitrogen, Ammonia | Nitrogen, Nitrate+ Nitrite | Nitrogen, Particulate Nitrogen | Nitrogen, Total Kjeldahl Nitrogen | Nitrogen, Total Nitrogen | Phosphorus, Ortho-Phosphate | Phosphorus, Total Phosphorus | Solids, Total Susp. Solids | Solids, Volatile Susp. Solids | Toxins, Microcystin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | m | C | - | uS/cm | mg/l | ug/l | ug/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 | ug/l |
| 5/27/09 | 6:50 | 2009AIP-001 | KR2544 | Link Dam | USBR | 0.5 | 17.28 | 7.8 | 111 | 7.35 | 19 | | 53 | 5.4 | 4.53 | | 0.07 | 0.01j | | 0.8 | 0.8 | <0.01 | 0.09 | 40 | 8 | 0.16j |
| 6/10/09 | 7:30 | 2009AIP-004 | KR2544 | Link Dam | USBR | 0.5 | 17.4 | 9.29 | 111 | 9.06 | 10.2 | | 54 | 5.7 | 6.13 | 7 | 0.08 | 0.03j | | 1.3 | 1.36 | <0.01 | 0.05 | 6 | 3j | 0.16j |
| 6/30/09 | 7:05 | 2009AIP-011 | KR2544 | Link Dam | USBR | 0.5 | 20.55 | 9.66 | 112 | 8.67 | 163 | | 50 | 7.6 | 9.5 | 13 | 0.12 | 0.02j | | 1.8 | 1.8 | 0.02j | 0.14 | 7 | 6 | <0.09 |
| 7/14/09 | 8:30 | 2009AIP-018 | KR2544 | Link Dam | USBR | 0.5 | 19.67 | 9.61 | 111 | 8.68 | 14.6 | | 53 | 7.9 | 6.53 | 10 | 0.11 | 0.02j | | 1.8 | 1.86 | <0.01 | 0.12 | 10 | 7 | 0.14j |
| 7/28/09 | 7:40 | 2009AIP-024 | KR2544 | Link Dam | USBR | 0.5 | 23.88 | 8.78 | 119 | 8.37 | 22.1 | | 57 | 8.1 | 5.58 | 7 | 0.13 | 0.06 | | 1.9 | 1.94 | 0.04j | 0.15 | 7 | 5j | 1.5 |
| 8/11/09 | 8:00 | 2009AIP-030 | KR2544 | Link Dam | USBR | 0.5 | 20.33 | 9.81 | 118 | 9.26 | 631 | | 58 | 7.9 | 23.2 | 23 | 0.16 | 0.03j | | 5.1 | 5.08 | 0.02j | 0.37 | 24 | 18 | |
| 8/25/09 | 7:05 | 2009AIP-038 | KR2544 | Link Dam | USBR | 0.5 | 19.88 | 9.99 | 118 | 9.33 | 158 | | 58 | 8.2 | 11.6 | 18 | 0.14 | 0.02j | | 3.6 | 3.59 | 0.05 | 0.23 | 19 | 14 | 4.1 |
| 9/8/09 | 8:00 | 2009AIP-043 | KR2544 | Link Dam | USBR | 0.5 | 16.18 | 9.89 | 113 | 8.43 | 4.4 | | 54 | 9.4 | 12.1 | 17 | 0.22 | <0.01 | | 4 | 3.98 | 0.06 | 0.3 | 21 | 13 | 5.5 |
| 9/22/09 | 7:40 | 2009AIP-050 | KR2544 | Link Dam | USBR | 0.5 | 16.03 | 9.58 | 112 | 8.47 | missing | | 59 | 8.5 | | 10 | 0.18 | 0.04j | | 3.9 | 3.95 | 0.05 | 0.26 | 15 | 8 | 2.5 |
| 10/7/09 | 8:45 | 2009AIP-056 | KR2544 | Link Dam | USBR | 0.5 | 8.11 | 8.04 | 119 | 9.17 | 3.9 | | 55 | 7.1 | 1.8 | | 0.2 | 0.3 | | 1.8 | 2.09 | <0.01 | 0.09 | 7 | 2j | 0.62 |
| 10/20/09 | 7:30 | 2009AIP-060 | KR2544 | Link Dam | USBR | 0.5 | 10.93 | 7.7 | 124 | 6.96 | 2 | | 61 | 7.9 | | 3 | 0.4 | 0.33 | | 1.7 | 2.02 | 0.01j | 0.11 | 5j | 2j | 0.4 |
| 11/10/09 | 8:30 | 2009AIP-068 | KR2544 | Link Dam | USBR | 0.5 | 5.17 | 7.6 | 128 | 8.86 | 8.8 | | 58 | 6.3 | | <3 | 0.71 | 0.36 | | 1.7 | 2.11 | <0.01 | 0.08 | 11 | 3j | 0.15j |
| 12/8/09 | 10:45 | 2009AIP-076 | KR2544 | Link Dam | USBR | 0.5 | 1.87 | 7.77 | 133 | 11.33 | 2 | | 59 | 6 | 2.18 | <3 | 0.84 | 0.4 | | 1.8 | 2.25 | <0.01 | 0.13 | 27 | 3j | 0.15j |
| 5/27/09 | 9:10 | 2009AIP-002 | KR2460 | Keno Reservoir at Miller Island | USBR | 0.5 | 18.31 | 8.04 | 120 | 8.25 | 26.3 | | 55 | 5.5 | 1.94 | | 0.07 | <0.01 | | 0.7 | 0.7 | 0.03j | 0.07 | 11 | 3j | 0.16j |
| 6/30/09 | 8:40 | 2009AIP-014 | KR2460 | Keno Reservoir at Miller Island | USBR | 0.5 | 21.66 | 8.76 | 117 | 2.14 | 26.3 | | 52 | 7.2 | 4.49 | | 0.44 | 0.09 | | 1.9 | 2 | 0.03j | 0.13 | 8 | 6 | <0.09 |
| 7/28/09 | 9:20 | 2009AIP-027 | KR2460 | Keno Reservoir at Miller Island | USBR | 0.5 | 23.75 | 7.39 | 129 | 2.56 | 8.8 | | 58 | 7.9 | 2 | | 0.53 | 0.05 | | 1.5 | 1.57 | 0.06 | 0.12 | 3j | 2j | 0.66 |
| 8/25/09 | 9:00 | 2009AIP-040 | KR2460 | Keno Reservoir at Miller Island | USBR | 0.5 | 21.71 | 9.29 | 127 | 0.8 | 35 | | 63 | 8.3 | 7.7 | | 0.91 | 0.01j | | 4.1 | 4.1 | 0.09 | 0.32 | 17 | 14 | |
| 9/22/09 | 9:20 | 2009AIP-053 | KR2460 | Keno Reservoir at Miller Island | USBR | 0.5 | 17.34 | 8.52 | 146 | 0.51 | missing | | 70 | 9.7 | | | 1.59 | 0.03j | | 3.8 | 3.78 | 0.11 | 0.35 | 9 | 5j | 0.25 |
| 10/20/09 | 9:30 | 2009AIP-065 | KR2460 | Keno Reservoir at Miller Island | USBR | 0.5 | 11.56 | 7.25 | 145 | 3.23 | 8.8 | | 64 | 7.5 | | | 0.77 | 0.33 | | 1.8 | 2.1 | 0.03j | 0.1 | 4j | 2j | 0.45 |
| 11/10/09 | 11:10 | 2009AIP-073 | KR2460 | Keno Reservoir at Miller Island | USBR | 0.5 | 6.56 | 7.46 | 129 | 7.65 | 4.8 | | 58 | 6.1 | | | 0.92 | 0.45 | | 1.7 | 2.16 | 0.03j | 0.1 | 6 | <2 | 0.18 |
| 12/8/09 | 10:00 | 2009AIP-081 | KR2460 | Keno Reservoir at Miller Island | USBR | 0.5 | 0.32 | 7.7 | 159 | 10.73 | 5.1 | | 65 | 6 | 1.8 | | 0.93 | 0.47 | | 2 | 2.48 | 0.03j | 0.13 | 35 | 5j | 0.17j |
| 5/27/09 | 11:50 | 2009AIP-003 | KR2334 | Klamath River bel. Keno Dam | USBR | 0.5 | 18.7 | 8.5 | 182 | 8.67 | 35 | | 74 | 7.5 | 2.6 | | 0.11 | <0.01 | | 0.9 | 0.9 | 0.14 | 0.19 | 13 | 4j | 0.14j |
| 6/10/09 | 10:40 | 2009AIP-009 | KR2334 | Klamath River bel. Keno Dam | USBR | 0.5 | 18.08 | 9.24 | 190 | 9.52 | | | | | | 7 | | | | | | | | | | |
| 6/30/09 | 7:50 | 2009AIP-015 | KR2334 | Klamath River bel. Keno Dam | USBR | 0.5 | 20.9 | 8.91 | 128 | 7.84 | 23.8 | | 55 | 8.1 | 3.93 | 6 | 0.15 | 0.04j | | 1.5 | 1.5 | 0.05 | 0.15 | 7 | 5j | <0.09 |
| 7/14/09 | 11:00 | 2009AIP-023 | KR2334 | Klamath River bel. Keno Dam | USBR | 0.5 | 20.68 | 7.9 | 181 | 7.28 | | | | | | 4 | | | | | | | | | | |
| 7/28/09 | 10:50 | 2009AIP-028 | KR2334 | Klamath River bel. Keno Dam | USBR | 0.5 | 26.61 | 8.25 | 148 | 7.6 | 26.3 | | 66 | 9.2 | 2.94 | 3 | 0.66 | 0.02j | | 2.1 | 2.11 | 0.07 | 0.17 | 5j | 3j | 0.09j |
| 8/11/09 | 10:00 | 2009AIP-036 | KR2334 | Klamath River bel. Keno Dam | USBR | 0.5 | 19.69 | 8.51 | 152 | 8.37 | | | | | | 5 | | | | | | | | | | |
| 8/25/09 | 10:30 | 2009AIP-041 | KR2334 | Klamath River bel. Keno Dam | USBR | 0.5 | 20.48 | 8.75 | 151 | 7.3 | 18 | | 57 | 8.7 | 2.33 | 5 | 0.95 | 0.02j | | 2.9 | 2.95 | 0.12 | 0.23 | 6 | 4j | |
| 9/8/09 | 11:00 | 2009AIP-049 | KR2334 | Klamath River bel. Keno Dam | USBR | 0.5 | 18.12 | 8.16 | 139 | 7.38 | | | | | | 3 | | | | | | | | | | |
| 9/22/09 | 10:45 | 2009AIP-054 | KR2334 | Klamath River bel. Keno Dam | USBR | 0.5 | 18.2 | 8.2 | 170 | 7.64 | missing | | 74 | 9.8 | | 3 | 1.19 | 0.04j | | 3.2 | 3.25 | 0.11 | 0.26 | 5j | 3j | 0.2 |
| 10/20/09 | 11:00 | 2009AIP-066 | KR2334 | Klamath River bel. Keno Dam | USBR | 0.5 | 10.77 | 7.47 | 161 | 8.94 | 7.3 | | 70 | 7.3 | | <3 | 0.59 | 0.36 | | 1.4 | 1.74 | 0.04j | 0.09 | 3j | <2 | 0.3 |
| 11/10/09 | 12:45 | 2009AIP-074 | KR2334 | Klamath River bel. Keno Dam | USBR | 0.5 | 7.1 | 7.66 | 141 | 10.55 | 5.8 | | 60 | 6.3 | | <3 | 0.71 | 0.52 | | 1.6 | 2.15 | 0.03j | 0.09 | 6 | <2 | 0.14j |
| 12/8/09 | 8:30 | 2009AIP-082 | KR2334 | Klamath River bel. Keno Dam | USBR | 0.5 | 0.84 | 7.6 | 195 | 11.84 | 16 | | 68 | 7.1 | 1.64 | <3 | 0.84 | 0.54 | | 1.9 | 2.43 | 0.02j | 0.1 | 20 | 2j | 0.16j |
| 5/25/09 | 13:00 | KR9055 | KR2282 | Klamath River ab. JC Boyle Res. | PacifiCorp | 0.5 | 20.42 | 8.5 | 192.9 | 8.33 | 27.58 | 9.52 | | 7.22 | 2.27 | | <0.0087 | 0.049 | 0.372 | | 0.81 | 0.19 | 0.28 | 13.2 | 3.2 | 0.14j |
| 6/23/09 | 21:20 | KR9070 | KR2282 | Klamath River ab. JC Boyle Res. | PacifiCorp | 0.5 | 19.03 | 7.76 | 205 | 7.89 | | | 78.3 | 8.15 | | | 0.12 | 0.4 | | | 1.04 | 0.095 | 0.12 | 6 | 1.6j | |
| 7/21/09 | 13:50 | KR9130 | KR2282 | Klamath River ab. JC Boyle Res. | PacifiCorp | 0.5 | 25.16 | 7.71 | 144 | 7.93 | 1.13 | 2.42 | 57.6 | 8.42 | 0.876 | | 0.086 | 0.76 | 0.156 | | 1.4 | 0.19 | 0.2 | 3.6 | 2.4 | |
| 8/19/09 | 11:20 | KR9163 | KR2282 | Klamath River ab. JC Boyle Res. | PacifiCorp | 0.5 | 21.3 | 7.61 | 143.4 | 3.86 | 5.95 | 9.7 | 57.9 | 8.22 | 1.46 | | 0.13 | 0.99 | 0.242 | | 2.47 | 0.22 | 0.23 | 5.2 | <0.87 | |
| 9/16/09 | 12:45 | KR9202 | KR2282 | Klamath River ab. JC Boyle Res. | PacifiCorp | 0.5 | 19.53 | 7.99 | 140 | 9.23 | 4.06 | 10.56 | 54 | 9.75 | 0.525 | | 0.014j | 1.55 | 0.0634 | | 2.18 | 0.24 | 0.3 | 4.8 | 1.6j | |
| 10/14/09 | missing | KR9240 | KR2282 | Klamath River ab. JC Boyle Res. | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 11/18/09 | 11:35 | KR9271 | KR2282 | Klamath River ab. JC Boyle Res. | PacifiCorp | 0.5 | 4.52 | 7.67 | 160.1 | 17.64 | 3.67 | 2.9 | 59 | 6.22 | 0.536 | | 0.36 | 0.95 | 0.0937 | | 2.12 | 0.12 | 0.11 | 4.4 | <0.87 | |
| 12/16/09 | missing | KR9298 | KR2282 | Klamath River ab. JC Boyle Res. | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 5/25/09 | 11:30 | KR9053 | KR2260 | JC Boyle Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | 19.93 | 4.49 | | 7.92 | 1.83 | | <0.0087 | <0.0057 | 0.31 | | 0.69 | 0.18 | 0.29 | 6 | 2.4 | 0.11j |
| 5/25/09 | 11:35 | KR9054 | KR2260 | JC Boyle Reservoir | PacifiCorp | 8 | 18.19 | 7.67 | 201.9 | 7.35 | | | | 8.08 | 1.88 | | 0.014j | 0.05 | 0.31 | | 0.79 | 0.2 | 0.27 | 6.8 | 2 | 0.14j |
| 6/23/09 | 20:15 | KR9072 | KR2260 | JC Boyle Reservoir | PacifiCorp | 8 | 17.87 | 7.53 | 202.3 | 6.94 | | | 80.7 | 0.27j | | 8.56 | 0.22 | 0.91 | | | 0.15j | 0.1 | 4.8 | 2.4 | | <0.09 |
| 6/23/09 | 20:30 | KR9071 | KR2260 | JC Boyle Reservoir | PacifiCorp | 0.5 | 20.59 | 8.16 | 200.8 | 8.93 | | | 77.1 | 8.52 | | | 0.12 | 0.26 | | | 0.85 | 0.095 | 0.13 | 4 | 1.6j | <0.09 |
| 7/21/09 | 10:40 | KR9128 | KR2260 | JC Boyle Reservoir | PacifiCorp | 0.5 | 24.23 | 7.51 | 153.3 | 6.85 | 0.74 | 2.79 | 60 | 8.96 | 1.1 | | 0.35 | 0.63 | 0.214 | | 1.52 | 0.22 | 0.24 | 1.6j | <0.87 | |
| 7/21/09 | 11:00 | KR9129 | KR2260 | JC Boyle Reservoir | PacifiCorp | 8 | 21.55 | 7.1 | 152.7 | 3.67 | 0.94 | 2.33 | 61.3 | 8.78 | 0.579 | | 0.18 | 0.66 | 0.117 | | 1.41 | 0.18 | 0.23 | 3.2 | 2 | |
| 8/19/09 | 12:30 | KR9161 | KR2260 | JC Boyle Reservoir | PacifiCorp | 0.5 | 22.18 | 7.65 | 146.9 | 4.02 | 3.98 | 4.29 | 59.7 | 7.97 | 0.946 | | 0.13 | 0.89 | 0.216 | | 2 | 0.19 | 0.18 | 2 | <0.87 | 0.37 |
| 8/19/09 | 12:40 | KR9162 | KR2260 | JC Boyle Reservoir | PacifiCorp | 8 | 19.51 | 7.12 | 152.8 | 2.4 | 4.22 | 6.59 | 61.1 | 8.48 | 1 | | 0.21 | 0.87 | 0.184 | | 2.01 | 0.21 | 0.21 | 4.8 | <0.87 | 0.24 |
| 9/16/09 | 9:30 | KR9200 | KR2260 | JC Boyle Reservoir | PacifiCorp | 0.5 | 18.67 | 7.23 | 151.5 | 5.79 | 0.62 | 1.97 | 58 | 8.35 | 0.943 | | 0.16 | 1.12 | 0.127 | | 1.52 | 0.22 | 0.31 | 2 | <0.87 | <0.09 |
| 9/16/09 | 9:40 | KR9201 | KR2260 | JC Boyle Reservoir | PacifiCorp | 8 | 18.03 | 7.12 | 153.4 | 4.65 | 1.84 | 5.97 | 58 | 9.67 | 1.15 | | 0.3 | 1.16 | 0.17 | | 1.71 | 0.25 | 0.35 | 2.8 | <0.87 | 0.09j |
| 10/14/09 | 10:35 | KR9238 | KR2260 | JC Boyle Reservoir | PacifiCorp | 0.5 | 10.47 | 7.47 | 167.5 | 9.29 | 2.4 | 4.06 | 67 | 8.04 | 0.483 | | 0.15 | 0.85 | 0.0928 | 1.32 | 2.9 | 0.095 | 0.14 | 2 | 1.2j | |
| 10/14/09 | 10:40 | KR9239 | KR2260 | JC Boyle Reservoir | PacifiCorp | 8 | 10.42 | 7.72 | 168.8 | 9.5 | 2.09 | 3.99 | 67 | 7.86 | 0.648 | | 0.17 | 0.84 | 0.113 | 1.22 | 2.62 | 0.1 | 0.21 | 3.2 | 1.6j | |
| 11/18/09 | 12:35 | KR9269 | KR2260 | JC Boyle Reservoir | PacifiCorp | 0.5 | 4.19 | 7.58 | 149.1 | 10.78 | 2.09 | 2.41 | 59 | 5.87 | 0.474 | | 0.36 | 0.92 | 0.087 | | 2.03 | 0.08 | 0.1 | 4 | 1.6j | 0.15j |
| 11/18/09 | 12:45 | KR9270 | KR2260 | JC Boyle Reservoir | PacifiCorp | 8 | 4.15 | 7.52 | 151.1 | 10.82 | 2.95 | 2.27 | 57 | 6.17 | 0.547 | | 0.34 | 0.93 | 0.0893 | | 2.1 | 0.11 | 0.094 | 2.8 | <0.87 | 0.14j |
| 12/16/09 | missing | KR9296 | KR2260 | JC Boyle Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 12/16/09 | missing | KR9297 | KR2260 | JC Boyle Reservoir | PacifiCorp | 8 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 5/25/09 | 10:45 | KR9046 | KR2240 | Klamath River bel. JC Boyle Dam | PacifiCorp | 0.5 | 19.7 | 8.19 | 203.2 | 7.9 | 25.19 | 5.69 | | 7.83 | 2.01 | | <0.0087 | 0.027 | 0.343 | | 0.82 | 0.19 | 0.26 | 8.8 | 2.4 | |
| 6/23/09 | 17:40 | KR9069 | KR2240 | Klamath River bel. JC Boyle Dam | PacifiCorp | 0.5 | 19.38 | 7.8 | 189.2 | 8.92 | | | 75.6 | 9.78 | | | 0.18 | 0.28 | | | 0.91 | 0.14 | 0.15 | 4.8 | 1.2j | |
| 7/21/09 | 11:40 | KR9125 | KR2240 | Klamath River bel. JC Boyle Dam | PacifiCorp | 0.5 | 23.33 | 7.46 | 151.3 | 7.95 | 0.96 | 2.05 | 60.6 | 9.74 | 0.785 | | 0.22 | 0.69 | 0.141 | | 1.46 | 0.19 | 0.21 | 2.8 | <0.87 | |
| 8/19/09 | 14:25 | KR9157 | KR2240 | Klamath River bel. JC Boyle Dam | PacifiCorp | 0.5 | 21.42 | 7.55 | 147.8 | 4.32 | 3.99 | 6.37 | 59.7 | 7.73 | 1.24 | | 0.14 | 0.92 | 0.212 | | 2.09 | 0.19 | 0.21 | 3.2 | <0.87 | |
| 8/19/09 | 14:40 | KR9160MS | KR2240 | Klamath River bel. JC Boyle Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | 4.21 | | | | | | | | | | | | |
| 9/16/09 | 11:40 | KR9196 | KR2240 | Klamath River bel. JC Boyle Dam | PacifiCorp | 0.5 | 18.52 | 7.7 | 145 | 9.6 | 1.72 | 4.54 | 58 | 8.2 | 0.697 | | 0.19 | 1.21 | 0.102 | | 1.75 | 0.25 | 0.29 | 1.2j | <0.87 | 11 |
| 10/14/09 | 11:45 | KR9234 | KR2240 | Klamath River bel. JC Boyle Dam | PacifiCorp | 0.5 | 10.53 | 7.61 | 168 | 10.32 | 2.03 | 4.87 | 69 | 7.92 | 0.673 | | 0.13 | 0.87 | 0.11 | 1.25 | 3.15 | 0.13 | 0.12 | 3.2 | <0.87 | |
| 11/18/09 | 10:30 | KR9265 | KR2240 | Klamath River bel. JC Boyle Dam | PacifiCorp | 0.5 | 4.1 | 7.65 | 148.5 | 11.19 | 2.38 | 2.16 | 58 | 5.81 | 0.421 | | 0.3 | 0.95 | 0.067 | | 2 | 0.09 | 0.099 | 2 | <0.87 | |
| 12/16/09 | 10:45 | KR9292 | KR2240 | Klamath River bel. JC Boyle Dam | PacifiCorp | 0.5 | 0.84 | 7.79 | 169.7 | 17.18 | 5.47 | 3.83 | 65.2 | 6.22 | 1 | 3.36 | 0.58 | 0.77 | 0.167 | | 2.3 | 0.05 | 0.086 | 12.4 | 2.4 | 0.14j |
| 5/25/09 | 10:00 | KR9052 | KR2195 | Klamath River bel. USGS Gage | PacifiCorp | 0.5 | 19.37 | 8.06 | 206.2 | 8.38 | 25.27 | 5.43 | | 8.06 | 1.77 | | <0.0087 | 0.041 | 0.312 | | 0.72 | 0.21 | 0.26 | 7.2 | 1.2j | 0.12j |
| 6/23/09 | 15:52 | KR9075 | KR2195 | Klamath River bel. USGS Gage | PacifiCorp | 0.5 | 19.5 | 7.29 | 188.8 | 8.66 | | | 73.8 | 7.97 | | | 0.1 | 0.29 | | | 0.91 | 0.095 | 0.12 | 3.6 | 1.2j | 0.09j |
| 7/21/09 | 12:50 | KR9124 | KR2195 | Klamath River bel. USGS Gage | PacifiCorp | 0.5 | 23.32 | 7.4 | 150 | 8.97 | 3.19 | 2.7 | 60 | 9.05 | 0.678 | | 0.17 | 0.71 | 0.13 | | 1.51 | 0.19 | 0.2 | 3.2 | 2 | |
| 8/19/09 | 13:15 | KR9158 | KR2195 | Klamath River bel. USGS Gage | PacifiCorp | 0.5 | 21.24 | 7.47 | 147.9 | 4.13 | 4.88 | 6.07 | 60.6 | 8.57 | 1.01 | | 0.12 | 0.92 | 0.191 | | 2.08 | 0.19 | 0.19 | 2.8 | <0.87 | 0.26 |
| 9/16/09 | 10:10 | KR9197 | KR2195 | Klamath River bel. USGS Gage | PacifiCorp | 0.5 | 13.17 | 8.09 | 148.5 | 11.22 | 0.57 | 1.33 | 66 | 2.56 | 0.346 | | <0.0087 | 0.55 | 0.0407 | | 0.42 | 0.14 | 0.18 | <0.87 | <0.87 | <0.09 |
| 9/16/09 | 10:10 | KR9197MS | KR2195 | Klamath River bel. USGS Gage | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | 6.69 | | | | | | | | | | | | |
| 10/14/09 | 14:00 | KR9235 | KR2195 | Klamath River bel. USGS Gage | PacifiCorp | 0.5 | 10.55 | 7.57 | 167.9 | 11.52 | 1.93 | 4.11 | 67 | 7.43 | 0.273 | | 0.1 | 0.88 | 0.053 | 1.28 | 2.82 | 0.11 | 0.098 | 4.4 | 1.2j | |
| 11/18/09 | 9:45 | KR9266 | KR2195 | Klamath River bel. USGS Gage | PacifiCorp | 0.5 | 4.24 | 7.68 | 147.8 | 10.76 | 2.59 | 2.26 | 57 | 5.69 | 0.514 | | 0.28 | 0.97 | 0.0848 | | 1.95 | 0.07 | 0.091 | 2.8 | <0.87 | 0.18 |
| 12/16/09 | 12:00 | KR9293 | KR2195 | Klamath River bel. USGS Gage | PacifiCorp | 0.5 | 1.02 | 7.7 | 168.8 | 12.55 | 5.77 | 3.78 | 64.2 | 6.26 | 1.04 | | 0.58 | 0.78 | 0.185 | | 2.36 | 0.06 | 0.1 | 12.4 | 2 | 0.16j |

| Date | Time | Sample ID | Site ID | Site Name | Agency | Depth | Water Temp. | pH | Specific Cond. | Diss. Oxygen | Algae, Chloroph-a | Algae, Pheophytin | Alkalinity | Carbon, Diss. Organic Carbon | Carbon, Particulate Carbon | Demand, Carbonaceous Biological Oxygen Demand | Nitrogen, Ammonia | Nitrogen, Nitrate+ Nitrite | Nitrogen, Particulate Nitrogen | Nitrogen, Total Kjeldahl Nitrogen | Nitrogen, Total Nitrogen | Phosphorus, Ortho-Phosphate | Phosphorus, Total Phosphorus | Solids, Total Susp. Solids | Solids, Volatile Susp. Solids | Toxins, Microcystin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | m | C | - | uS/cm | mg/l | ug/l | ug/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 | ug/l |
| 5/23/09 | 8:00 | KR9050 | KR2064 | Klamath River ab. Shovel Ck | PacifiCorp | 0.5 | 20.26 | 8.66 | 210.3 | 9.28 | 11.58 | 4.83 | | 7.78 | 2.75 | 4.7 | <0.0087 | 0.054 | 0.436 | | 0.82 | 0.17 | 0.24 | 10 | 3.2 | |
| 6/24/09 | 15:05 | KR9076 | KR2064 | Klamath River ab. Shovel Ck | PacifiCorp | 0.5 | 20.02 | 8.42 | 190.2 | 10.27 | | | 77.2 | 7.33 | | <2 | <0.0087 | 0.34 | | | 0.82 | 0.095 | 0.11 | 5.2 | 1.6j | <0.09 |
| 7/20/09 | 20:25 | KR9105 | KR2064 | Klamath River ab. Shovel Ck | PacifiCorp | 0.5 | 23.32 | 7.89 | 152.3 | 8.41 | 1.35 | 2.76 | 61.4 | 7.75 | 0.669 | 5.1 | <0.0087 | 0.84 | 0.141 | | 1.1 | 0.21 | 0.18 | 2.8 | 1.6j | |
| 8/17/09 | 19:00 | KR9138 | KR2064 | Klamath River ab. Shovel Ck | PacifiCorp | 0.5 | 20.84 | 8.05 | 144.3 | 11 | 4.86 | 4.71 | 59.4 | 7.75 | 0.983 | <2 | <0.0087 | 0.78 | 0.159 | | 1.58 | 0.18 | 0.16 | 4.4 | 1.2j | 0.17j |
| 9/15/09 | 16:30 | KR9177 | KR2064 | Klamath River ab. Shovel Ck | PacifiCorp | 0.5 | 16.6 | 8.63 | 153.1 | 11.28 | 0.54 | 1.18 | 65 | 3.26 | 0.449 | 7.62 | <0.0087 | 0.49 | 0.0589 | | 0.28 | 0.12 | 0.15 | <0.87 | <0.87 | <0.09 |
| 10/13/09 | 16:50 | KR9215 | KR2064 | Klamath River ab. Shovel Ck | PacifiCorp | 0.5 | 13.8 | 7.35 | 171.5 | 8.34 | 1.76 | 1.56 | 72 | 5.6 | 0.636 | <2 | 0.21 | 0.66 | 0.115 | 1.02 | 2.03 | 0.21 | 0.32 | 1.6j | <0.87 | |
| 11/16/09 | 16:20 | KR9246 | KR2064 | Klamath River ab. Shovel Ck | PacifiCorp | 0.5 | 7.49 | 7.87 | 146.1 | 11.66 | 1.57 | 2.19 | 62 | 2.98 | 0.439 | 6.3 | 0.018j | 0.63 | 0.067 | | 0.85 | 0.11 | 0.098 | 3.6 | <0.87 | 0.09j |
| 12/14/09 | 16:35 | KR9273 | KR2064 | Klamath River ab. Shovel Ck | PacifiCorp | 0.5 | 2.81 | 7.79 | 177 | 15.34 | 4.05 | 3.48 | 67.1 | 5.59 | 0.63 | 3.53 | 0.39 | 0.89 | 0.118 | | 2.03 | 0.1 | 0.15 | 11.2 | <0.87 | 0.15j |
| 6/8/09 | 12:15 | KR9059 | CRMC | Copco Reservoir Mallard Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 1.5 |
| 6/22/09 | 10:00 | KR9064 | CRMC | Copco Reservoir Mallard Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | <0.09 |
| 7/6/09 | 10:10 | KR9095 | CRMC | Copco Reservoir Mallard Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.25 |
| 7/20/09 | 9:55 | KR9100 | CRMC | Copco Reservoir Mallard Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 8700 |
| 8/3/09 | 10:50 | KR9133 | CRMC | Copco Reservoir Mallard Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 7500 |
| 8/17/09 | 12:00 | KR9177A | CRMC | Copco Reservoir Mallard Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 2000 |
| 8/31/09 | 11:40 | KR9167 | CRMC | Copco Reservoir Mallard Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 1000 |
| 9/14/09 | 9:45 | KR9172 | CRMC | Copco Reservoir Mallard Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 9/28/09 | 11:20 | KR9205 | CRMC | Copco Reservoir Mallard Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 73000 |
| 10/12/09 | 11:00 | KR9210 | CRMC | Copco Reservoir Mallard Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 290 |
| 6/8/09 | 13:30 | KR9060 | CRCC | Copco Reservoir Copco Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.18 |
| 6/22/09 | 11:25 | KR9065 | CRCC | Copco Reservoir Copco Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.23 |
| 7/6/09 | 11:25 | KR9096 | CRCC | Copco Reservoir Copco Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 50 |
| 7/20/09 | 11:20 | KR9101 | CRCC | Copco Reservoir Copco Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 2200 |
| 8/3/09 | 11:25 | KR9134 | CRCC | Copco Reservoir Copco Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 3800 |
| 8/17/09 | 13:07 | KR9178A | CRCC | Copco Reservoir Copco Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 62 |
| 8/31/09 | 13:00 | KR9168 | CRCC | Copco Reservoir Copco Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 22000 |
| 9/14/09 | 10:35 | KR9173 | CRCC | Copco Reservoir Copco Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 9/28/09 | 12:15 | KR9206 | CRCC | Copco Reservoir Copco Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 36000 |
| 10/12/09 | 11:40 | KR9211 | CRCC | Copco Reservoir Copco Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 3200 |
| 10/26/09 | 12:00 | KR9242 | CRCC | Copco Reservoir Copco Cove | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 27 |
| 5/24/09 | 11:00 | KR9035 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | 22.41 | 8.6 | 206.9 | 8.96 | 22.44 | 2.56 | | 6.05 | 1.88 | | <0.0087 | <0.0057 | 0.253 | | 0.59 | 0.13 | 0.18 | 8.4 | 3.6 | 0.15j |
| 5/24/09 | 11:05 | KR9036 | KR1990 | Copco Reservoir | PacifiCorp | 9 | 17.07 | 7.86 | 202.1 | 8.61 | 15.41 | 2.75 | | 6.28 | 1.16 | | <0.0087 | <0.0057 | 0.182 | | 0.51 | 0.15 | 0.2 | 3.6 | 1.2j | |
| 5/24/09 | 11:10 | KR9038 | KR1990 | Copco Reservoir | PacifiCorp | 18 | 11.01 | 7.2 | 225.8 | 3.61 | | | | 5.6 | 0.7 | | 0.36 | 0.036 | 0.104 | | 0.92 | 0.27 | 0.29 | 2.4 | 1.2j | |
| 5/24/09 | 11:15 | KR9039 | KR1990 | Copco Reservoir | PacifiCorp | 27 | missing | missing | missing | missing | | | | 5.83 | 1.72 | | <0.0087 | <0.0057 | 0.224 | | 0.52 | 0.14 | 0.24 | 4.4 | 2.4 | |
| 5/24/09 | 11:25 | KR9033 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.14j |
| 5/24/09 | 11:50 | KR9034 | KR1990 | Copco Reservoir | PacifiCorp | INT | 19.05 | 8.61 | 198.7 | 10.09 | 23.97 | 2.4 | | | | | | | | | | | | | | 0.13j |
| 6/24/09 | 12:25 | KR9080 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | 22.2 | 8.76 | 205.1 | 11.95 | | | 79.4 | 6.75 | | | <0.0087 | 0.083 | | | 0.49 | 0.095 | 0.16 | 2.4 | 1.6j | 0.19 |
| 6/24/09 | 12:55 | KR9081 | KR1990 | Copco Reservoir | PacifiCorp | 9 | 18.08 | 7.58 | 206.4 | 7.24 | | | 78.4 | 6.26 | | | 0.13 | 0.17 | | | 0.62 | 0.12073684 | 0.15 | <0.87 | <0.87 | |
| 6/24/09 | 13:35 | KR9082 | KR1990 | Copco Reservoir | PacifiCorp | 18 | 11.88 | 7.11 | 215.9 | 2.34 | | | 79.7 | 5.66 | | | 0.28 | 0.042 | | | 0.65 | 0.25 | 0.27 | 2.8 | 2 | |
| 6/24/09 | 13:55 | KR9083 | KR1990 | Copco Reservoir | PacifiCorp | 27 | 10.6 | 7.1 | 238.1 | 1.86 | | | 91.3 | 6.26 | | | 1 | <0.0057 | | | 0.84 | 0.62 | 0.73 | 3.2 | 2 | |
| 6/24/09 | 14:00 | KR9079 | KR1990 | Copco Reservoir | PacifiCorp | INT | missing | missing | missing | missing | | | | | | | | | | | | | | | | <0.09 |
| 7/21/09 | 14:00 | KR9116 | KR1990 | Copco Reservoir | PacifiCorp | INT | missing | missing | missing | missing | 5.64 | 2.2 | | | 0.689 | | | | 0.13 | | | | | | | |
| 7/21/09 | 14:00 | KR9117 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 7/22/09 | 14:00 | KR9120 | KR1990 | Copco Reservoir | PacifiCorp | 18 | missing | missing | missing | missing | 0.56 | 1.19 | 81.8 | 5.29 | 0.421 | | 0.37 | 0.15 | 0.0749 | | 0.45 | 0.31 | 0.33 | 1.2j | <0.87 | |
| 7/22/09 | 14:10 | KR9118 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | 24.73 | 8.71 | 163.7 | 10.94 | 22.01 | 1 | 67.5 | 6.37 | 3.25 | | 0.032j | 0.48 | 0.585 | | 0.92 | 0.12 | 0.16 | 5.6 | 5.6 | |
| 7/22/09 | 14:30 | KR9119 | KR1990 | Copco Reservoir | PacifiCorp | 9 | 20.69 | 7.43 | 168.7 | 5.49 | 0.63 | 3.14 | 68.4 | 5.47 | 0.608 | | 0.091 | 0.52 | 0.108 | | 0.69 | 0.22 | 0.15 | <0.87 | <0.87 | |
| 7/22/09 | 14:50 | KR9121 | KR1990 | Copco Reservoir | PacifiCorp | 27 | 10.95 | 7.2 | 235.8 | 2.03 | 0.56 | 0.83 | 93.8 | 5.99 | 0.579 | | 1.21 | <0.0057 | 0.117 | | 0.82 | 0.76 | 0.7 | <0.87 | <0.87 | |
| 8/18/09 | 14:39 | KR9150 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | 22.28 | 9.09 | 155.5 | 6.93 | | | | | | | | | | | | | | | | 100 |
| 8/18/09 | 14:40 | KR9151 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | 62.07 | 2.54 | 67.3 | 6.03 | 4.03 | | <0.0087 | 0.28 | 0.781 | | 1.27 | 0.14 | 0.16 | 9.6 | 3.6 | 8.9 |
| 8/18/09 | 15:00 | KR9152 | KR1990 | Copco Reservoir | PacifiCorp | 9 | 20.15 | 8.13 | 161.2 | 4.48 | 7.81 | 1.32 | 67.2 | 5.81 | 0.58 | | <0.0087 | 0.34 | 0.123 | | 1 | 0.14 | 0.11 | 4 | 2 | |
| 8/18/09 | 15:15 | KR9153 | KR1990 | Copco Reservoir | PacifiCorp | 18 | 15.2 | 7.21 | 213.5 | 1.44 | 0.76 | 0.9 | 76.3 | 5.44 | 0.427 | | 0.41 | 0.21 | 0.0786 | | 0.99 | 0.29 | 0.28 | 3.2 | <0.87 | |
| 8/18/09 | 15:25 | KR9154 | KR1990 | Copco Reservoir | PacifiCorp | 27 | 11.23 | 7.09 | 237.4 | 1.4 | 0.51 | 0.78 | 96 | 5.69 | 0.689 | | 1.5 | 0.015 | 0.128 | | 1.45 | 1.4 | 0.85 | 3.6 | <0.87 | |
| 8/18/09 | 15:35 | KR9149 | KR1990 | Copco Reservoir | PacifiCorp | INT | missing | missing | missing | missing | | | | | | | | | | | | | | | | 4.7 |
| 9/15/09 | 10:05 | KR9189 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 15 |
| 9/15/09 | 10:10 | KR9190 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | 19.2 | 8.69 | 158 | 10.88 | 31.2 | 0.29 | 75 | 6.01 | 3 | | <0.0087 | 0.59 | 0.582 | | 0.83 | 0.15 | 0.25 | 4.8 | 3.6 | 14 |
| 9/15/09 | 10:20 | KR9191 | KR1990 | Copco Reservoir | PacifiCorp | 9 | 18.73 | 8.59 | 156.2 | 10.58 | 13 | 1.35 | 74 | 5.79 | 1.19 | | <0.0087 | 0.6 | 0.22 | | 0.72 | 0.14 | 0.18 | 3.2 | 2 | 2 |
| 9/15/09 | 11:15 | KR9192 | KR1990 | Copco Reservoir | PacifiCorp | 18 | 16.99 | 7.14 | 169.5 | 3.39 | 1.87 | 1.92 | 64 | 5.62 | 0.775 | | 0.22 | 0.8 | 0.124 | | 0.93 | 0.2 | 0.28 | 2.4 | 1.2j | |
| 9/15/09 | 11:20 | KR9193 | KR1990 | Copco Reservoir | PacifiCorp | 27 | missing | missing | missing | missing | 0.56 | 0.29 | 102 | 5.92 | 0.189 | | 1.94 | 0.016 | 0.0136 | | 0.89 | 0.8 | 1.11 | 2 | <0.87 | |
| 9/15/09 | 11:30 | KR9188 | KR1990 | Copco Reservoir | PacifiCorp | INT | missing | missing | missing | missing | 26.2 | 1.19 | | | 1.64 | | | | 0.285 | | | | | | | 6.2 |
| 10/13/09 | 10:50 | KR9228 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | 13.1 | 7.56 | 166 | 8.28 | 4.35 | 1.77 | 67 | 6.18 | 0.633 | | 0.075 | 0.88 | 0.133 | 1.12 | 2.74 | 0.2 | 0.22 | 2.4 | <0.87 | |
| 10/13/09 | 10:55 | KR9229 | KR1990 | Copco Reservoir | PacifiCorp | 9 | 12.81 | 7.72 | 166.8 | 6.78 | 2.21 | 2.36 | 68 | 6.45 | 0.548 | | 0.12 | 0.89 | 0.0906 | 1.12 | 2.52 | 0.18 | 0.17 | 2.8 | <0.87 | |
| 10/13/09 | 11:00 | KR9230 | KR1990 | Copco Reservoir | PacifiCorp | 18 | 12.21 | 7.64 | 169.8 | 5.83 | 0.92 | 3.15 | 71 | 6.87 | 0.657 | | 0.23 | 0.85 | 0.095 | 1.38 | 2.73 | 0.21 | 0.25 | 3.2 | <0.87 | |
| 10/13/09 | 11:05 | KR9231 | KR1990 | Copco Reservoir | PacifiCorp | 27 | missing | missing | missing | missing | 0.56 | 1.95 | 82 | 6.16 | 1.86 | | 1.04 | 0.4 | 0.351 | 2.08 | 2.68 | 0.5 | 0.55 | 8.8 | 3.6 | |
| 10/13/09 | 11:10 | KR9227 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 10/13/09 | 11:15 | KR9226 | KR1990 | Copco Reservoir | PacifiCorp | INT | missing | missing | missing | missing | 5.73 | 2.62 | | | 1.25 | | | | 0.188 | | | | | | | |
| 11/17/09 | 11:20 | KR9258 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.1j |
| 11/17/09 | 11:25 | KR9257 | KR1990 | Copco Reservoir | PacifiCorp | INT | missing | missing | missing | missing | 0.84 | 1.72 | | | 0.835 | | | | 0.0937 | | | | | | | 0.11j |
| 11/17/09 | 11:30 | KR9259 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | 8.14 | 7.57 | 158.2 | 9.56 | 0.56 | 1.05 | 63 | 5.58 | 0.201 | | 0.1 | 0.88 | 0.0357 | | 1.55 | 0.12 | 0.15 | 2.4 | <0.87 | 0.12j |
| 11/17/09 | 11:35 | KR9260 | KR1990 | Copco Reservoir | PacifiCorp | 9 | 7.58 | 7.52 | 155.5 | 10.18 | 0.56 | 1.33 | 63 | 5.14 | 0.236 | | 0.11 | 0.89 | 0.0335 | | 1.51 | 0.12 | 0.11 | 2 | <0.87 | |
| 11/17/09 | 11:40 | KR9261 | KR1990 | Copco Reservoir | PacifiCorp | 18 | 7.26 | 7.55 | 154.5 | 10.39 | 0.59 | 1.23 | 63 | 5.24 | 0.201 | | 0.084 | 0.88 | 0.0312 | | 1.49 | 0.1 | 0.12 | 1.2j | 1.2j | |
| 11/17/09 | 11:45 | KR9262 | KR1990 | Copco Reservoir | PacifiCorp | 27 | 7.16 | 7.55 | 154.2 | 10.44 | 0.56 | 1.44 | 62 | 5.15 | 0.305 | | 0.11 | 0.9 | 0.0536 | | 1.49 | 0.1 | 0.13 | 1.6j | <0.87 | |
| 12/15/09 | 10:45 | KR9286 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | 1.95 | 7.82 | 173.8 | 12.78 | 1.57 | 2.8 | 67.9 | 5.26 | 0.547 | | 0.28 | 0.88 | 0.08 | | 1.96 | 0.08 | 0.11 | 7.2 | 2.4 | 0.16j |
| 12/15/09 | 10:50 | KR9287 | KR1990 | Copco Reservoir | PacifiCorp | 9 | 2.93 | 7.67 | 165.3 | 11.98 | 1.16 | 1.9 | 67.2 | 4.9 | 0.361 | | 0.26 | 0.89 | 0.064 | | 1.71 | 0.09 | 0.095 | 4.4 | 1.2j | |
| 12/15/09 | 10:55 | KR9288 | KR1990 | Copco Reservoir | PacifiCorp | 18 | 3.35 | 7.65 | 163.7 | 11.57 | 0.56 | 0.86 | 65 | 4.8 | 0.275 | | 0.2 | 0.92 | 0.0457 | | 1.75 | 0.12 | 0.092 | 3.2 | 1.2j | |
| 12/15/09 | 11:00 | KR9289 | KR1990 | Copco Reservoir | PacifiCorp | 27 | 3.62 | 7.58 | 165.4 | 11.13 | 0.56 | 1.07 | 65.9 | 4.72 | 0.32 | | 0.21 | 0.9 | 0.0423 | | 1.55 | 0.11 | 0.13 | 2 | 1.2j | |
| 12/15/09 | 11:05 | KR9284 | KR1990 | Copco Reservoir | PacifiCorp | INT | missing | missing | missing | missing | 2.46 | 2.33 | | | 1.08 | | | | 0.151 | | | | | | | 0.14j |
| 12/15/09 | missing | KR9285 | KR1990 | Copco Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 5/24/09 | 16:30 | KR9032 | KR1950 | Klamath River bel. Copco Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 6/24/09 | 16:40 | KR9084 | KR1950 | Klamath River bel. Copco Dam | PacifiCorp | 0.5 | 19.36 | 8.01 | 202.4 | 8.84 | | | 79.7 | 6.53 | | | 0.085 | 0.16 | | | 0.61 | 0.11 | 0.15 | 1.2j | <0.87 | <0.09 |
| 7/22/09 | 16:00 | KR9122 | KR1950 | Klamath River bel. Copco Dam | PacifiCorp | 0.5 | 22.04 | 8.17 | 168.2 | 8.43 | 8.39 | 3.07 | 70.5 | 5.67 | 1.25 | | 0.05 | 0.48 | 0.227 | | 0.78 | 0.17 | 0.36 | 3.6 | 3.6 | |
| 7/22/09 | 16:05 | KR9122MS | KR1950 | Klamath River bel. Copco Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | 11.9 | | | | | | | | | | | | |
| 8/18/09 | missing | KR9155 | KR1950 | Klamath River bel. Copco Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 9/15/09 | 9:00 | KR9194 | KR1950 | Klamath River bel. Copco Dam | PacifiCorp | 0.5 | 18.49 | 8.3 | 162 | 9.17 | 9.33 | 1.28 | 65 | 5.53 | 1.01 | | 0.058 | 0.68 | 0.177 | | 0.84 | 0.17 | 0.34 | 2.8 | 2.4 | |
| 10/13/09 | 12:55 | KR9232 | KR1950 | Klamath River bel. Copco Dam | PacifiCorp | 0.5 | 12.94 | 7.69 | 165.1 | 10.37 | 4.61 | 2.89 | 67 | 6.73 | 0.932 | | 0.11 | 0.9 | 0.177 | 1.28 | 2.84 | 0.19 | 0.21 | 3.6 | <0.87 | |
| 11/17/09 | 9:30 | KR9263 | KR1950 | Klamath River bel. Copco Dam | PacifiCorp | 0.5 | 7.73 | 7.62 | 156.3 | 9.81 | 1.78 | 1.77 | 63 | 5.15 | 0.314 | | 0.078 | 0.9 | 0.0536 | | 1.52 | 0.11 | 0.08 | 2.4 | <0.87 | 0.15j |
| 12/15/09 | 9:40 | KR9290 | KR1950 | Klamath River bel. Copco Dam | PacifiCorp | 0.5 | 2.93 | 7.74 | 167.7 | missing | 0.88 | 1.26 | 64.6 | 4.92 | 0.384 | | 0.22 | 0.91 | 0.0503 | | 1.81 | 0.09 | 0.071 | 4 | 2 | 0.15j |

| Date | Time | Sample ID | Site ID | Site Name | Agency | Depth | Water Temp. | pH | Specific Cond. | Diss. Oxygen | Algae, Chloroph-a | Algae, Pheophytin | Alkalinity | Carbon, Diss. Organic Carbon | Carbon, Particulate Carbon | Demand, Carbonaceous Biological Oxygen Demand | Nitrogen, Ammonia | Nitrogen, Nitrate+ Nitrite | Nitrogen, Particulate Nitrogen | Nitrogen, Total Kjeldahl Nitrogen | Nitrogen, Total Nitrogen | Phosphorus, Ortho-Phosphate | Phosphorus, Total Phosphorus | Solids, Total Susp. Solids | Solids, Volatile Susp. Solids | Toxins, Microcystin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | m | C | - | uS/cm | mg/l | ug/l | ug/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 | ug/l |
| 6/8/09 | 14:20 | KR9061 | IRJW | Iron Gate Reservoir Jay Williams | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.84 |
| 6/22/09 | 12:45 | KR9066 | IRJW | Iron Gate Reservoir Jay Williams | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.12j |
| 7/6/09 | 13:20 | KR9097 | IRJW | Iron Gate Reservoir Jay Williams | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 7.2 |
| 7/20/09 | 12:30 | KR9102 | IRJW | Iron Gate Reservoir Jay Williams | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 220 |
| 8/3/09 | 12:40 | KR9135 | IRJW | Iron Gate Reservoir Jay Williams | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 1000 |
| 8/17/09 | 14:00 | KR9179A | IRJW | Iron Gate Reservoir Jay Williams | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 160 |
| 8/31/09 | 14:30 | KR9169 | IRJW | Iron Gate Reservoir Jay Williams | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.13j |
| 9/14/09 | 11:20 | KR9175 | IRJW | Iron Gate Reservoir Jay Williams | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 9/28/09 | 13:10 | KR9208 | IRJW | Iron Gate Reservoir Jay Williams | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 160 |
| 10/12/09 | 12:30 | KR9213 | IRJW | Iron Gate Reservoir Jay Williams | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 3200 |
| 10/26/09 | 12:50 | KR9244 | IRJW | Iron Gate Reservoir Jay Williams | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 2400 |
| 6/8/09 | 14:10 | KR9062 | IRCC | Iron Gate Reservoir Camp Ck | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.14j |
| 6/22/09 | 12:05 | KR9067 | IRCC | Iron Gate Reservoir Camp Ck | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 2.5 |
| 7/6/09 | 12:40 | KR9098 | IRCC | Iron Gate Reservoir Camp Ck | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 1.1 |
| 7/20/09 | 12:00 | KR9103 | IRCC | Iron Gate Reservoir Camp Ck | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 11 |
| 8/3/09 | 12:15 | KR9136 | IRCC | Iron Gate Reservoir Camp Ck | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 10 |
| 8/17/09 | 13:40 | KR9180A | IRCC | Iron Gate Reservoir Camp Ck | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 15 |
| 8/31/09 | 13:40 | KR9170 | IRCC | Iron Gate Reservoir Camp Ck | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 150 |
| 9/14/09 | 11:00 | KR9174 | IRCC | Iron Gate Reservoir Camp Ck | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 9/28/09 | missing | KR9207 | IRCC | Iron Gate Reservoir Camp Ck | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 190 |
| 10/12/09 | 12:12 | KR9212 | IRCC | Iron Gate Reservoir Camp Ck | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 12 |
| 10/26/09 | 12:30 | KR9243 | IRCC | Iron Gate Reservoir Camp Ck | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 13 |
| 5/24/09 | 14:00 | KR9042 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | 22.47 | 8.87 | 176.9 | 9.78 | | | | 4.9 | 1.4 | | <0.0087 | <0.0057 | 0.179 | | 0.43 | 0.082 | 0.12 | 7.2 | 1.2j | 0.13j |
| 5/24/09 | 14:05 | KR9043 | KR1920 | Iron Gate Reservoir | PacifiCorp | 10 | 13.13 | 7.53 | 182.7 | 8.01 | | | | 5.3 | 1.06 | | <0.0087 | <0.0057 | 0.171 | | 0.37 | 0.072 | 0.13 | 4 | <0.87 | |
| 5/24/09 | 14:10 | KR9047 | KR1920 | Iron Gate Reservoir | PacifiCorp | 20 | 7.75 | 7.38 | 215.3 | 6.81 | | | | 4.82 | 0.558 | | <0.0087 | 0.52 | 0.0875 | | 0.84 | 0.049 | 0.13 | <0.87 | <0.87 | |
| 5/24/09 | 14:15 | KR9048 | KR1920 | Iron Gate Reservoir | PacifiCorp | 30 | missing | missing | missing | missing | | | | 5.14 | 0.743 | | <0.0087 | 0.72 | 0.124 | | 1.05 | 0.12 | 0.16 | <0.87 | <0.87 | |
| 5/24/09 | 14:20 | KR9049 | KR1920 | Iron Gate Reservoir | PacifiCorp | 40 | missing | missing | missing | missing | | | | 4.62 | 0.751 | | <0.0087 | 0.79 | 0.115 | | 1.15 | 0.11 | 0.14 | <0.87 | <0.87 | |
| 5/24/09 | 14:30 | KR9040 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | 10.56 | 1.34 | | | | | | | | | | | | | | 0.15j |
| 5/24/09 | 14:35 | KR9041 | KR1920 | Iron Gate Reservoir | PacifiCorp | INT | missing | missing | missing | missing | 16.46 | 2.97 | | | | | | | | | | | | | | 0.14j |
| 6/24/09 | 14:05 | KR9085 | KR1920 | Iron Gate Reservoir | PacifiCorp | INT | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.11j |
| 6/24/09 | 18:20 | KR9092 | KR1920 | Iron Gate Reservoir | PacifiCorp | 40 | 6.63 | 7.1 | 208.2 | 2.18 | | | 77 | 4.68 | | | <0.0087 | 0.78 | | | 0.95 | 0.13 | 0.13 | 2 | <0.87 | |
| 6/24/09 | 18:30 | KR9089 | KR1920 | Iron Gate Reservoir | PacifiCorp | 10 | 6.75 | 7.15 | 207.5 | 3.9 | | | 79.8 | 4.31 | | | <0.0087 | 0.42 | | | 0.63 | 0.11 | 0.14 | <0.87 | 1.2j | |
| 6/24/09 | 18:45 | KR9090 | KR1920 | Iron Gate Reservoir | PacifiCorp | 20 | 8.88 | 7.23 | 215.3 | 6.11 | | | 79.8 | 4.69 | | | <0.0087 | 0.48 | | | 0.64 | 0.098 | 0.11 | 1.6j | <0.87 | |
| 6/24/09 | 19:00 | KR9091 | KR1920 | Iron Gate Reservoir | PacifiCorp | 30 | 18.19 | 7.55 | 181.5 | 7.6 | | | 74.4 | 5.51 | | | 0.081 | 0.1 | | | 0.4 | 0.16 | 0.16 | 1.2j | <0.87 | |
| 6/24/09 | 19:15 | KR9086 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | 21.78 | 8.63 | 182.3 | 10.17 | | | 73.6 | 5.83 | | | <0.0087 | 0.039 | | | 0.38 | 0.1 | 0.14 | <0.87 | <0.87 | 0.14j |
| 7/21/09 | 10:10 | KR9107 | KR1920 | Iron Gate Reservoir | PacifiCorp | INT | missing | missing | missing | missing | 13.66 | 2.04 | | | 1.35 | | | | 0.227 | | | | | | | |
| 7/21/09 | 12:10 | KR9108 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 7/22/09 | 10:00 | KR9109 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | 25.43 | 9.21 | 178.2 | 11.71 | 17.05 | 0.42 | 74.6 | 6.66 | 1.84 | | <0.0087 | <0.0057 | 0.319 | | 0.41 | 0.075 | 0.16 | 6.4 | 6.4 | |
| 7/22/09 | 10:20 | KR9110 | KR1920 | Iron Gate Reservoir | PacifiCorp | 10 | 20.05 | 7.28 | 181.8 | 3.95 | 5.51 | 1.96 | 71.6 | 5.65 | 0.555 | | <0.0087 | 0.39 | 0.106 | | 0.49 | 0.14 | 0.15 | <0.87 | <0.87 | |
| 7/22/09 | 10:50 | KR9111 | KR1920 | Iron Gate Reservoir | PacifiCorp | 20 | 9.54 | 7.21 | 210.6 | 4.39 | 0.56 | 0.51 | 80.9 | 5.01 | 0.299 | | <0.0087 | 0.42 | 0.0573 | | 0.44 | 0.17 | 0.1 | <0.87 | <0.87 | |
| 7/22/09 | 11:30 | KR9112 | KR1920 | Iron Gate Reservoir | PacifiCorp | 30 | 6.95 | 7.16 | 206.2 | 2.77 | 0.56 | 0.37 | 78.6 | 4.69 | 0.56 | | <0.0087 | 0.68 | 0.165 | | 0.67 | 0.15 | 0.13 | <0.87 | <0.87 | |
| 7/22/09 | 12:00 | KR9113 | KR1920 | Iron Gate Reservoir | PacifiCorp | 40 | 6.75 | 7.16 | 208.9 | 2.54 | 0.56 | 0.39 | 79.6 | 4.5 | 0.279 | | 0.067 | 0.66 | 0.0529 | | 0.7 | 0.15 | 0.12 | <0.87 | <0.87 | |
| 8/18/09 | 11:20 | KR9141 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 7.4 |
| 8/18/09 | 11:30 | KR9142 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | 23.36 | 9.29 | 165.3 | 6.72 | 29.22 | 1.72 | 72.1 | 6.48 | 2.1 | | <0.0087 | <0.0057 | 0.357 | | 0.67 | 0.12 | 0.12 | 4.8 | 2.8 | 12 |
| 8/18/09 | 11:40 | KR9143 | KR1920 | Iron Gate Reservoir | PacifiCorp | 10 | 20.6 | 7.33 | 169.7 | 6.83 | 4.76 | 1.34 | 70 | 5.37 | 0.161 | | 0.015j | 0.5 | 0.0359 | | | 0.18 | 0.16 | 2.4 | <0.87 | |
| 8/18/09 | 12:00 | KR9144 | KR1920 | Iron Gate Reservoir | PacifiCorp | 20 | 11.24 | 7.15 | 205.4 | 3.57 | 1.18 | 0.79 | 78.2 | 4.26 | 0.214 | | <0.0087 | 0.39 | 0.0427 | | 0.74 | 0.16 | 0.16 | <0.87 | <0.87 | |
| 8/18/09 | 12:20 | KR9145 | KR1920 | Iron Gate Reservoir | PacifiCorp | 30 | 7.11 | 7.16 | 209.3 | 1.99 | 1.38 | 0.53 | 79.8 | 4.72 | 0.289 | | 0.044j | 0.6 | 0.0629 | | 1.07 | 0.16 | 0.17 | 1.6j | <0.87 | |
| 8/18/09 | 12:35 | KR9146 | KR1920 | Iron Gate Reservoir | PacifiCorp | 40 | 6.85 | 7.15 | 211.7 | 1.73 | 1.89 | 0.54 | 79.8 | 4.75 | 0.357 | | 0.17 | 0.58 | 0.0674 | | 1.09 | 0.2 | 0.16 | 2 | <0.87 | |
| 8/18/09 | 13:10 | KR9140 | KR1920 | Iron Gate Reservoir | PacifiCorp | INT | missing | missing | missing | missing | | | | | | | | | | | | | | | | 5.6 |
| 9/15/09 | 12:55 | KR9181 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | 19.62 | 8.88 | 160.2 | 11.1 | 45.89 | 0.29 | 68 | 5.08 | 3.54 | | <0.0087 | 0.12 | 0.742 | | 0.4 | 0.15 | 0.19 | 5.6 | 4.4 | 11 |
| 9/15/09 | 13:00 | KR9180 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 13 |
| 9/15/09 | 13:00 | KR9182 | KR1920 | Iron Gate Reservoir | PacifiCorp | 10 | 19.18 | 8.11 | 162 | 7.05 | 5.57 | 0.94 | 68 | 5.46 | 0.65 | | <0.0087 | 0.39 | 0.111 | | 0.39 | 0.16 | 0.15 | <0.87 | <0.87 | |
| 9/15/09 | 13:20 | KR9183 | KR1920 | Iron Gate Reservoir | PacifiCorp | 20 | 11.47 | 7.02 | 205 | 1.46 | 0.78 | 0.64 | 76 | 4.38 | 0.514 | | <0.0087 | 0.15 | 0.0724 | | 0.11j | 0.21 | 0.22 | <0.87 | <0.87 | |
| 9/15/09 | 13:30 | KR9184 | KR1920 | Iron Gate Reservoir | PacifiCorp | 30 | missing | missing | missing | missing | 0.56 | 0.51 | 81 | 4.76 | 0.647 | | 0.13 | 0.46 | 0.0928 | | 0.42 | 0.16 | 0.16 | <0.87 | <0.87 | |
| 9/15/09 | 13:40 | KR9185 | KR1920 | Iron Gate Reservoir | PacifiCorp | 40 | missing | missing | missing | missing | 0.56 | 0.43 | 81 | 4.44 | 0.441 | | 0.24 | 0.5 | 0.0611 | | 0.47 | 0.18 | 0.22 | <0.87 | <0.87 | |
| 9/15/09 | 13:50 | KR9179 | KR1920 | Iron Gate Reservoir | PacifiCorp | INT | missing | missing | missing | missing | 42.19 | 0.29 | | | 2.4 | | | | 0.464 | | | | | | | 7.6 |
| 10/13/09 | 14:40 | KR9219 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | 13.98 | 7.39 | 169.1 | 7.61 | 1.43 | 1.33 | 70 | 5.8 | 0.432 | | 0.18 | 0.68 | 0.0707 | 1.07 | 2.11 | 0.2 | 0.22 | 2.4 | <0.87 | |
| 10/13/09 | 14:45 | KR9220 | KR1920 | Iron Gate Reservoir | PacifiCorp | 10 | 13.97 | 7.62 | 169.6 | 7.93 | 1.38 | 1.62 | 69 | 5.95 | 0.697 | | 0.19 | 0.69 | 0.119 | 1.14 | 2.1 | 0.23 | 0.24 | 2 | <0.87 | |
| 10/13/09 | 14:50 | KR9221 | KR1920 | Iron Gate Reservoir | PacifiCorp | 20 | 12.54 | 7.36 | 188.3 | 4.55 | 0.76 | 1.52 | 73 | 5.77 | 0.677 | | 0.2 | 0.59 | 0.117 | 0.95 | 1.95 | 0.23 | 0.24 | 2 | 1.2j | |
| 10/13/09 | 14:55 | KR9222 | KR1920 | Iron Gate Reservoir | PacifiCorp | 30 | 7.34 | 7.18 | 211.9 | 1.94 | 0.56 | 0.47 | 82 | 4.72 | 0.447 | | 0.2 | 0.16 | 0.0685 | 1.03 | 0.9 | 0.23 | 0.22 | 1.6j | <0.87 | |
| 10/13/09 | 15:00 | KR9223 | KR1920 | Iron Gate Reservoir | PacifiCorp | 40 | 7.04 | 7.13 | 215.3 | 1.77 | 0.56 | 0.48 | 82 | 4.83 | 0.436 | | 0.39 | 0.38 | 0.0751 | 1.05 | 1.26 | 0.23 | 0.25 | 1.2j | <0.87 | |
| 10/13/09 | 15:05 | KR9218 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 10/13/09 | 15:10 | KR9217 | KR1920 | Iron Gate Reservoir | PacifiCorp | INT | missing | missing | missing | missing | 2.22 | 1.41 | | | 0.86 | | | | 0.13 | | | | | | | |
| 11/17/09 | 13:50 | KR9254 | KR1920 | Iron Gate Reservoir | PacifiCorp | 40 | 7.12 | 6.91 | 222.4 | 1.18 | 0.56 | 0.36 | 82 | 4.74 | 0.566 | | 0.51 | 0.33 | 0.121 | | 1.18 | 0.23 | 0.23 | 2.8 | <0.87 | |
| 11/17/09 | 14:00 | KR9250 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | 9.67 | 7.32 | 168.2 | 8.31 | 0.56 | 0.62 | 68 | 5.32 | 0.277 | | 0.15 | 0.75 | 0.0424 | | 1.45 | 0.13 | 0.16 | 1.2j | <0.87 | 0.12j |
| 11/17/09 | 14:10 | KR9251 | KR1920 | Iron Gate Reservoir | PacifiCorp | 10 | 9.66 | 7.26 | 167.7 | 7.56 | 0.56 | 0.71 | 69 | 5.63 | 0.243 | | 0.17 | 0.76 | 0.0402 | | 1.38 | 0.13 | 0.64 | 1.2j | <0.87 | |
| 11/17/09 | 14:15 | KR9252 | KR1920 | Iron Gate Reservoir | PacifiCorp | 20 | 9.16 | 7.12 | 173.3 | 5.83 | 0.56 | 0.87 | 69 | 5.43 | 0.44 | | 0.18 | 0.73 | 0.0826 | | 1.39 | 0.14 | 0.16 | 2 | <0.87 | |
| 11/17/09 | 14:20 | KR9253 | KR1920 | Iron Gate Reservoir | PacifiCorp | 30 | 8.17 | 6.95 | 214.4 | 2.39 | 0.56 | 0.83 | 70 | 5.52 | 0.438 | | 0.24 | 0.65 | 0.0826 | | 1.35 | 0.16 | 0.15 | 2 | 1.6j | |
| 11/17/09 | 14:30 | KR9248 | KR1920 | Iron Gate Reservoir | PacifiCorp | INT | missing | missing | missing | missing | 0.56 | 0.67 | | | 0.706 | | | | 0.112 | | | | | | | 0.21 |
| 11/17/09 | 14:35 | KR9249 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.15j |
| 12/15/09 | 12:45 | KR9277 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | 5.36 | 7.47 | 160.3 | 10.4 | 1.07 | 0.75 | 65.6 | 4.83 | 0.308 | | 0.16 | 0.83 | 0.0366 | | 1.55 | 0.11 | 0.079 | <0.87 | <0.87 | 0.14j |
| 12/15/09 | 12:55 | KR9278 | KR1920 | Iron Gate Reservoir | PacifiCorp | 10 | 4.64 | 7.49 | 160.9 | 10.04 | 0.56 | 0.73 | 65.4 | 4.84 | 0.304 | | 0.16 | 0.85 | 0.0549 | | 1.51 | 0.11 | 0.094 | <0.87 | <0.87 | |
| 12/15/09 | 13:05 | KR9279 | KR1920 | Iron Gate Reservoir | PacifiCorp | 20 | 4.39 | 7.51 | 161.6 | 10.12 | 0.56 | 0.86 | 65.4 | 4.76 | 0.353 | | 0.16 | 0.84 | 0.0526 | | 1.47 | 0.1 | 0.14 | <0.87 | <0.87 | |
| 12/15/09 | 13:15 | KR9280 | KR1920 | Iron Gate Reservoir | PacifiCorp | 30 | 4.27 | 7.51 | 161.8 | 10.15 | 0.56 | 0.73 | 65.6 | 4.75 | 0.578 | | 0.17 | 0.85 | 0.08 | | 1.64 | 0.11 | 0.098 | <0.87 | 1.2j | |
| 12/15/09 | 13:30 | KR9281 | KR1920 | Iron Gate Reservoir | PacifiCorp | 40 | 4.19 | 7.53 | 162.3 | 10.13 | 0.56 | 0.68 | 64.6 | 4.81 | 0.49 | | 0.17 | 0.85 | 0.0709 | | 1.63 | 0.11 | 0.11 | 1.2j | <0.87 | |
| 12/15/09 | 13:35 | KR9275 | KR1920 | Iron Gate Reservoir | PacifiCorp | INT | missing | missing | missing | missing | 0.88 | 0.75 | | | 0.519 | | | | 0.0732 | | | | | | | 0.13j |
| 12/15/09 | missing | KR9276 | KR1920 | Iron Gate Reservoir | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |

| Date | Time | Sample ID | Site ID | Site Name | Agency | Depth | Water Temp. | pH | Specific Cond. | Diss. Oxygen | Algae, Chloroph-a | Algae, Pheophytin | Alkalinity | Carbon, Diss. Organic Carbon | Carbon, Particulate Carbon | Demand, Carbonaceous Biological Oxygen Demand | Nitrogen, Ammonia | Nitrogen, Nitrate+ Nitrite | Nitrogen, Particulate Nitrogen | Nitrogen, Total Kjeldahl Nitrogen | Nitrogen, Total Nitrogen | Phosphorus, Ortho-Phosphate | Phosphorus, Total Phosphorus | Solids, Total Susp. Solids | Solids, Volatile Susp. Solids | Toxins, Microcystin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | m | C | - | uS/cm | mg/l | ug/l | ug/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 | ug/l |
| 5/14/09 | 10:15 | KR9030 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | 71 | 5.71 | | <2 | 0.011j | 0.084 | | | 0.12j | 0.092 | 0.11 | 2.4 | <0.87 | |
| 5/24/09 | 17:00 | KR9031 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | 18.05 | 8.42 | 179.5 | 9.78 | 18.9 | 2.65 | | 5.63 | 1.54 | 2.6 | <0.0087 | 0.02 | 0.215 | | 0.46 | 0.1 | 0.19 | 4.4 | 1.2j | 0.12j |
| 6/8/09 | 15:00 | KR9063 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.14j |
| 6/8/09 | 15:40 | KR9058 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | 76.5 | 5.62 | | | <0.0087 | 0.032 | | | 0.4 | 0.14 | 0.16 | <0.87 | <0.87 | 0.12j |
| 6/22/09 | 13:14 | KR9068 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.09j |
| 6/24/09 | 20:30 | KR9078 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | 20.5 | 8.25 | 183.1 | 10.33 | | | 69.8 | 5.76 | | <2 | 0.028j | 0.075 | | | 0.41 | 0.12 | 0.12 | 1.2j | <0.87 | 0.1j |
| 7/6/09 | 14:20 | KR9099 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 2 |
| 7/6/09 | 14:30 | KR9094 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | 76.5 | 6.6 | | | 0.017j | 0.17 | | | 0.54 | | 0.12 | 1.2j | 1.2j | 0.45 |
| 7/20/09 | 12:55 | KR9104 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 13 |
| 7/21/09 | 17:00 | KR9106 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | 22.34 | 8.27 | 178.4 | 9.55 | 9.97 | 2.99 | 73.2 | 5.49 | 0.848 | 4.98 | <0.0087 | 0.22 | 0.149 | | 0.43 | 0.12 | 0.13 | 3.6 | 3.2 | |
| 8/3/09 | 13:10 | KR9132 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 1700 |
| 8/10/09 | 10:15 | KR9137 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 5 |
| 8/17/09 | 14:20 | KR9181A | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 2 |
| 8/18/09 | 16:50 | KR9139 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | 21.93 | 8.82 | 166.8 | 5.04 | 13.35 | 1.94 | 70.1 | 5.99 | 1.02 | <2 | <0.0087 | 0.19 | 0.186 | | 0.73 | 0.13 | 0.11 | 3.2 | <0.87 | 2 |
| 8/24/09 | 12:00 | KR9165 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 8.8 |
| 8/31/09 | 14:50 | KR9166 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.13j |
| 9/8/09 | 11:00 | KR9171 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 0.64 |
| 9/14/09 | 11:30 | KR9176 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | |
| 9/15/09 | 14:50 | KR9178 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | 19.71 | 8.78 | 162.9 | 10.46 | 16.73 | 0.47 | 68 | 5.48 | 1.68 | 7.02 | <0.0087 | 0.22 | 0.327 | | 0.47 | 0.15 | 0.21 | 3.6 | 2.4 | 8.7 |
| 9/15/09 | 15:30 | KR9187MS | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | 4.14 | | | | | | | | | | | | |
| 9/21/09 | 11:10 | KR9204 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 9.8 |
| 9/28/09 | 13:30 | KR9209 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 11 |
| 10/12/09 | 12:40 | KR9214 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 2.1 |
| 10/13/09 | 18:25 | KR9216 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | 13.8 | 7.35 | 171.5 | 8.34 | 1.92 | 4.14 | 67 | 6.86 | 0.813 | <2 | <0.0087 | 0.88 | 0.137 | 1.11 | 2.51 | 0.11 | 0.15 | 4 | 2.4 | |
| 10/26/09 | 13:10 | KR9245 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | | | | | | | | | | | | | 5.1 |
| 11/17/09 | 8:30 | KR9247 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | 9.47 | 7.3 | 168.8 | 8.69 | 0.56 | 0.9 | 69 | 5.46 | 0.454 | 6.15 | 0.15 | 0.77 | 0.0804 | | 1.44 | 0.14 | 0.15 | 2 | <0.87 | 0.15j |
| 11/17/09 | 8:35 | KR9256MS | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | missing | missing | missing | missing | | | | 4.47 | | | | | | | | | | | | |
| 12/15/09 | 14:25 | KR9274 | KR1897 | Klamath River bel. Iron Gate Dam | PacifiCorp | 0.5 | 4.73 | 7.55 | 161.2 | 11.19 | 0.62 | 0.93 | 65.9 | 5.47 | 0.413 | 2.91 | 0.16 | 0.86 | 0.0549 | | 1.55 | 0.1 | 0.11 | 1.6j | <0.87 | 0.14j |
| 5/14/09 | 11:15 | WA051409-OC | KR1767 | Klamath River at Walker Bridge | Karuk | 0.5 | 13.17 | 8.15 | 203 | 10.52 | 9.07 | 4.37 | 89.7 | 4.15 | | | <0.010 | 0.095 | | | 0.56 | 0.078 | 0.1 | 5.5 | 2.5 | 0.13j |
| 5/28/09 | 11:13 | WA052809-OC | KR1767 | Klamath River at Walker Bridge | Karuk | 0.5 | 17.97 | 9.47 | 79 | 9.47 | 10.68 | 4.45 | 85.4 | 4.57 | | | <0.010 | 0.012 | | | 0.5 | 0.073 | 0.11 | 5.37 | 2.12 | 0.12j |
| 6/11/09 | 11:27 | WA061109-OC | KR1767 | Klamath River at Walker Bridge | Karuk | 0.5 | 18.7 | 8.25 | 150 | 9.09 | 6.76 | 3.57 | 95 | 4.91 | | | <0.010 | 0.02 | | | 0.52 | 0.1 | 0.15 | 5 | 1.75 | |
| 6/25/09 | 12:35 | WA062509-OC | KR1767 | Klamath River at Walker Bridge | Karuk | 0.5 | 20.12 | 8.42 | 202 | 9.64 | 2.93 | 3.04 | 91.7 | 4.84 | | | <0.010 | 0.07 | | | 0.61 | 0.082 | 0.13 | 3.75 | 2 | <0.09 |
| 7/9/09 | 11:50 | WA070909-OC | KR1767 | Klamath River at Walker Bridge | Karuk | 0.5 | 20.84 | 7.51 | 207 | missing | 2.93 | 3.04 | 96.5 | 5.3 | | | <0.010 | 0.14 | | | 0.63 | 0.086 | 0.11 | 2.25 | 1.62 | 0.39 |
| 7/23/09 | 12:05 | WA072309-OC | KR1767 | Klamath River at Walker Bridge | Karuk | 0.5 | 23.75 | 8.52 | 192 | 9.55 | 5.6 | 4.48 | 86.1 | 5.07 | | | <0.010 | 0.2 | | | 0.81 | 0.098 | 0.13 | 3.12 | 1.62 | 0.17j |
| 8/6/09 | 12:00 | WA080609-OC | KR1767 | Klamath River at Walker Bridge | Karuk | 0.5 | 21.28 | 8.45 | 184 | 8.55 | 13.88 | 4.05 | 85.6 | 5.03 | | | <0.010 | 0.21 | | | 0.98 | 0.11 | 0.16 | 5.33 | 3.33 | |
| 8/20/09 | 12:13 | WA082009-OC | KR1767 | Klamath River at Walker Bridge | Karuk | 0.5 | 22.86 | 8.64 | 181 | 9.29 | 8.54 | 4.53 | 83.3 | 4.69 | | | <0.010 | 0.18 | | | 0.82 | 0.12 | 0.15 | 3.5 | 2.12 | |
| 9/3/09 | 11:40 | WA090309-OC | KR1767 | Klamath River at Walker Bridge | Karuk | 0.5 | 20.67 | 8.66 | 174 | 9.29 | 16.02 | 4.72 | 83.1 | 5.19 | | | <0.010 | 0.14 | | | 0.96 | 0.11 | 0.15 | 5.16 | 3.16 | |
| 9/17/09 | missing | WA091709-OC | KR1767 | Klamath River at Walker Bridge | Karuk | 0.5 | missing | missing | missing | missing | 10.14 | 4.8 | 84.8 | 4.64 | | | 0.017 | 0.27 | | | 1 | 0.12 | 0.16 | 5 | 3.16 | 4.9 |
| 10/1/09 | 11:22 | WA100109-OC | KR1767 | Klamath River at Walker Bridge | Karuk | 0.5 | 15.37 | 8.4 | 184 | 10.01 | 18.69 | 10.09 | 84.3 | 4.76 | | | <0.010 | 0.33 | | | 1.6 | 0.12 | 0.2 | 12.75 | 6 | 10 |
| 10/15/09 | 11:47 | WA101509-OC | KR1767 | Klamath River at Walker Bridge | Karuk | 0.5 | 14.17 | 8.2 | 199 | 10.13 | 5.34 | 5.12 | 93.6 | 4.18 | | | 0.038 | 0.72 | | | 1.69 | 0.15 | 0.19 | 6.16 | 2.66 | 0.96 |
| 11/12/09 | 12:00 | WA111209-OC | KR1767 | Klamath River at Walker Bridge | Karuk | 0.5 | 9.64 | 8.22 | 182 | 11.3 | 2.67 | 3.31 | 95.4 | 4.01 | | | 0.038 | 0.76 | | | 1.39 | 0.11 | 0.13 | 3.12 | 0.87 | |
| 12/10/09 | 12:40 | WA121009-OC | KR1767 | Klamath River at Walker Bridge | Karuk | 0.5 | 2.98 | 8.18 | 110 | 13.04 | 2.93 | 3.79 | 87.5 | 3.56 | | | 0.044 | 0.82 | | | 1.62 | 0.077 | 0.1 | 2.75 | 0.87 | |
| 5/14/09 | 10:10 | SV051409-OC | KR1285 | Klamath River bel. Seiad | Karuk | 0.5 | 12.55 | 8.09 | 168 | 10.7 | 6.94 | 3.33 | 82 | 2.93 | | | 0.011 | 0.03 | | | 0.33 | 0.039 | 0.065 | 6 | 2.16 | 0.11j |
| 5/28/09 | 10:12 | SV052809-OC | KR1285 | Klamath River bel. Seiad | Karuk | 0.5 | 17.71 | 8.1 | 42 | 9.27 | 6.14 | 3.76 | 81.1 | 3.28 | | | <0.010 | <0.010 | | | 0.35 | 0.043 | 0.079 | 11.5 | 2.62 | 0.14j |
| 6/11/09 | 10:05 | SV061109-OC | KR1285 | Klamath River bel. Seiad | Karuk | 0.5 | 18.13 | 8.24 | 200 | 9.06 | 4.8 | 3.29 | 97.3 | 3.86 | | | 0.01 | 0.013 | | | 0.44 | 0.075 | 0.12 | 7.5 | 2.33 | <0.09 |
| 6/25/09 | 11:20 | SV062509-OC | KR1285 | Klamath River bel. Seiad | Karuk | 0.5 | 20.19 | 8.4 | 202 | 9.59 | 2.13 | 3.65 | 96.6 | 4.28 | | | <0.010 | 0.034 | | | 0.47 | 0.081 | 0.12 | 5.12 | 1.37 | <0.09 |
| 7/9/09 | 10:36 | SV070909-OC | KR1285 | Klamath River bel. Seiad | Karuk | 0.5 | 20.38 | 8.48 | 212 | 9.22 | 3.47 | 4.75 | 101.3 | 4.69 | | | <0.010 | <0.010 | | | 0.43 | 0.061 | 0.1 | 4.87 | 1.75 | 0.19 |
| 7/23/09 | 10:45 | SV072309-OC | KR1285 | Klamath River bel. Seiad | Karuk | 0.5 | 23.65 | 8.43 | 199 | 9.28 | 5.07 | 4.45 | 89.7 | 4.72 | | | 0.013 | 0.075 | | | 0.62 | 0.082 | 0.11 | 2.87 | 1.62 | 0.18 |
| 8/6/09 | 10:20 | SV080609-OC | KR1285 | Klamath River bel. Seiad | Karuk | 0.5 | 20.89 | 8.2 | 192 | 8.84 | 9.87 | 3.76 | 88.6 | 4.54 | | | 0.01 | 0.19 | | | 0.76 | 0.1 | 0.14 | 2.62 | 2 | |
| 8/20/09 | 10:21 | SV082009-OC | KR1285 | Klamath River bel. Seiad | Karuk | 0.5 | 22.46 | 8.49 | 185 | 9.36 | 8.54 | 5.84 | 90 | 4.66 | | | <0.010 | 0.05 | | | 0.65 | 0.1 | 0.13 | 2.5 | 1.75 | |
| 9/3/09 | 10:05 | SV090309-OC | KR1285 | Klamath River bel. Seiad | Karuk | 0.5 | 20.32 | 8.24 | 185 | 8.85 | 6.94 | 5.2 | 87.9 | 4.76 | | | 0.014 | 0.18 | | | 0.81 | 0.11 | 0.14 | 5.62 | 3.37 | |
| 9/17/09 | 10:45 | SV091709-OC | KR1285 | Klamath River bel. Seiad | Karuk | 0.5 | 19.89 | 8.49 | 184 | 9.49 | 14.95 | 5.6 | 88 | 4.41 | | | <0.010 | 0.21 | | | 0.93 | 0.11 | 0.16 | 9.16 | 4.16 | 7.2 |
| 10/1/09 | 9:50 | SV100109-OC | KR1285 | Klamath River bel. Seiad | Karuk | 0.5 | 14.24 | 8.48 | 186 | 10.54 | 16.55 | 4.37 | 88.6 | 4.48 | | | <0.010 | 0.13 | | | 1.27 | 0.1 | 0.17 | 8.25 | 6.5 | 1.4 |
| 10/15/09 | 10:25 | SV101509-OC | KR1285 | Klamath River bel. Seiad | Karuk | 0.5 | 13.92 | 8.17 | 204 | 10.13 | 5.34 | 6.99 | 93 | 4.05 | | | 0.025 | 0.66 | | | 1.43 | 0.15 | 0.17 | 6.5 | 2.5 | 0.42 |
| 11/12/09 | 10:45 | SV111209-OC | KR1285 | Klamath River bel. Seiad | Karuk | 0.5 | 9.38 | 8.3 | 188 | 11.62 | 3.2 | 4.64 | 97.5 | 3.78 | | | 0.014 | 0.66 | | | 1.24 | 0.1 | 0.12 | 2.87 | 1.37 | |
| 12/10/09 | 11:10 | SV121009-OC | KR1285 | Klamath River bel. Seiad | Karuk | 0.5 | 1.68 | 8.21 | 109 | 12.68 | 3.73 | 4.11 | 91.7 | 3.34 | | | 0.025 | 0.77 | | | 1.41 | 0.073 | 0.099 | 3.37 | 1.37 | |
| 5/28/09 | 9:32 | HC052809-OC | KR1060 | Klamath River at Happy Camp | Karuk | 0.5 | 17.62 | 7.99 | 159 | 9.13 | 5.87 | 2.72 | 78 | 2.71 | | | <0.010 | <0.010 | | | 0.29 | 0.037 | 0.064 | 4.5 | 1.5 | 0.14j |
| 6/25/09 | 10:00 | HC062509-OC | KR1060 | Klamath River at Happy Camp | Karuk | 0.5 | 20.1 | 8.25 | 199 | 9.05 | 2.4 | 2.64 | 94.1 | 3.75 | | | <0.010 | 0.01 | | | 0.34 | 0.073 | 0.1 | 3.37 | 1.37 | <0.09 |
| 7/23/09 | 9:45 | HC072309-OC | KR1060 | Klamath River at Happy Camp | Karuk | 0.5 | 23.13 | 8.21 | 198 | 8.6 | 6.14 | 4.69 | 91 | 4.12 | | | 0.01 | <0.010 | | | 0.47 | 0.065 | 0.1 | 4.87 | 2.12 | 0.16j |
| 8/20/09 | 9:30 | HC082009-OC | KR1060 | Klamath River at Happy Camp | Karuk | 0.5 | 22.17 | 8.26 | 187 | 8.23 | 6.4 | 4.43 | 90.4 | 4.23 | | | <0.010 | <0.010 | | | 0.57 | 0.088 | 0.12 | 3.87 | 1.87 | |
| 9/17/09 | 10:05 | HC091709-OC | KR1060 | Klamath River at Happy Camp | Karuk | 0.5 | 19.42 | 8.16 | 185 | 8.76 | 15.48 | 11.42 | 89.1 | 4.06 | | | 0.028 | 0.22 | | | 0.85 | 0.1 | 0.16 | 11.83 | 5.16 | 2.1 |
| 10/15/09 | 9:27 | HC101509-OC | KR1060 | Klamath River at Happy Camp | Karuk | 0.5 | 13.5 | 8.08 | 192 | 10.6 | 7.47 | 10.46 | 91.3 | 3.61 | | | 0.02 | 0.55 | | | 1.31 | 0.11 | 0.16 | 10.4 | 3.19 | 0.51 |
| 11/12/09 | 10:00 | HC111209-OC | KR1060 | Klamath River at Happy Camp | Karuk | 0.5 | 9.44 | 8.13 | 184 | 11.35 | 4.45 | 4.27 | 93.4 | 3.48 | | | 0.01 | 0.57 | | | 1.05 | 0.089 | 0.11 | 3.62 | 1.12 | |
| 12/10/09 | 10:07 | HC121009-OC | KR1060 | Klamath River at Happy Camp | Karuk | 0.5 | 0.85 | 8.02 | 106 | 13.8 | 3.47 | 4 | 90.4 | 3.05 | | | <0.010 | 0.69 | | | 1.12 | 0.061 | 0.087 | 2.62 | 1.12 | |
| 5/14/09 | 8:00 | OR051409-OC | KR0591 | Klamath River at Orleans (USGS) | Karuk | 0.5 | 11.71 | 7.82 | 126 | 10.49 | 2.93 | 0.98 | 64.5 | 1.22 | | | <0.010 | 0.011 | | | 0.14 | 0.017 | 0.032 | 8 | 2 | 0.16j |
| 5/28/09 | 8:12 | OR052809-OC | KR0591 | Klamath River at Orleans (USGS) | Karuk | 0.5 | 17.25 | 7.77 | 85 | 8.34 | 5.34 | 1.38 | 62.9 | 1.6 | | | 0.01 | 0.018 | | | 0.19 | 0.017 | 0.053 | 13.33 | 3.33 | |
| 6/11/09 | 7:50 | OR061109-OC | KR0591 | Klamath River at Orleans (USGS) | Karuk | 0.5 | 17.36 | 8.14 | 121 | 9.3 | 2.93 | 1.92 | 77.7 | 2.31 | | | <0.010 | <0.010 | | | 0.2 | 0.035 | 0.061 | 3.37 | 1.12 | <0.09 |
| 6/25/09 | 8:15 | OR062509-OC | KR0591 | Klamath River at Orleans (USGS) | Karuk | 0.5 | 19.8 | 8.34 | 174 | 9.51 | 1.33 | 2.21 | 83.8 | 2.47 | | | <0.010 | <0.010 | | | 0.23 | 0.039 | 0.096 | 5.37 | 1.25 | 0.11j |
| 7/9/09 | 8:00 | OR070909-OC | KR0591 | Klamath River at Orleans (USGS) | Karuk | 0.5 | 20.59 | 8.07 | 184 | 6.56 | 1.24 | 1.24 | 89.6 | 2.69 | | | 0.011 | <0.010 | | | 0.21 | 0.032 | 0.045 | 1.12 | 0.99 | <0.09 |
| 7/23/09 | 8:08 | OR072309-OC | KR0591 | Klamath River at Orleans (USGS) | Karuk | 0.5 | 23.44 | 8.09 | 173 | 7.21 | 3.47 | 2.13 | 85.9 | 3.24 | | | <0.010 | <0.010 | | | 0.32 | 0.042 | 0.06 | 2.5 | 1.37 | 0.13j |
| 8/6/09 | 7:55 | OR080609-OC | KR0591 | Klamath River at Orleans (USGS) | Karuk | 0.5 | 22.26 | 8.26 | missing | 8.82 | 5.34 | 2.32 | 86.3 | 2.87 | | | <0.010 | <0.010 | | | 0.3 | 0.053 | 0.083 | 3.5 | 2.12 | |
| 8/20/09 | 7:45 | OR082009-OC | KR0591 | Klamath River at Orleans (USGS) | Karuk | 0.5 | 22.67 | 8.34 | 181 | 8.33 | 5.87 | 1.97 | 86 | 3.08 | | | <0.010 | <0.010 | | | 0.42 | 0.057 | 0.083 | 2.75 | 1.5 | |
| 9/3/09 | 7:45 | OR090309-OC | KR0591 | Klamath River at Orleans (USGS) | Karuk | 0.5 | 20.63 | 8.27 | 181 | 8.47 | 4.53 | 3.12 | 87.1 | 3.34 | | | <0.010 | <0.010 | | | 0.38 | 0.055 | 0.074 | 3 | 1.75 | |
| 9/17/09 | 8:36 | OR091709-OC | KR0591 | Klamath River at Orleans (USGS) | Karuk | 0.5 | 19.68 | 8.29 | 171 | 8.4 | 6.14 | 0.96 | 88.8 | 3.01 | | | 0.017 | 0.064 | | | 0.43 | 0.082 | 0.096 | 3.62 | 1.62 | 0.6 |
| 10/1/09 | missing | OR100109-OC | KR0591 | Klamath River at Orleans (USGS) | Karuk | 0.5 | missing | missing | missing | missing | 34.17 | 11.8 | 89.7 | 3.51 | | | <0.010 | <0.010 | | | 0.95 | 0.049 | 0.19 | 17 | 7.75 | 6.4 |
| 10/15/09 | 8:00 | OR101509-OC | KR0591 | Klamath River at Orleans (USGS) | Karuk | 0.5 | 13.26 | 8.14 | 154 | 10.37 | 22.42 | 22.8 | 70.5 | 3.74 | | | 0.015 | 0.31 | | | 1.32 | 0.052 | 0.2 | 56 | 13 | 0.4 |
| 11/12/09 | 8:30 | OR111209-OC | KR0591 | Klamath River at Orleans (USGS) | Karuk | 0.5 | 9.42 | 8.14 | 126 | 11.62 | 2.53 | 4 | 84.4 | 2.63 | | | <0.010 | 0.35 | | | 0.58 | 0.056 | 0.072 | 1.75 | 0.87 | |
| 12/10/09 | 8:43 | OR121009-OC | KR0591 | Klamath River at Orleans (USGS) | Karuk | 0.5 | 1.01 | 8.07 | 97 | 14.14 | 20.02 | 4.83 | 85.6 | 2.33 | | | <0.010 | 0.44 | | | 0.91 | 0.038 | 0.12 | 6.83 | 2.5 | |

| Date | Time | Sample ID | Site ID | Site Name | Agency | Depth | Water Temp. | pH | Specific Cond. | Diss. Oxygen | Algae, Chloroph-a | Algae, Pheophytin | Alkalinity | Carbon, Diss. Organic Carbon | Carbon, Particulate Carbon | Demand, Carbonaceous Biological Oxygen Demand | Nitrogen, Ammonia | Nitrogen, Nitrate+ Nitrite | Nitrogen, Particulate Nitrogen | Nitrogen, Total Kjeldahl Nitrogen | Nitrogen, Total Nitrogen | Phosphorus, Ortho-Phosphate | Phosphorus, Total Phosphorus | Solids, Total Susp. Solids | Solids, Volatile Susp. Solids | Toxins, Microcystin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | m | C | - | uS/cm | mg/l | ug/l | ug/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 | ug/l |
| 5/28/09 | 11:06 | WE052809 | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | 17.38 | 8.11 | 123 | 9.57 | 6.68 | 1.17 | 62.2 | 1.64 | | | <0.010 | <0.010 | | | 0.22 | 0.019 | 0.038 | 4 | 1.38 | |
| 6/25/09 | 11:24 | WE062509 | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | 20.15 | 8.4 | 169 | 9.39 | 1.87 | 1.5 | 82.5 | 2.26 | | | <0.010 | <0.010 | | | 0.22 | 0.036 | 0.057 | 1.88 | 0.87 | |
| 6/25/09 | 11:24 | WE062509-SG | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | <0.09 |
| 7/23/09 | 11:12 | WE072309-SG | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.3 |
| 7/23/09 | 11:19 | WE072309-OC | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | 22.66 | 8.32 | 181 | 8.94 | 4.01 | 2.72 | 86.9 | 2.58 | | | <0.010 | <0.010 | | | 0.34 | 0.037 | 0.054 | 2.75 | 1.75 | |
| 8/20/09 | 11:35 | WE082009-OC | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | 22.09 | 8.24 | 179 | 9.02 | 5.87 | 1.6 | 85.8 | 2.82 | | | <0.010 | 0.011 | | | 0.35 | 0.054 | 0.072 | 3.25 | 2.13 | |
| 8/20/09 | 11:35 | WE082009-OC | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.89 |
| 8/20/09 | 11:47 | WE082009-SG | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.22 |
| 9/17/09 | 11:37 | WE091709-OC | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | 19.78 | 8.2 | 180 | 9.48 | 5.61 | 4.3 | 86.9 | 2.92 | | | <0.010 | 0.049 | | | 0.39 | 0.063 | 0.086 | 2.75 | 1.5 | |
| 9/17/09 | 11:40 | WE091709-OC | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 1.1 |
| 9/17/09 | 11:51 | WE091709-SG | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | <0.09 |
| 10/15/09 | 11:36 | WE101509-OC | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | 13.29 | 7.92 | 152 | 10.18 | 25.63 | 20.35 | 71 | 3.77 | | | <0.010 | 0.26 | | | 1.05 | 0.048 | 0.19 | 33.75 | 9.75 | |
| 10/15/09 | 11:36 | WE101509-OC | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.92 |
| 10/15/09 | 11:50 | WE101509-SG | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 1.1 |
| 11/12/09 | 12:02 | WE111209-OC | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | 9.75 | 8.21 | 171 | 12.03 | 3.74 | 4.3 | 83.7 | 2.66 | | | 0.013 | 0.33 | | | 0.58 | 0.056 | 0.067 | 1.88 | 0.63 | |
| 12/17/09 | 11:32 | WE121709-OC | KR0435 | Klamath River At Weitchpec | Yurok | 0.5 | 6.67 | 7.63 | 117 | 12.1 | 9.61 | 7.21 | 57.5 | 2.77 | | | <0.010 | 0.21 | | | 0.52 | 0.017 | 0.063 | 11 | 3.75 | |
| 5/28/09 | 10:22 | TC052809 | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | 16.91 | 8.07 | 122 | 9.68 | 4.27 | 0.96 | 62.5 | 1.33 | | | <0.010 | <0.010 | | | 0.14 | 0.012 | 0.026 | 4 | 1 | |
| 5/28/09 | 10:22 | TC052809-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | <0.09 |
| 5/28/09 | 10:22 | TC052809 | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | |
| 6/25/09 | 10:38 | TC062509 | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | 19.88 | 8.27 | 164 | 9 | 1.87 | 1.12 | 81.8 | 1.71 | | | <0.010 | <0.010 | | | 0.19 | 0.022 | 0.041 | 1.5 | 0.62 | |
| 6/25/09 | 10:38 | TC062509-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.1 |
| 6/25/09 | 10:38 | TC062509-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | |
| 7/23/09 | 10:24 | TC072309-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | 22.52 | 8.32 | 181 | 8.4 | 2.67 | 3.31 | 83.5 | 2.04 | | | <0.010 | <0.010 | | | 0.22 | 0.024 | 0.042 | 2.5 | 1.5 | |
| 7/23/09 | 10:24 | TC072309-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.16 |
| 7/23/09 | 10:24 | TC072309-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | |
| 8/20/09 | 10:52 | TC082009-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | 22.38 | 8.26 | 174 | 8.58 | 4.54 | 1.63 | 87.6 | 2.23 | | | <0.010 | <0.010 | | | 0.26 | 0.033 | 0.05 | 2.5 | 1.75 | |
| 8/20/09 | 10:52 | TC082009-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.43 |
| 8/20/09 | 10:52 | TC082009-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | |
| 9/17/09 | 10:58 | TC091709-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | 19.99 | 8.2 | 173 | 9.08 | 4.54 | 3.5 | 83.6 | 2.01 | | | <0.010 | 0.025 | | | 0.27 | 0.043 | 0.06 | 1.88 | 1.13 | |
| 9/17/09 | 10:58 | TC091709-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.64 |
| 9/17/09 | 10:58 | TC091709-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | |
| 10/15/09 | 10:51 | TC101509-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.67 |
| 10/15/09 | 10:59 | TC101509-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | 13.44 | 7.85 | 158 | 10.03 | 27.23 | 18 | 73.8 | 2.83 | | | <0.010 | 0.16 | | | 0.82 | 0.031 | 0.14 | 34 | 10 | |
| 10/15/09 | 10:59 | TC101509-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | |
| 11/12/09 | 11:14 | TC111209-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | 9.73 | 8.14 | 172 | 11.73 | 2.94 | 3.23 | 85.7 | 2.09 | | | 0.011 | 0.24 | | | 0.45 | 0.041 | 0.05 | 1.88 | 0.63 | |
| 11/12/09 | 11:16 | TC111209-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | <0.09 |
| 12/17/09 | 10:59 | TC121709-OC | KR0425 | Klamath River bel. Trinity River | Yurok | 0.5 | 6.75 | 7.68 | 131 | 11.95 | 14.42 | 10.25 | 64.3 | 2.24 | | | 0.011 | 0.16 | | | 0.77 | 0.011 | 0.1 | 38 | 6.5 | |
| 5/28/09 | 8:20 | TG052809 | KR0060 | Klamath River near Klamath | Yurok | 0.5 | 16.59 | 8.07 | 123 | 9.4 | 4.54 | 1.07 | 63.2 | 1.08 | | | <0.010 | 0.011 | | | 0.15 | 0.009 | 0.024 | 4.88 | 1.25 | |
| 5/28/09 | 8:20 | TG052809-OC | KR0060 | Klamath River near Klamath | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | <0.09 |
| 6/25/09 | 8:53 | TG062509 | KR0060 | Klamath River near Klamath | Yurok | 0.5 | 18.96 | 8.09 | 163 | 8.96 | 2.67 | 1.82 | 80.4 | 1.42 | | | <0.010 | 0.018 | | | 0.19 | 0.014 | 0.032 | 5 | 1.25 | |
| 6/25/09 | 8:53 | TG062509-OC | KR0060 | Klamath River near Klamath | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | <0.09 |
| 6/25/09 | 9:40 | TG062509-SG | KR0060 | Klamath River near Klamath | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | <0.09 |
| 7/23/09 | 8:06 | TG072309-SG | KR0060 | Klamath River near Klamath | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.26 |
| 7/23/09 | 8:10 | TG072309-OC | KR0060 | Klamath River near Klamath | Yurok | 0.5 | 20.72 | 7.68 | 178 | 7.2 | 5.07 | 2.59 | 86.5 | 1.46 | | | <0.010 | 0.022 | | | 0.22 | 0.012 | 0.027 | 2 | 1.25 | |
| 7/23/09 | 8:10 | TG072309-OC | KR0060 | Klamath River near Klamath | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.15 |
| 8/20/09 | 8:28 | TG082009-OC | KR0060 | Klamath River near Klamath | Yurok | 0.5 | 21.47 | 8.26 | 175 | 7.65 | 6.14 | 2.27 | 85.9 | 1.87 | | | <0.010 | 0.013 | | | 0.25 | 0.02 | 0.042 | 2.75 | 1.75 | |
| 8/20/09 | 8:28 | TG082009-OC | KR0060 | Klamath River near Klamath | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.49 |
| 8/20/09 | 8:41 | TG082009-SG | KR0060 | Klamath River near Klamath | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.29 |
| 9/17/09 | 9:03 | TG091709-OC | KR0060 | Klamath River near Klamath | Yurok | 0.5 | 20.01 | 8.19 | 174 | 8.13 | 7.74 | 4.97 | 84.7 | 1.96 | | | <0.010 | <0.010 | | | 0.27 | 0.031 | 0.054 | 3.75 | 1.5 | |
| 9/17/09 | 9:06 | TG091709-OC | KR0060 | Klamath River near Klamath | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 1.7 |
| 9/17/09 | 9:16 | TG091709-SG | KR0060 | Klamath River near Klamath | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 1.7 |
| 10/15/09 | 8:43 | TG101509-OC | KR0060 | Klamath River near Klamath | Yurok | 0.5 | 13.78 | 7.87 | 167 | 9.57 | 26.7 | 23.02 | 78.4 | 2.51 | | | <0.010 | 0.22 | | | 0.8 | 0.046 | 0.15 | 30.25 | 7.25 | |
| 10/15/09 | 8:53 | TG101509-OC | KR0060 | Klamath River near Klamath | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 1.2 |
| 10/15/09 | 9:01 | TG101509-SG | KR0060 | Klamath River near Klamath | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 1.2 |
| 11/12/09 | 9:16 | TG111209-OC | KR0060 | Klamath River near Klamath | Yurok | 0.5 | 10.2 | 7.84 | 171 | 10.71 | 2.31 | 4.54 | 84.6 | 1.65 | | | 0.012 | 0.23 | | | 0.4 | 0.033 | 0.044 | 2.13 | 1 | |
| 11/12/09 | 9:16 | TG111209-OC | KR0060 | Klamath River near Klamath | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | <0.09 |
| 12/17/09 | 9:00 | TG121709-OC | KR0060 | Klamath River near Klamath | Yurok | 0.5 | 7.01 | 7.61 | 128 | 11.73 | 19.22 | 13.67 | 62.8 | 1.97 | | | 0.019 | 0.16 | | | 0.7 | 0.011 | 0.12 | 51 | 7.5 | |
| 5/28/09 | 7:33 | LES052809 | KR0005 | Klamath River Estuary | Yurok | 0.5 | 16.5 | 8.05 | 127 | 9.28 | 4.27 | 1.71 | 61.2 | 1.24 | | | <0.010 | <0.010 | | | 0.16 | 0.01 | 0.073 | 17.88 | 2.25 | |
| 5/28/09 | 7:33 | LES052809-OC | KR0005 | Klamath River Estuary | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | <0.09 |
| 6/25/09 | 7:41 | LES062509 | KR0005 | Klamath River Estuary | Yurok | 0.5 | 19.14 | 8.01 | 2512 | 8.21 | 1.87 | 1.68 | 81.8 | 1.82 | | | <0.010 | 0.012 | | | 0.2 | 0.017 | 0.034 | 3.5 | 1.38 | |
| 6/25/09 | 7:41 | LES062509-OC | KR0005 | Klamath River Estuary | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | <0.09 |
| 7/23/09 | 7:10 | LES072309-OC | KR0005 | Klamath River Estuary | Yurok | 0.5 | 19.5 | 8.17 | 100 to 14,. | 8.12 | 3.2 | 2.03 | 94.8 | 1.61 | | | 0.022 | 0.015 | | | 0.29 | 0.014 | 0.028 | 2.38 | 0.75 | |
| 7/23/09 | 7:10 | LES072309-OC | KR0005 | Klamath River Estuary | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.19 |
| 8/20/09 | 7:33 | LES082009-OC | KR0005 | Klamath River Estuary | Yurok | 0.5 | 20.7 | 8.18 | 000 to 530 | 7.87 | 3.47 | 1.95 | 90 | 1.97 | | | 0.011 | 0.018 | | | 0.23 | 0.019 | 0.035 | 2.13 | <0.50 | |
| 8/20/09 | 7:33 | LES082009-OC | KR0005 | Klamath River Estuary | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 0.34 |
| 9/17/09 | 8:09 | LES091709-OC | KR0005 | Klamath River Estuary | Yurok | 0.5 | 18.96 | 8.01 | 800 to 590 | 7.84 | 5.34 | 3.82 | 88.6 | 2.06 | | | 0.041 | 0.019 | | | 0.41 | 0.033 | 0.065 | 3.83 | 2.67 | |
| 9/17/09 | 8:09 | LES091709-OC | KR0005 | Klamath River Estuary | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 1.4 |
| 10/15/09 | 7:55 | LES101509-OC | KR0005 | Klamath River Estuary | Yurok | 0.5 | 14.01 | 7.83 | 22340 | 9.12 | 8.01 | 9.93 | 82.1 | 2.82 | | | 0.025 | 0.19 | | | 0.58 | 0.047 | 0.089 | 12.75 | 2.75 | |
| 10/15/09 | 7:58 | LES101509-OC | KR0005 | Klamath River Estuary | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | 2.3 |
| 11/12/09 | 7:52 | LES111209-OC | KR0005 | Klamath River Estuary | Yurok | 0.5 | 9.93 | 7.89 | 7140 | 10.13 | 1.6 | 4.75 | 89 | 1.88 | | | 0.033 | 0.2 | | | 0.44 | 0.038 | 0.091 | 17 | 1.5 | |
| 11/12/09 | 7:53 | LES111209-OC | KR0005 | Klamath River Estuary | Yurok | 0.5 | | | | | | | | | | | | | | | | | | | | <0.09 |
| 12/17/09 | 7:56 | LES121709-OC | KR0005 | Klamath River Estuary | Yurok | 0.5 | 7.1 | 7.44 | 162 | 11.5 | 17.09 | 16.18 | 59.9 | 1.9 | | | 0.026 | 0.2 | | | 0.69 | 0.012 | 0.12 | 42 | 8 | |

| Date | Time | Sample ID | Site ID | Site Name | Agency | Depth | Water Temp. | pH | Specific Cond. | Diss. Oxygen | Algae, Chloroph-a | Algae, Pheophytin | Alkalinity | Carbon, Diss. Organic Carbon | Carbon, Particulate Carbon | Demand, Carbonaceous Biological Oxygen Demand | Nitrogen, Ammonia | Nitrogen, Nitrate+ Nitrite | Nitrogen, Particulate Nitrogen | Nitrogen, Total Kjeldahl Nitrogen | Nitrogen, Total Nitrogen | Phosphorus, Ortho-Phosphate | Phosphorus, Total Phosphorus | Solids, Total Susp. Solids | Solids, Volatile Susp. Solids | Toxins, Microcystin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | m | C | - | uS/cm | mg/l | ug/l | ug/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 | ug/l |
| 5/14/09 | 12:06 | SH051409-OC | SHR00 | Shasta River near mouth | Karuk | 0.5 | 15.79 | 8.62 | 556 | 10.81 | 4.27 | 3.57 | 307 | 5.52 | | | <0.010 | <0.010 | | | 0.52 | 0.15 | 0.18 | 9.16 | 3.5 | 0.12j |
| 5/28/09 | 12:11 | SH052809-OC | SHR00 | Shasta River near mouth | Karuk | 0.5 | 21.41 | 8.57 | 607 | 9.83 | 1.33 | 1.46 | 318.2 | 5.49 | | | <0.010 | <0.010 | | | 0.45 | 0.2 | 0.24 | 0.75 | <0.50 | 0.16j |
| 6/11/09 | 13:30 | SH061106-OC | SHR00 | Shasta River near mouth | Karuk | 0.5 | 20.62 | 8.57 | 600 | 8.51 | 5.87 | 7.95 | 314.8 | 6.16 | | | <0.010 | <0.010 | | | 0.83 | 0.15 | 0.25 | 25.25 | 6.75 | |
| 6/25/09 | 14:15 | SH062509-OC | SHR00 | Shasta River near mouth | Karuk | 0.5 | 23.87 | 8.69 | 577 | 8.83 | 1.6 | 4.75 | 304 | 5.94 | | | <0.010 | <0.010 | | | 0.54 | 0.17 | 0.22 | 7.12 | 1.87 | <0.09 |
| 7/9/09 | 14:00 | SH070909-OC | SHR00 | Shasta River near mouth | Karuk | 0.5 | missing | missing | missing | missing | 1.33 | 3.15 | 328.2 | 6.22 | | | <0.010 | <0.010 | | | 0.54 | 0.17 | 0.21 | 4.75 | 1.87 | <0.09 |
| 7/23/09 | 12:50 | SH072309-OC | SHR00 | Shasta River near mouth | Karuk | 0.5 | 25.26 | 8.71 | 627 | 9.49 | 1.33 | 3.33 | 322.4 | 7.19 | | | <0.010 | <0.010 | | | 0.69 | 0.22 | 0.28 | 3.5 | 1.12 | 1 |
| 8/6/09 | 13:00 | SH080609-OC | SHR00 | Shasta River near mouth | Karuk | 0.5 | 19.17 | 8.65 | 598 | 9.08 | 1.6 | 2.69 | 313.6 | 5.32 | | | <0.010 | <0.010 | | | 0.47 | 0.21 | 0.22 | 1.87 | 0.5 | |
| 8/20/09 | 13:00 | SH082009-OC | SHR00 | Shasta River near mouth | Karuk | 0.5 | 23.35 | 8.77 | 593 | 9.51 | 1.86 | 2.42 | 286.4 | 5.21 | | | <0.010 | <0.010 | | | 0.46 | 0.17 | 0.21 | 3 | 2.37 | |
| 9/3/09 | 12:23 | SH090309-OC | SHR00 | Shasta River near mouth | Karuk | 0.5 | 19.82 | 8.69 | 612 | 10.09 | 1.86 | 1.86 | 304.8 | 5.75 | | | <0.010 | <0.010 | | | 0.46 | 0.17 | 0.2 | 1.37 | 0.75 | |
| 9/17/09 | 13:00 | SH091709-OC | SHR00 | Shasta River near mouth | Karuk | 0.5 | 20.16 | 8.77 | 626 | 9.72 | 4.27 | 6.19 | 323.4 | 5.36 | | | <0.010 | <0.010 | | | 0.61 | 0.2 | 0.24 | 17.66 | 4.16 | <0.09 |
| 10/1/09 | 12:04 | SH100109-OC | SHR00 | Shasta River near mouth | Karuk | 0.5 | 11.48 | 8.59 | 617 | 10.36 | 14.95 | 21.68 | 298.4 | 5.36 | | | 0.007 | 0.076 | | | 1.18 | 0.16 | 0.28 | 55 | 15 | <0.09 |
| 10/15/09 | 12:50 | SH101509-OC | SHR00 | Shasta River near mouth | Karuk | 0.5 | 12.72 | 8.58 | 466 | 10.5 | 3.73 | 5.6 | 236.6 | 2.32 | | | <0.010 | 0.09 | | | 0.36 | 0.16 | 0.18 | 8.66 | 1.83 | 0.09j |
| 11/12/09 | 12:45 | SH111209-OC | SHR00 | Shasta River near mouth | Karuk | 0.5 | 8.07 | 8.74 | 397 | 12.08 | 3.02 | 4.45 | 224.8 | 1.33 | | | <0.010 | 0.084 | | | 0.23 | 0.15 | 0.17 | 4.37 | 1.12 | |
| 12/10/09 | 13:15 | SH121009-OC | SHR00 | Shasta River near mouth | Karuk | 0.5 | 0.01 | 8.49 | 223 | 13.73 | 7.2 | 3.63 | 215.4 | 1.03 | | | <0.010 | 0.21 | | | 0.37 | 0.17 | 0.2 | 7.62 | 2 | |
| 5/14/09 | 10:45 | SC051409-OC | SCR00 | Scott River near mouth | Karuk | 0.5 | 10.96 | 8.2 | 115 | 11.18 | 2.13 | 0.66 | 67.1 | 1.54 | | | <0.010 | 0.058 | | | 0.15 | 0.004 | 0.014 | 5 | 0.87 | 0.11j |
| 5/28/09 | 10:42 | SC052809-OC | SCR00 | Scott River near mouth | Karuk | 0.5 | 15.64 | 8.33 | 116 | 9.77 | 2.13 | 1.41 | 67.4 | 1.43 | | | <0.010 | <0.010 | | | 0.1 | 0.001 | 0.009 | 3.5 | 1.37 | 0.19 |
| 6/11/09 | 0:00 | SC061109-OC | SCR00 | Scott River near mouth | Karuk | 0.5 | 16.12 | 8.41 | 172 | 9.5 | 1.86 | 2.61 | 94.4 | 1.41 | | | <0.010 | 0.064 | | | 0.16 | <0.001 | 0.009 | 2.66 | 1.16 | 0.09j |
| 6/25/09 | 12:05 | SC062509-OC | SCR00 | Scott River near mouth | Karuk | 0.5 | 19.45 | 8.49 | 215 | 9.37 | 0.8 | 2.75 | 115.8 | 0.99 | | | <0.010 | 0.11 | | | 0.2 | <0.001 | 0.012 | 1.37 | 0.87 | 0.09j |
| 7/9/09 | 11:08 | SC070909-OC | SCR00 | Scott River near mouth | Karuk | 0.5 | 19.16 | 8.51 | 228 | 9.41 | 1.06 | 0.92 | 122.7 | 1.18 | | | <0.010 | 0.011 | | | 0.1 | <0.001 | 0.007 | 1.12 | 0.62 | <0.09 |
| 7/23/09 | 11:25 | SC072309-OC | SCR00 | Scott River near mouth | Karuk | 0.5 | 23.68 | 8.51 | 223 | 9.27 | 1.42 | 1.44 | 115.7 | 0.86 | | | <0.010 | <0.010 | | | 0.1 | <0.001 | 0.006 | 0.5 | <0.50 | 0.12j |
| 8/6/09 | 11:10 | SC080609-OC | SCR00 | Scott River near mouth | Karuk | 0.5 | 19.57 | 8.37 | 237 | 9.08 | 0.93 | 1.21 | 120.8 | 0.83 | | | 0.011 | 0.011 | | | 0.084 | 0.002 | 0.008 | 0.87 | 0.75 | |
| 8/20/09 | 11:19 | SC082009-OC | SCR00 | Scott River near mouth | Karuk | 0.5 | 22.31 | 8.58 | 250 | 9.31 | 1.06 | <0.1 | 120.4 | 0.95 | | | <0.010 | <0.010 | | | 0.14 | 0.001 | 0.007 | 0.99 | 0.99 | |
| 9/3/09 | 10:50 | SC090309-OC | SCR00 | Scott River near mouth | Karuk | 0.5 | 19.81 | 8.55 | 256 | 9.6 | 0.71 | 1.15 | 123.9 | 0.99 | | | <0.010 | <0.010 | | | 0.077 | <0.001 | 0.01 | 1.5 | 0.62 | |
| 9/17/09 | 11:25 | SC091709-OC | SCR00 | Scott River near mouth | Karuk | 0.5 | 20.32 | 8.71 | 259 | 9.91 | 1.6 | 1.01 | 128.9 | 0.79 | | | 0.02 | <0.010 | | | 0.076 | <0.001 | 0.009 | 0.87 | 0.87 | <0.09 |
| 10/1/09 | 10:30 | SC100109-OC | SCR00 | Scott River near mouth | Karuk | 0.5 | 12.29 | 8.49 | 177 | 11.18 | 1.6 | 0.51 | 126.2 | 0.78 | | | <0.010 | <0.010 | | | 0.079 | <0.001 | 0.006 | 0.75 | <0.50 | 0.1j |
| 10/15/09 | 11:12 | SC101509-OC | SCR00 | Scott River near mouth | Karuk | 0.5 | 12.89 | 8.35 | 208 | 10.74 | 2.93 | 1.54 | 104.1 | 2.93 | | | <0.010 | <0.010 | | | 0.17 | 0.001 | 0.012 | 2.62 | 1.25 | 0.09j |
| 11/12/09 | 11:30 | SC111209-OC | SCR00 | Scott River near mouth | Karuk | 0.5 | 7.75 | 8.59 | 234 | 12.55 | 1.73 | 1.06 | 133.4 | 0.75 | | | <0.010 | 0.024 | | | 0.078 | 0.001 | 0.003 | <0.50 | <0.50 | |
| 12/10/09 | 11:45 | SC121009-OC | SCR00 | Scott River near mouth | Karuk | 0.5 | 0.01 | 8.34 | 152 | 13.77 | 4.09 | 0.26 | 148 | 0.78 | | | <0.010 | 0.34 | | | 0.37 | <0.001 | 0.002 | 0.99 | 0.5 | |
| 5/14/09 | 8:35 | SA051409-OC | SAR00 | Salmon River near mouth | Karuk | 0.5 | 9.85 | 7.78 | 73 | 11.76 | 1.33 | 0.16 | 38.2 | 1.11 | | | <0.010 | <0.010 | | | 0.06 | 0.003 | 0.012 | 3.62 | 0.75 | 0.13j |
| 5/28/09 | 8:33 | SA052809-OC | SAR00 | Salmon River near mouth | Karuk | 0.5 | 14.78 | 7.76 | 69 | 9.92 | 1.6 | 0.26 | 36.2 | 0.87 | | | <0.010 | <0.010 | | | 0.064 | 0.002 | 0.014 | 5.75 | 1.5 | 0.12j |
| 6/11/09 | 8:21 | SA061109-OC | SAR00 | Salmon River near mouth | Karuk | 0.5 | 14.95 | 7.98 | 88 | 9.7 | 0.66 | 0.64 | 45.2 | 0.66 | | | <0.010 | <0.010 | | | <0.050 | 0.002 | 0.006 | 0.75 | 0.5 | <0.09 |
| 6/25/09 | 8:52 | SA062509-OC | SAR00 | Salmon River near mouth | Karuk | 0.5 | 17.75 | 8.08 | 105 | 9.55 | 1.33 | 0.16 | 54 | 0.66 | | | <0.010 | <0.010 | | | <0.050 | 0.005 | 0.011 | <0.50 | <0.50 | <0.09 |
| 7/9/09 | 8:45 | SA070909-OC | SAR00 | Salmon River near mouth | Karuk | 0.5 | 17.64 | 8.16 | 119 | 9.39 | 0.89 | 0.48 | 61 | 0.64 | | | <0.010 | <0.010 | | | <0.050 | 0.003 | 0.006 | <0.50 | <0.50 | <0.09 |
| 7/23/09 | 8:45 | SA072309-OC | SAR00 | Salmon River near mouth | Karuk | 0.5 | 20.35 | 8.09 | 130 | 9.2 | 9.87 | 5.25 | 65.3 | 0.52 | | | <0.010 | <0.010 | | | 0.13 | <0.001 | 0.019 | 10 | 3.62 | 0.09j |
| 8/6/09 | 8:32 | SA080609-OC | SAR00 | Salmon River near mouth | Karuk | 0.5 | 19.92 | 8.01 | 128 | 8.96 | 1.46 | 0.86 | 70.5 | 0.68 | | | <0.010 | <0.010 | | | 0.075 | 0.005 | 0.01 | 1.5 | 1.12 | |
| 8/20/09 | 8:26 | SA082009-OC | SAR00 | Salmon River near mouth | Karuk | 0.5 | 19.7 | 8.12 | 144 | 8.68 | 0.8 | 1.06 | 72.1 | 0.48 | | | <0.010 | <0.010 | | | 0.059 | 0.001 | 0.007 | <0.50 | <0.50 | |
| 9/3/09 | 8:15 | SA090309-OC | SAR00 | Salmon River near mouth | Karuk | 0.5 | 18.04 | 8.05 | 146 | 9.01 | 1.06 | 1.73 | 74.9 | 0.62 | | | <0.010 | <0.010 | | | 0.073 | 0.002 | 0.007 | 5.12 | 0.99 | |
| 9/17/09 | 9:15 | SA091709-OC | SAR00 | Salmon River near mouth | Karuk | 0.5 | 17.74 | 8.13 | 148 | 9.24 | 1.24 | 1.37 | 74.8 | 0.47 | | | <0.010 | 0.014 | | | <0.050 | 0.002 | 0.005 | 1.25 | <0.50 | 0.1j |
| 10/1/09 | missing | SA100109-OC | SAR00 | Salmon River near mouth | Karuk | 0.5 | missing | missing | missing | missing | 1.6 | 1.13 | 73.5 | 0.53 | | | <0.010 | <0.010 | | | 0.069 | 0.001 | 0.007 | 1.87 | 1 | <0.09 |
| 10/15/09 | 8:38 | SA101509-OC | SAR00 | Salmon River near mouth | Karuk | 0.5 | 12.18 | 7.92 | 95 | 10.6 | 12.81 | 9.23 | 43.6 | 3.52 | | | <0.010 | 0.22 | | | 0.76 | 0.003 | 0.085 | 34.66 | 10.66 | 0.09j |
| 11/12/09 | 8:30 | SA111209-OC | SAR00 | Salmon River near mouth | Karuk | 0.5 | 8.71 | 8.02 | 115 | 11.65 | 1.33 | 1.09 | 62.3 | 1.05 | | | <0.010 | 0.016 | | | 0.076 | 0.004 | 0.008 | 2 | 0.75 | |
| 12/10/09 | 9:15 | SA121009-OC | SAR00 | Salmon River near mouth | Karuk | 0.5 | 0.05 | 8.03 | 65 | 14.31 | 4.53 | 0.5 | 61.9 | 0.51 | | | <0.010 | 0.015 | | | 0.075 | 0.002 | 0.014 | 6.62 | 2.75 | |
| 5/28/09 | 11:24 | TR052809 | TRR00 | Trinity River near mouth | Yurok | 0.5 | 16.38 | 8.03 | 122 | 9.62 | 1.34 | 0.16 | 64.8 | 0.73 | | | <0.010 | <0.010 | | | 0.084 | 0.002 | 0.01 | 2.38 | 1 | |
| 6/25/09 | 11:46 | TR062509 | TRR00 | Trinity River near mouth | Yurok | 0.5 | 19.82 | 8.33 | 154 | 9.4 | 1.07 | 0.99 | 77.1 | 0.61 | | | <0.010 | <0.010 | | | 0.072 | 0.002 | 0.008 | 1.63 | 0.75 | |
| 7/23/09 | 11:35 | TR072309-OC | TRR00 | Trinity River near mouth | Yurok | 0.5 | 22.47 | 8.24 | 167 | 8.73 | 1.34 | 1.09 | 83 | 0.56 | | | <0.010 | <0.010 | | | 0.072 | 0.003 | 0.006 | 0.87 | 0.87 | |
| 8/20/09 | 11:55 | TR082009-OC | TRR00 | Trinity River near mouth | Yurok | 0.5 | 22.32 | 8.28 | 163 | 8.98 | 0.8 | 0.51 | 80 | 0.82 | | | <0.010 | <0.010 | | | 0.057 | <0.001 | 0.006 | 1 | 0.88 | |
| 9/17/09 | 11:58 | TR091709-OC | TRR00 | Trinity River near mouth | Yurok | 0.5 | 19.84 | 8.27 | 157 | 9.56 | 1.6 | 0.64 | 76.1 | 0.78 | | | <0.010 | <0.010 | | | 0.053 | <0.001 | 0.006 | 0.75 | 0.63 | |
| 10/15/09 | 12:00 | TR101509-OC | TRR00 | Trinity River near mouth | Yurok | 0.5 | 13.51 | 7.95 | 167 | 10.11 | 24.03 | 11.11 | 81.7 | 1.47 | | | <0.010 | <0.010 | | | 0.59 | <0.001 | 0.092 | 35.25 | 11 | |
| 11/12/09 | 12:30 | TR111209-OC | TRR00 | Trinity River near mouth | Yurok | 0.5 | 9.92 | 8.3 | 178 | 12.04 | 1.47 | 0.12 | 85.4 | 0.76 | | | <0.010 | <0.010 | | | <0.050 | 0.003 | 0.005 | <0.50 | <0.50 | |
| 12/17/09 | 11:48 | TR121709-OC | TRR00 | Trinity River near mouth | Yurok | 0.5 | 6.83 | 7.9 | 158 | 11.88 | 18.69 | 12.34 | 75.7 | 2.36 | | | 0.013 | 0.11 | | | 0.67 | 0.005 | 0.15 | 48 | 7.5 | |

## *Appendix B: 2009 Klamath River AIP Sampling Lab Cross*

# Technical Memorandum

Date: April 2, 2010

To: Rick Carlson, U.S. Bureau of Reclamation
Susan Corum, Karuk Tribe
Clayton Creager, North Coast Regional Water Quality Control Board
Rich Fadness, North Coast Regional Water Quality Control Board
Ken Fetcho, Yurok Tribe
Sue Keydel, U.S. Environmental Protection Agency, Region 9
Steve Kirk, Oregon Department of Environmental Quality
Linda Prendergast, PacifiCorp
Chantell Royer, Humboldt State University

From: Mike Deas, Watercourse Engineering, Inc.
Jennifer Vaughn, Watercourse Engineering, Inc.

Re: 2009 Klamath River AIP Sampling Lab Cross Comparison (DRAFT)

## 1. Abstract

As there are several sampling crews using different analytical laboratories participating in the monitoring of water quality in the Klamath River, a comparison of laboratory results was undertaken to determine the similarity of the results of the different laboratories. Five sets of triplicate samples were collected by Reclamation staff at Link Dam from June 10 through December 8, 2009 and sent to three different laboratories to be analyzed for the same constituents. The relative percent difference between each laboratory was calculated for each result pair in a triplicate set (the first laboratory compared with the second, the first laboratory compared with the third, and the second laboratory compared with the third), resulting in 231 result pairs for all seven sample sets. The comparison of the result pairs indicated that some constituents were similar at all labs for all seven sampling sets (such as nitrate + nitrite), while other constituents had dissimilar results when the laboratories were compared (such as total nitrogen). A 20 percent relative percent difference (RPD) criteria was applied as a threshold to ascertain differences – this was an arbitrary threshold only for purposes of general comparison. Based on the 20 percent criteria, the total amount of similar result pairs for all seven sampling sets was 168 (73 percent of total result pairs). Of the 63 dissimilar result pairs, 22 percent were from comparisons between Basic Laboratory and CH2MHill Analytical Services Lab, 27 percent were from comparisons between Basic Laboratory and Aquatic Research and 51 percent were from comparisons between CH2MHill and Aquatic Research.

# 2. Introduction

There are multiple stakeholders along the Klamath River, many of whom use different laboratories to analyze the water samples collected for Klamath River water quality monitoring. Laboratory cross comparison was performed during 2009 to provide insight into laboratory performance measures at the three principal laboratories employed in the 2009 sampling season: Basic Laboratory in Redding, California, CH2MHill Applied Sciences Laboratory in Corvallis, Oregon; and Aquatic Research, Inc. in Seattle, Washington. The laboratory cross comparisons were performed by collecting a single sample volume at Link Dam, splitting each volume into a triplicate, and sending a sample set to each of the three laboratories. This was completed throughout the 2009 sampling season. Water quality analysis included alkalinity, ammonia, carbonaceous biological oxygen demand – 5 day (CBOD5), dissolved organic carbon (DOC), nitrate plus nitrite (NO3+NO2), total nitrogen (TN), ortho-phosphate (OPO4) for Basic Laboratory and CH2MHill, or soluble reactive phosphate (SRP) for Aquatic Research, Inc., total phosphorus (TP), total Kjeldahl nitrogen (TKN), total suspended solids (TSS), and volatile suspended solids (VSS).

# 3. Comparison

## *3.1. Method Comparison*

The methods of analysis for the three laboratories were compared along with the associated method detection limits (MDLs). The reporting limits (RLs) were not fully compared between the three laboratories as Aquatic Research does not present reporting limits with their analysis. All methods that were used were either EPA methods or Standard Methods. The analytical methods and associated limits for each constituent at each laboratory are presented in Table 5.

The topic of precision (measure of the degree of agreement among replicate analysis of a sample, often expressed as a standard deviation) is an important element of this discussion. This holds for both within lab and between lab comparisons for the same method and where different methods for the same constituent are applied. Standard Methods (2005) and EPA methods identify precision for all methods, typically for a range of constituent concentrations. Not only does precision change among methods, but also laboratory equipment and personnel can further modify precision of methods. A 20 percent relative percent difference (RPD) criteria was applied as a threshold to ascertain differences – this was an arbitrary threshold only for purposes of general comparison and may be overly stringent given the inherent variability within labs, among labs, and among methods. Nonetheless, this approach provides a mechanism to compare laboratories across a wide range of parameters.

**Table 5. Methods and Limits for each laboratory**

| | | Basic | | | CH2MHill | | | Aquatic Research | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Constituent** | **units** | **Method** | **MDL** | **RL** | **Method** | **MDL** | **RL** | **Method** | **MDL** | **RL** |
| Alkalinity | mg/l | SM 2320B | 1 | 5 | E310.1 | 0.55 | 5.00 | SM18 2320B | 1 | - |
| Ammonia | mg/l | EPA 350.1 | 0.02 | 0.05 | E350.1 | 0.0087 | 0.050 | SM184500NH3H | 0.01 | - |
| CBOD5 | mg/l | SM 5210 | 3 | 3 | SM5210B | 2.00 | 2.00 | SM205210B | 2 | - |
| DOC | mg/l | SM5310C | 0.3 | 0.5 | E415.1 | 0.052 | 0.50 | SM205310B | 0.25 | - |
| NO3+NO2 | mg/l | EPA 353.2 | 0.01 | 0.05 | E353.2 | 0.0017 | 0.010 | SM184500N03F | 0.01 | - |
| TN | mg/l | EPA 351.2 | (calc) | 0.2 | SM4500-N C | 0.020 | 0.020 | SM204500NC | 0.05 | - |
| OPO4 | mg/l | SM 4500P-E | 0.01 | 0.05 | E365.1 | 0.0018 | 0.010 | SM18 4500PF | 0.001 | - |
| TP | mg/l | SM 4500P-BE | 0.02 | 0.05 | E365.4 | 0.0078 | 0.050 | SM18 4500PF | 0.002 | - |
| TKN | mg/l | EPA 351.2 | 0.1 | 0.2 | E351.2 | 0.038 | 0.20 | EPA 351.1 | 0.2 | - |
| TSS | mg/l | SM 2540D | 2 (1) | 6 (5) | E160.2 | 0.87 | 2.00 | SM20 2540D | 0.5 | - |
| VSS | mg/l | SM 2540D | 2 (1) | 6 (5) | E160.4 | 0.87 | 2.00 | SM20 2540E | 0.5 | - |

Notes:

- Three, 14 L churn sample splitter volumes were used to process the triplicate samples. Nutrients were processed together to ensure comparability among inorganic an organic forms.
- Only CBOD was analyzed with the same method at all three laboratories, but it had a higher MDL at Basic Laboratories than at the other two laboratories.
- When laboratories used the same method for a constituent analysis, the MDL and RL (if applicable) were not necessarily the same.
- There is not an MDL for TN at Basic, because it is a calculated value.
- The MDL and RL for TSS and VSS were lowered by collecting a larger water sample. The higher values apply to the June 10 and July 14 sampling collections. The lower values apply to all other sample collections.

## *3.2. Results Comparison*

To compare the results from each laboratory, the relative percent difference was calculated for each pair of results: Basic and CH2MHill, Basic and Aquatic Research, and CH2MHill and Aquatic Research. The values of the three samples used to determine the relative percent difference (RPD) and criteria values for each day are presented in Table 6 through Table 14. All comparisons are made based on samples collected only at Link Dam.

The RPD was calculated using the following formula:

$$RPD = ((X1 - X2)/((X1 + X2)/2))$$

Where: X1 = Value of sample from laboratory 1

X2 = Value of sample from laboratory 2

The criteria used to determine if the paired samples were similar was an RPD of 20 percent or less for values greater than five times the reporting limit. For values less than or equal to five times the reporting limit, the RPD criteria was plus or minus the reporting limit (USBR, 2009). If the paired samples had an RPD greater than 20percent (or a difference greater than plus or minus the reporting limit), the samples were considered dissimilar.

Some of the reported results from the laboratories were presented as non-detects (ND), censored data (i.e., "less than value"), or were less than the RL (i.e., not censored). All of these reported results were replaced with the RL for calculation of the RPD (except for data from Aquatic Research, which was replaced with the appropriate MDL). When comparing Basic with either CH2MHill or Aquatic Research, Basic reporting limits were used as necessary to determine the RPD criteria. When CH2MHill was compared to Aquatic Research, CH2MHill reporting limits were used. The compliance with the RPD criteria for the pairs of samples for each date is presented below in Table 7 through Table 15. Where RPD was greater than 20 percent, the actual percent was placed in the tables to identify the actual difference.

Under certain circumstances where concentrations were low and/or reporting limits high, calculation of the RPD was not feasible. For example, when assessing similarity/dissimilarity for the June 10, 2009 comparisons for TSS, the RPD was not calculated. As shown in Table 6, the TSS values from Basic, CH2MHill Applied Sciences and Aquatic Research were 6.0 mg/l, 12.8 mg/l, and 10.0 mg/l, respectively. When comparing the results from Basic and CH2MHill, Basic's reporting limit of 6.0 mg/l was used. Neither the Basic nor the CH2MHill Applied Sciences results were greater than five times the reporting limit; therefore, the RPD calculation could not be used. Instead, the absolute difference between the two values was determined to be 6.8 mg/l, which was higher than Basic's reporting limit of 6.0 mg/l. As such, this comparison did not meet the assumed criteria and results were not considered similar.

Similarly, when comparing the results from Basic and Aquatic Research, Basic's reporting limit of 6.0 mg/l was used. Neither the Basic nor the Aquatic Research results were greater than five times the reporting limit, therefore the RPD calculations could not be used. Instead the absolute difference between the two values was determined to be 4.0 mg/l, which was less than the Basic reporting limit of 6.0 mg/l. This comparison did meet the assumed criteria and were considered similar.

When comparing the results from CH2MHill Applied Sciences and Aquatic Research, CH2MHill's reporting limit of 2.0 mg/l was used. The TSS value from CH2MHill was greater than five times the reporting limit, which allowed for the calculation of the RPD. The resulting RPD was 24.5 percent, which was greater than 20 percent. Therefore, this comparison did not meet the assumed criteria and were not considered similar.

**Table 6. Result values used to determine RPD and criteria values, June 10, 2009.**

| | Laboratory | Basic | CH2MHill Applied Sciences | Aquatic Research, Inc. |
|---|---|---|---|---|
| | Sample ID / units | 2009AIP-004 | 2009AIP-006 | 2009AIP-007 |
| Alkalinity | mg/l | 54 | 51.6 | 58.3 |
| Ammonia | mg/l | 0.08 | 0.05[d] | 0.010 |
| CBOD5 | mg/l | 7 | 6.85 | 7.32 |
| DOC | mg/l | 5.7 | 5.59 | 5.28 |
| NO3+NO2 | mg/l | 0.05 [a] | 0.010[e] | 0.01[g] |
| TN | mg/l | 1.36 | 1.23 | 1.16 |
| OPO4 | mg/l | 0.05[b] | 0.010 [f] | 0.0031 |
| TP | mg/l | 0.05 | 0.088 | 0.06 |
| TKN | mg/l | 1.3 | 1.72 | 1.33 |
| TSS | mg/l | 6 | 12.8 | 10 |
| VSS | mg/l | 6 [c] | 9.6 | 7.5 |

[a] Basic Laboratory reported results for NO3+NO2 was 0.03 mg/l and was replaced with the appropriate RL. .

[b] Basic Laboratory reported result for OPO4 was "ND" and was replaced with the appropriate RL. .

[c] Basic Laboratory reported result for VSS was 3.0 mg/l and was replaced with the appropriate RL. .

[d] CH2MHill reported result for ammonia was -0.056 mg/l and was replaced with the appropriate RL. .

[e] CH2MHill reported result for NO3+NO2 was -0.0044 mg/l and was replaced with the appropriate RL.

[f] CH2MHill reported result for OPO4 was 0.004 mg/l and was replaced with the appropriate RL.

[g] Aquatic Research reported result for NO3+NO2 was "<0.010 mg/l" and was replaced with the appropriate MDL.

**Table 7. Comparison of similarity criteria compliance (non-compliance noted) for June 10, 2009.**

| Constituent | Basic versus CH2MHill Applied Sciences | Basic versus Aquatic Research, Inc. | CH2MHill Applied Sciences versus Aquatic Research, Inc. |
|---|---|---|---|
| Alkalinity | OK | OK | OK |
| Ammonia | OK | **0.07 mg/l[a]** | OK |
| CBOD5 | OK | OK | OK |
| DOC | OK | OK | OK |
| NO3+NO2 | OK | OK | OK |
| TN | OK | OK | OK |
| OPO4 | OK | OK | OK |
| TP | OK | OK | OK |
| TKN | **27.8%** | OK | **25.4%** |
| TSS | **6.8 mg/l[b]** | OK | **24.5%** |
| VSS | OK | OK | **2.1 mg/l[c]** |

[a] Basic ammonia reporting limit was 0.05 mg/l.

[b] Basic TSS reporting limit was 6.0 mg/l.

[c] CH2MHill VSS reporting limit was 2.0 mg/l.

**Table 8. Result values used to determine RPD and criteria values, July 14, 2009.**

| | Laboratory | Basic | CH2MHill Applied Sciences | Aquatic Research, Inc. |
|---|---|---|---|---|
| | Sample ID / units | 2009AIP-018 | 2009AIP-020 | 2009AIP-021 |
| Alkalinity | mg/l | 53 | 47.3 | 58.1 |
| Ammonia | mg/l | 0.11 | 0.05[c] | 0.072 |
| CBOD5 | mg/l | 10 | 7.04 | 8.14 |
| DOC | mg/l | 7.9 | 6.86 | 7.39 |
| NO3+NO2 | mg/l | 0.05[a] | 0.019 | 0.015 |
| TN | mg/l | 1.86 | 0.86 | 2.78 |
| OPO4 | mg/l | 0.05[b] | 0.043 | 0.020 |
| TP | mg/l | 0.12 | 0.14 | 0.12 |
| TKN | mg/l | 1.8 | 2.08 | 2.89 |
| TSS | mg/l | 10 | 4 | 7.5 |
| VSS | mg/l | 7 | 3.2 | 6 |

[a] Basic Laboratory reported results for NO3+NO2 was 0.02 mg/l and was replaced with the appropriate RL value.

[b] Basic Laboratory reported result for OPO4 was "ND" and was replaced with the appropriate RL.

[c] CH2MHill reported result for ammonia was -0.12 mg/l and was replaced with the appropriate RL.

**Table 9. Comparison of similarity criteria compliance (non-compliance noted) for July 14, 2009.**

| Constituent | Basic versus CH2MHill Applied Sciences | Basic versus Aquatic Research, Inc. | CH2MHill Applied Sciences versus Aquatic Research, Inc. |
|---|---|---|---|
| Alkalinity | OK | OK | **20.5%** |
| Ammonia | **0.06 mg/l[a]** | OK | OK |
| CBOD5 | OK | OK | OK |
| DOC | OK | OK | OK |
| NO3+NO2 | OK | OK | OK |
| TN | **73.5%** | **39.7%** | **105.6%** |
| OPO4 | OK | OK | **0.03 mg/l[b]** |
| TP | OK | OK | OK |
| TKN | OK | **46.4%** | **32.5%** |
| TSS | OK | OK | **3.5 mg/l[c]** |
| VSS | OK | OK | **2.8 mg/l[d]** |

[a] Basic ammonia reporting limit was 0.05 mg/l.

[b] CH2MHill OPO4 reporting limit was 0.01 mg/l.

[c] CH2MHill TSS reporting limit was 2.0 mg/l.

[d] CH2MHill VSS reporting limit was 2.0 mg/l.

**Table 10. Result values used to determine RPD and criteria values, August 11, 2009.**

| | Laboratory | Basic | CH2MHill Applied Sciences | Aquatic Research, Inc. |
|---|---|---|---|---|
| | Sample ID / units | 2009AIP-030 | 2009AIP-033 | 2009AIP-034 |
| Alkalinity | mg/l | 58 | 60 | 72 |
| Ammonia | mg/l | 0.16 | 0.05[b] | 0.028 |
| CBOD5 | mg/l | 23 | 34.2 | 32.5 |
| DOC | mg/l | 7.9 | 8 | 7.55 |
| NO3+NO2 | mg/l | 0.05 | 0.012 | 0.012 |
| TN | mg/l | 5.08 | 5.37 | 7.06 |
| OPO4 | mg/l | 0.05[a] | 0.033 | 0.045 |
| TP | mg/l | 0.37 | 0.32 | 0.42 |
| TKN | mg/l | 5.1 | 5.45 | 7.02 |
| TSS | mg/l | 24 | 18.8 | 27 |
| VSS | mg/l | 18 | 15.2 | 25 |

[a] Basic Laboratory reported result for OPO4 was 0.02 mg/l and was replaced with the appropriate RL value.

[b] CH2MHill reported result for ammonia was 0.013 mg/l and was replaced with the appropriate RL.

**Table 11. Comparison of similarity criteria compliance (non-compliance noted) for August 11, 2009.**

| Constituent | Basic versus CH2MHill Applied Sciences | Basic versus Aquatic Research, Inc. | CH2MHill Applied Sciences versus Aquatic Research, Inc. |
|---|---|---|---|
| Alkalinity | OK | **21.5%** | OK |
| Ammonia | **0.11 mg/l[a]** | **0.13 mg/l[a]** | OK |
| CBOD5 | **39.2%** | **34.2%** | OK |
| DOC | OK | OK | OK |
| NO3+NO2 | OK | OK | OK |
| TN | OK | **32.6%** | **27.2%** |
| OPO4 | OK | OK | **0.012 mg/l[b]** |
| TP | OK | OK | **26.1%** |
| TKN | OK | **31.7%** | **25.2%** |
| TSS | OK | OK | **35.8%** |
| VSS | OK | **7.0 mg/l[c]** | **48.8%** |

[a] Basic ammonia reporting limit was 0.05 mg/l.

[b] CH2MHill OPO4 reporting limit was 0.01 mg/l.

[c] Basic VSS reporting limit was 6.0 mg/l.

**Table 12. Result values used to determine RPD and criteria values, September 8, 2009.**

| | Laboratory | Basic | CH2MHill Applied Sciences | Aquatic Research, Inc. |
|---|---|---|---|---|
| | Sample ID / units | 2009AIP-043 | 2009AIP-047 | 2009AIP-046 |
| Alkalinity | mg/l | 54 | 53.9 | 61.2 |
| Ammonia | mg/l | 0.22 | 0.05[b] | 0.053 |
| CBOD5 | mg/l | 17 | 11.2 | 18.7 |
| DOC | mg/l | 9.4 | 9.26 | 7.06 |
| NO3+NO2 | mg/l | 0.05[a] | 0.01[c] | 0.010[d] |
| TN | mg/l | 3.98 | 2.24 | 3.66 |
| OPO4 | mg/l | 0.06 | 0.074 | 0.079 |
| TP | mg/l | 0.3 | 0.31 | 0.33 |
| TKN | mg/l | 4 | 3.37 | 3.48 |
| TSS | mg/l | 21 | 29.6 | 21 |
| VSS | mg/l | 13 | 24.4 | 15 |

[a] Basic Laboratory reported result for NO3+NO2 was ND and was replaced with the appropriate RL value.

[b] CH2MHill reported result for ammonia was -0.0079 mg/l and was replaced with the appropriate RL value.

[c] CH2MHill reported result for NO3+NO2 was 0.0063 mg/l and was replaced with the appropriate RL value.

[d] Aquatic Research reported result for NO3+NO2 was <0.010 mg/l and was replaced with the appropriate RL value.

**Table 13. Comparison of similarity criteria compliance (non-compliance noted) for September 8, 2009.**

| Constituent | Basic versus CH2MHill Applied Sciences | Basic versus Aquatic Research, Inc. | CH2MHill Applied Sciences versus Aquatic Research, Inc. |
|---|---|---|---|
| Alkalinity | OK | OK | OK |
| Ammonia | **0.17 mg/l[a]** | **0.17 mg/l[a]** | OK |
| CBOD5 | OK | OK | **50.2%** |
| DOC | OK | **28.4%** | **27.0%** |
| NO3+NO2 | OK | OK | OK |
| TN | **56.0%** | OK | **48.1%** |
| OPO4 | OK | OK | OK |
| TP | OK | OK | OK |
| TKN | OK | OK | OK |
| TSS | **8.6 mg/l[b]** | OK | **34.0%** |
| VSS | **11.4 mg/l[c]** | OK | **47.7%** |

[a] Basic ammonia reporting limit was 0.05 mg/l.

[b] Basic TSS reporting limit was 6.0 mg/l.

[c] Basic VSS reporting limit was 6.0 mg/l.

**Table 14. Result values used to determine RPD and criteria values, October 20, 2009.**

| | Laboratory | Basic | CH2MHill Applied Sciences | Aquatic Research, Inc. |
|---|---|---|---|---|
| | Sample ID / units | 2009AIP-060 | 2009AIP-063 | 2009AIP-064 |
| Alkalinity | mg/l | 61 | 58 | 63.1 |
| Ammonia | mg/l | 0.4 | 0.39 | 0.340 |
| CBOD5 | mg/l | 3 | 12.9 | 3.32 |
| DOC | mg/l | 7.9 | 7.55 | 6.31 |
| NO3+NO2 | mg/l | 0.33 | 0.28 | 0.300 |
| TN | mg/l | 2.02 | 1.02 | 1.49 |
| OPO4 | mg/l | 0.05[a] | 0.01[d] | 0.010 |
| TP | mg/l | 0.11 | 0.23 | 0.10[e] |
| TKN | mg/l | 1.7 | 1.74 | 1.49 |
| TSS | mg/l | 6[b] | 6.8 | 10 |
| VSS | mg/l | 6[c] | 4.4 | 5.3 |

[a] Basic Laboratory reported result for OPO4 was 0.01 mg/l and was replaced with the appropriate RL value for RPD determination.

[b] Basic Laboratory reported result for TSS was 5 mg/l and was replaced with the appropriate RL value for RPD determination.

[c] Basic Laboratory reported result for VSS was 2 mg/l and was replaced with the appropriate RL value for RPD determination.

[d] CH2MHill reported result for OPO4 was 0.008 mg/l and was replaced with the appropriate RL value for RPD determination.

[e] Aquatic Research reported result for TP was 0.096 mg/l and was replaced with the appropriate RL value for RPD determination.

**Table 15. Comparison of similarity criteria compliance (non-compliance noted) for October 20, 2009.**

| Constituent | Basic versus CH2MHill Applied Sciences | Basic versus Aquatic Research, Inc. | CH2MHill Applied Sciences versus Aquatic Research, Inc. |
|---|---|---|---|
| Alkalinity | OK | OK | OK |
| Ammonia | OK | OK | OK |
| CBOD5 | **9.9 mg/l[a]** | OK | **9.6 mg/l[b]** |
| DOC | OK | **22.4%** | OK |
| NO3+NO2 | OK | OK | OK |
| TN | **65.8%** | **30.2%** | **37.5%** |
| OPO4 | OK | OK | OK |
| TP | **0.12 mg/l[c]** | OK | **0.13 mg/l[d]** |
| TKN | OK | OK | OK |
| TSS | OK | OK | **3.2 mg/l[e]** |
| VSS | OK | OK | OK |

[a] Basic CBOD5 reporting limit was 3.0 mg/l.

[b] CH2MHill CBOD5 reporting limit was 2.0 mg/l.

[c] Basic TP reporting limit was 0.05 mg/l.

[d] CH2MHill TP reporting limit was 0.05 mg/l.

[e] CH2MHill TSS reporting limit was 2.0 mg/l.

**Table 16. Result values used to determine RPD and criteria values, November 10, 2009.**

| | Laboratory | Basic | CH2MHill Applied Sciences | Aquatic Research, Inc. |
|---|---|---|---|---|
| | Sample ID / units | 2009AIP-068 | 2009AIP-072 | 2009AIP-071 |
| Alkalinity | mg/l | 58 | 58 | 64.2 |
| Ammonia | mg/l | 0.71 | 0.72 | 0.837 |
| CBOD5 | mg/l | 3[a] | 3.23 | 2.4 |
| DOC | mg/l | 6.3 | 6.94 | 4.82 |
| NO3+NO2 | mg/l | 0.36 | 0.34 | 0.319 |
| TN | mg/l | 2.11 | 2 | 1.97 |
| OPO4 | mg/l | 0.05[b] | 0.024 | 0.011 |
| TP | mg/l | 0.08 | 0.1 | 0.06 |
| TKN | mg/l | 1.7 | 1.98 | 2.01 |
| TSS | mg/l | 11 | 9.6 | 13 |
| VSS | mg/l | 6[c] | 2 | 4.4 |

[a] Basic Laboratory reported result for CBOD5 was ND and was replaced with the appropriate RL value for RPD determination.

[b] Basic Laboratory reported result for OPO4 was ND and was replaced with the appropriate RL value for RPD determination.

[c] Basic Laboratory reported result for VSS was 3 mg/l and was replaced with the appropriate RL value for RPD determination.

**Table 17. Comparison of similarity criteria compliance (non-compliance noted) for November 10, 2009.**

| Constituent | Basic versus CH2MHill Applied Sciences | Basic versus Aquatic Research, Inc. | CH2MHill Applied Sciences versus Aquatic Research, Inc. |
|---|---|---|---|
| Alkalinity | OK | OK | OK |
| Ammonia | OK | OK | OK |
| CBOD5 | OK | OK | OK |
| DOC | OK | **26.6%** | **36.1%** |
| NO3+NO2 | OK | OK | OK |
| TN | OK | OK | OK |
| OPO4 | OK | OK | **0.013 mg/l[a]** |
| TP | OK | OK | OK |
| TKN | OK | OK | OK |
| TSS | OK | OK | **30.1%** |
| VSS | OK | OK | **2.4 mg/l[b]** |

[a] CH2MHill OPO4 reporting limit was 0.01 mg/l.

[b] CH2MHill VSS reporting limit was 2.0 mg/l.

**Table 18. Result values used to determine RPD and criteria values, December 8, 2009.**

| | Laboratory | Basic | CH2MHill Applied Sciences | Aquatic Research, Inc. |
|---|---|---|---|---|
| | Sample ID / units | 2009AIP-076 | 2009AIP-080 | 2009AIP-079 |
| Alkalinity | mg/l | 59 | 59 | 62.7 |
| Ammonia | mg/l | 0.84 | 0.91 | 0.862 |
| CBOD5 | mg/l | 3[a] | 3.53 | 2.72 |
| DOC | mg/l | 6 | 6.34 | 5.00 |
| NO3+NO2 | mg/l | 0.4 | 0.33 | 0.306 |
| TN | mg/l | 2.25 | 2.14 | 1.88 |
| OPO4 | mg/l | 0.05[b] | 0.022 | 0.006 |
| TP | mg/l | 0.13 | 0.093 | 0.06 |
| TKN | mg/l | 1.8 | 2.02 | 1.88 |
| TSS | mg/l | 27 | 26.8 | 34 |
| VSS | mg/l | 6[c] | 3.2 | 6 |

[a] Basic Laboratory reported result for CBOD5 was ND and was replaced with the appropriate RL value for RPD determination.

[b] Basic Laboratory reported result for OPO4 was ND and was replaced with the appropriate RL value for RPD determination.

[c] Basic Laboratory reported result for VSS was 3 mg/l and was replaced with the appropriate RL value for RPD determination.

**Table 19. Comparison of similarity criteria compliance (non-compliance noted) for December 8, 2009.**

| Constituent | Basic versus CH2MHill Applied Sciences | Basic versus Aquatic Research, Inc. | CH2MHill Applied Sciences versus Aquatic Research, Inc. |
|---|---|---|---|
| Alkalinity | OK | OK | OK |
| Ammonia | OK | OK | OK |
| CBOD5 | OK | OK | OK |
| DOC | OK | OK | **23.6%** |
| NO3+NO2 | OK | **26.6%** | OK |
| TN | OK | OK | OK |
| OPO4 | OK | OK | **0.016 mg/l[b]** |
| TP | OK | **0.068 mg/l[a]** | OK |
| TKN | OK | OK | OK |
| TSS | OK | **23.0%** | **23.7%** |
| VSS | OK | OK | **2.8 mg/l[c]** |

[a] CH2MHill TP reporting limit was 0.05 mg/l.

[b] CH2MHill OPO4 reporting limit was 0.01 mg/l.

[c] CH2MHill VSS reporting limit was 2.0 mg/l.

## *3.3. Comparison Summary*

For each constituent there were 21 laboratory cross comparisons (three for each of the seven sampling dates). For each comparison, if the RPD was within the assumed 20 percent limit, the result pair was considered similar. If the RPD was outside of 20 percent limit, the result pair of that comparison was considered dissimilar and the percent difference entered in the tables. The number of similar and dissimilar results is presented in Table 20 and Figure 10.

The constituents for which comparisons produced greater than 80 percent similar result pairs were NO3+NO2, Alkalinity and OPO4. Constituents for which comparisons

produced between 71 to 80 percent similar result pairs were ammonia, total phosphorus, CBOD5, DOC and TKN. The constituent for which comparisons produced between 61 to 70 percent similar result pairs was VSS. Constituents for which comparisons produced between 51 and 60 percent similar result pairs were total nitrogen and TSS. A potential reason for the dissilimar results in TSS and VSS was that the reporting limit was notably higher at Basic Laboratory (6 mg/l) than at CH2MHill (2 mg/l) or Aquatic Research (RL not included, MDL = 0.5 mg/l). A potential reason for the dissilimar results in total nitrogen analysis at CH2MHill was the implementation of a new method which produced inconsistent results during portions of 2009.

There were a total of 231 laboratory cross comparisons calculated (33 for each sampling date). There were 63 result pairs that were dissimilar (27 percent). Of those 63 dissimilar result pairs, 22 percent were from comparing results from Basic and CH2MHill, 27 percent were from comparing results from Basic and Aquatic Research, and 51 percent were from comparing CH2MHill and Aquatic Research. These results indicate that when comparing Basic to CH2MHill or Basic to Aquatic Research, the values will be similar more often than when comparing CH2MHill with Aquatic Research. These results do not identify if one laboratory is more "accurate" than another, but rather identify differences or similarities based on RPD among the laboratories.

**Table 20. Number of similar result pairs and dissimilar results pairs per constituent and per laboratory comparison**

| | Alkalinity | Ammonia | CBOD5 | DOC | NO3+ NO2 | TN | OPO4 | TP | TKN | TSS | VSS | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Number of similar result pairs (Percent of total results pairs) | 19 (90%) | 16 (76%) | 15 (71%) | 15 (71%) | 20 (95%) | 11 (52%) | 17 (81%) | 16 (76%) | 15 (71%) | 11 (52%) | 13 (62%) | **168 (73%)** |
| Total number of dissimilar result pairs | 2 | 5 | 6 | 6 | 1 | 10 | 4 | 5 | 6 | 10 | 8 | **63** |
| *Dissimilar Basic and CH2MHill results* | *0* | *2* | *3* | *0* | *0* | *3* | *0* | *2* | *1* | *2* | *1* | ***14*** |
| *Dissimilar Basic and Aquatic Research results* | *1* | *3* | *1* | *3* | *1* | *3* | *0* | *1* | *2* | *1* | *1* | ***17*** |
| *Dissimilar CH2MHill and Aquatic Research Results* | *1* | *0* | *2* | *3* | *0* | *4* | *4* | *2* | *3* | *7* | *6* | ***32*** |

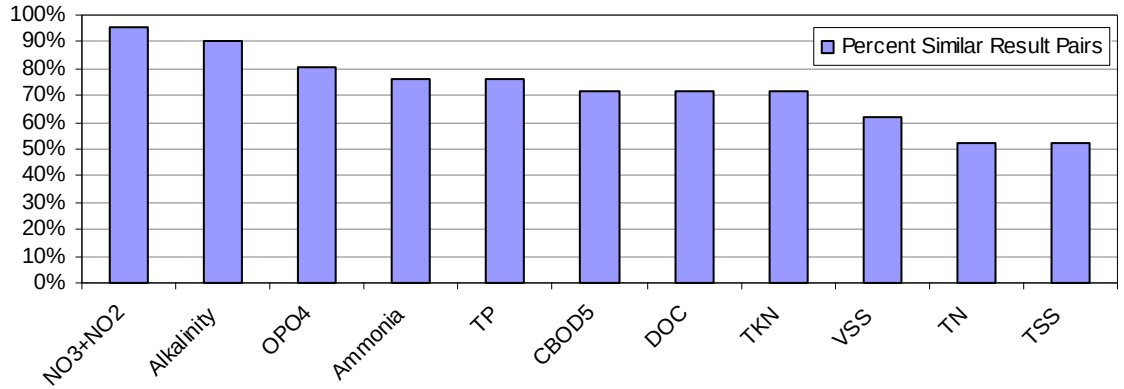


**Figure 10. Percent of similar result pairs from June 10, 2009 through December 8, 2009**

# 4. References

U.S. Bureau of Reclamation (USBR). 2009. Standard Operating Procedures for Quality Assurance. Revision 2009-05. Environmental Monitoring Branch, Mid-Pacific Region, Sacramento, CA. May.

Standard Methods, 21st Ed. 2005. Ed. A.D. Eaton, L.S. Clesceri, E.W. Rice, A.E. Greenberg. Published jointly by American Public Health Assc., American Water Work Assc., and Water Environment Federation.