MONITORING REPORT FOR 2011

CLARK FORK RIVER OPERABLE UNIT

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Acronyms

ALS	Freshwater Aquatic Life Standards
BIV	Biotic Index Value
CFROU	Clark Fork River Operable Unit
COC	Contaminants of Concern
CV	Coefficient of Variation
DO	Dissolved Oxygen
EPT	Ephemeroptera/Plecoptera/Trichoptera
FSBI	Fine Sediment Biotic Index
ft/s	Feet per Second
FWP	Montana Department of Fish, Wildlife and Parks
HBI	Hilsenhoff Biotic Index
HH/DW	Human Health/Drinking Water
MDEQ	Montana Department of Environmental Quality
MMI	Multi Metrics Index
MVFP	Montana Valleys and Foothill Prairies
NRDP	Natural Resource Damages Program of the Department of Justice
NTU	Nephelometric Units
PECs	Probable Effect Concentrations
QA/QC	Quality Assurance/Quality Control
RIVPACS	River Invertebrate Prediction and Classification System
RPD	Relative Percent Difference
SBC	Silver Bow Creek
TECs	Threshold of Effect Concentrations
TN	Total Nitrogen
TP	Total Phosphorus
TR	Total Recoverable
TSS	Total Suspended Sediment
USGS	United States Geological Service

EXECUTIVE SUMMARY AND INTRODUCTION

EXECUTIVE SUMMARY

The *Interim Comprehensive Long-Term Monitoring Plan for the Clark Fork River Operable Unit* (CFROU) (PBS&J, 2010a; Atkins, 2011) established monitoring activities that will determine the environmental effectiveness of remediation and restoration actions within the Milltown Reservoir/Clark Fork River Superfund Site as they are implemented over the next 10 to 12 years. The CFROU remedy is intended to remove threats to human health and the environment posed by mining related contaminants within the floodplain of the upper Clark Fork.

Monitoring under the Interim Comprehensive Long-Term Plan began in the spring of 2010 at each of six Clark Fork monitoring stations, prior to initiation of any remediation and restoration actions within the CFROU. A seventh monitoring station, on Silver Bow Creek (SBC), was added beginning in 2011. Stations monitored during each of the four events in 2011 included SS-25, SBC at Warm Springs; CFR-03A, Clark Fork near Galen; CFR-27H, Clark Fork at Deer Lodge; CFR-42G, Clark Fork above the Little Blackfoot River near Garrison; CFR-53C, Clark Fork at Gold Creek; CFR-84F, Clark Fork near Drummond; and CFR-116A, Clark Fork at Turah.

Surface water sampling was conducted once during each calendar quarter of 2011, while in-stream sediment and aquatic biota (macroinvertebrates and periphyton) samples were collected once annually during the third quarter monitoring event in September 2011. Periphyton (benthic algae) sampling was added to the third quarter CFROU biological monitoring in 2011. Montana Department of Fish, Wildlife and Parks (FWP) received funding from Montana Department of Environmental Quality (MDEQ) in 2011 to implement *in situ* toxicity testing using caged fish from the April through August. The purpose was to help assess the effects of current levels of metals contamination in the Clark Fork River on the mortality of fishes, and to use this information as pre-impact monitoring data for the assessment of remediation and to aid in the planning and implementation of cleanup efforts.

Surface water samples were collected with a hand-held or bridge crane-mounted, depth-integrating sampler at equal-width increments across a stream section, composited, and sub-sampled according to approved methods and using approved sampling devices. Surface water parameters sampled for in 2010 and continued in 2011 included total recoverable and dissolved fractions of Contaminant of Concern (COC) metals (arsenic, cadmium, copper, lead and zinc), total suspended sediment, selected inorganic compounds/ions and calculated values (chloride, sulfate, total alkalinity, bicarbonate alkalinity, and hardness). Monitoring for algal nutrients was added to the CFROU monitoring program beginning in the first calendar quarter of 2011. Primary nutrient parameters of concern included ammonia, nitrate plus nitrite nitrogen, total nitrogen (TN), and total phosphorus (TP). Field measurements included water temperature, pH, dissolved oxygen (DO), electrical conductance, and turbidity. Streamflows at each of the seven Clark Fork monitoring sites on each monitoring date in 2011 were determined from co-located United States Geological Survey (USGS) streamflow gauging stations.

In-stream sediment samples, collected at each of the seven sites in the third quarter of 2011, were composites of predominately fine-grained material from at least five low velocity depositional zones targeted within each reach. Sediment samples were sieved in the laboratory into three size fractions (less than 0.065 mm, 0.065–1 mm, and 1–2 mm), digested, and analyzed for the five COC metals (as total arsenic, cadmium, copper, lead and zinc).

Macroinvertebrate sampling in the third quarter of 2011 consisted of four, 0.1 square-meter modified Hess samples per site. Taxonomic analyses of replicate macroinvertebrate samples

were performed according to standard methods and the resulting data were assessed utilizing a suite of metrics, some of which were established specifically for the Clark Fork River.

Peiphyton sampling in the third quarter of 2011 consisted of one semi-quantitative composite sample per site. The goal was to subsample benthic algae from all substrate/habitat types in all wadeable water depths and velocities within a stream reach, in proportion to the relative importance of each, to obtain a composite sample that represented the entire benthic algal community in miniature. Taxonomic analysis was performed on the soft-bodied (non-diatom) algae and the diatom algae components. Resulting data for non-diatom and diatom algae were evaluated using a suite of metrics and indices to establish the degree of impairment present at each CFROU monitoring site.

Fish cages (two treatment cages and one cage for fish replacement/histology) were placed in-stream at each of the seven CFROU monitoring sites, as well in three tributary control sites (Little Blackfoot River, Flint Creek and Rock Creek) and a handling control site. Each cage was stocked with 25 hatchery-reared fingerling brown trout on March 30, 2011, and fish mortality was to be monitored twice weekly from April 1 through August 31, 2011. Additionally, FWP collected water samples for ammonia nitrogen and total recoverable and dissolved fractions of COC metals (arsenic, cadmium, copper, lead and zinc) on three occasions during the deployment period from each of the sites with caged fish. Fish tissue samples also were collected for histological analysis.

To date, remedial measures have not been implemented within the CFROU. Results presented in this second annual monitoring report represent an assessment of pre-remediation conditions present during the 2011 calendar year. First quarter monitoring was conducted in mid-April, under early spring, base streamflow conditions but with streamflows slightly above the long-term average for those dates. Second quarter monitoring was conducted on June 7–8, 2011 during well above average flows for those dates during a rising hydrograph and close to the seasonal peak flows. Third quarter monitoring was completed over several days in late August and early September in conjunction with a special synoptic monitoring event at selected upper river stations. Fourth quarter monitoring took place during early December. Streamflows during the third and fourth quarter monitoring event were generally above normal compared to long-term historical streamflows for those dates recorded at co-located USGS gauging stations.

Surface water field measurements collected during all quarters of 2011 at each of the seven CFROU monitoring stations indicated seasonally appropriate conditions, with generally cold, well oxygenated, neutral pH, and moderately mineralized waters that would not be expected to preclude any designated beneficial water uses, including cold water fisheries.

Total suspended sediment (TSS) concentrations during 2011 were somewhat elevated during the early spring monitoring event, very high during spring snowmelt runoff in June, and generally very low during the late-summer and winter monitoring events. Load estimates for TSS suggested that much of the annual suspended sediment load within the CFROU was transported during the spring snowmelt runoff hydrograph. The most significant inter-station increases in TSS during 2011 occurred in the reach from Deer Lodge to near Garrison. Total suspended sediment was highly correlated with concentrations of TR cadmium, copper, lead and zinc in the upper Clark Fork during 2011.

The upper Clark Fork had predominantly a calcium bicarbonate water type during 2011, with appreciable but declining concentrations of sulfate anion from the headwaters to Turah. Water hardness contributed by calcium and magnesium ions was classified as hard to very hard except during snowmelt runoff. Lower water hardness during the second quarter 2011 monitoring event contributed to a greater frequency and magnitude of metals excursions.

Algal nutrients monitoring initiated in the CFROU in 2011 included ammonia, nitrate plus nitrite nitrogen, TN, and TP. Assessments of nutrient monitoring results included comparisons of TN, nitrate plus nitrite nitrogen, and TP concentrations to threshold criteria recommended by MDEQ to prevent summertime nutrient enrichment/nuisance algae problems in surface waters. Concentrations of TN exceeded the summertime water quality standard only at the SBC at Warm Springs and Clark Fork near Galen monitoring stations, while nitrate plus nitrite nitrogen did not exceed the recommended threshold value during the summer 2011 period. Summertime exceedances of the Clark Fork TP water quality standard were observed at four of the seven monitoring stations, including SBC at Warm Springs, and at the Clark Fork near Galen, Gold Creek, and near Drummond monitoring stations. Ammonia nitrogen concentrations were consistently below the analytical reporting level at all CFROU monitoring stations during all of the four quarterly 2011 monitoring events and did not exceed either of the aquatic life chronic or acute toxicity thresholds.

The highest rates of TN and TP transport (loads) occurred during spring runoff conditions in June, likely as a result of cumulative nonpoint source inputs throughout the upper Clark Fork watershed. The general spatial trend for TN and TP loading during all four quarterly monitoring events was an incremental downstream increase. Possible sources of TN and TP loading within the CFROU include but are not limited to agricultural nonpoint sources, groundwater inputs, natural geologic sources, and municipal wastewater discharges from the communities of Butte (via SBC), Warm Springs, Deer Lodge, and Drummond.

Primary COCs in the upper Clark Fork included TR and dissolved arsenic, cadmium, copper, lead and zinc. The 2011 quarterly monitoring data for each of these contaminants were assessed for spatial and temporal trends in in-stream concentrations; apparent relationships between dissolved and TR concentrations; the timing and locations of aquatic life and human health performance standards excursions; spatial and temporal patterns for estimated in-stream loads; and relationships of TR metals to suspended sediment through regression analysis. Spatial trends for all COCs showed generally highest concentrations at the near Garrison and Deer Lodge monitoring stations, especially during the spring snowmelt runoff monitoring event. Lowest concentrations of metals were observed in SBC at Warm Springs (copper and zinc) and in the Clark Fork at Turah (arsenic, cadmium and lead).

The highest concentrations of TR metals in the CFROU were measured during the second quarter (June) high streamflow monitoring event. Metals concentrations during the June 2011 monitoring event were an order of magnitude higher than during the other three quarters. Highest concentrations of TR arsenic, cadmium, copper, lead and zinc during the June 2011 event were measured near Garrison. Second highest concentrations of TR metals during June were observed at Deer Lodge. A majority of the measureable cadmium, copper, lead, and zinc in the CFROU was present in the sediment-associated form during all four of the 2011 quarterly monitoring events. Arsenic was present in a predominantly dissolved form at all of the seven monitoring stations, except during the June runoff monitoring event when more than half of the arsenic at some stations was present as the sediment-associated, non-dissolved form.

First quarter (April) 2011 monitoring results showed excursions of Freshwater Aquatic Life Standards (ALS) for copper (five of seven stations) and of human health/drinking water (HH/DW) performance standards for arsenic (five of seven stations). Other metals were not problematic during this monitoring event.

Second quarter (June) 2011 high water monitoring results showed frequent excursions of ALS, including copper (seven of seven stations), cadmium and lead (six of seven stations each), and zinc (two of seven stations), as well as frequent excursions of HH/DW standards for arsenic (seven of seven stations) and lead (two of seven stations). These excursions were attributable

to increased metals pollutant loading associated with spring snowmelt runoff and rain, coupled with decreased water hardness (and associated lower metals toxicity thresholds) due to runoff-induced dilution. During the June 2011 event most metals were present in the particulate, sediment-associated TR state, and TSS concentrations at some stations were 10-fold higher in June 2011 than during the April 2011 monitoring event.

Third quarter (August–September) 2011 monitoring results showed a low frequency of excursions of ALS for copper only (two of seven stations). The lower frequency and magnitude of aquatic toxicity excursions during the third quarter was attributable to reduced metals pollutant loading associated with lower seasonal streamflows, coupled with elevated water hardness and associated higher toxicity thresholds. During the third quarter 2011 event a much higher percentage of most metals were present in the dissolved state, compared to the June 2011 runoff event, and TSS concentrations were consistently low. Frequent occurrences of HH/DW standards excursions for arsenic (six of seven stations) were noted during August–September 2011.

Fourth quarter (December) 2011 monitoring results showed excursions of aquatic life chronic toxicity standards for copper (two of six stations) and of HH/DW standards for arsenic (four of six stations). The frequency and magnitude of arsenic HH/DW standards excursions was lower than during each of the three previous 2011 quarterly monitoring events.

Of the seven CFROU monitoring stations, the stations near Garrison and at Deer Lodge showed the highest frequency of metals excursions (11 and 10 individual excursions, respectively); the Clark Fork near Galen and Gold Creek stations ranked second (seven excursions each); and the Clark Fork near Drummond and at Turah ranked third (six excursions each). The monitoring station on SBC at Warm Springs showed the fewest metals excursions, with five individual metals exceeding performance standards in 2011.

Spatial and temporal patterns in in-stream metals loads suggested that much of the TR and dissolved arsenic, cadmium, copper, lead and zinc in the CFROU were transported during runoff conditions, most likely in association with suspended sediment. Most of these metals showed downstream increases in loading during the second quarter (June) 2011 monitoring event from the headwaters area at Warm Springs to near Garrison (arsenic, copper, lead, zinc) or Gold Creek (cadmium), and again from Gold Creek to Turah (all COC metals). Spatial patterns in metals loading in the CFROU were less distinct at other times of the year, although peak loads tended to be seen at Turah or near Drummond.

Regression analysis of TR metals concentrations versus TSS concentrations showed positive relationships (R-squared values of 0.79–0.86) for zinc, lead, cadmium and copper, and a weaker relationship for arsenic (R-squared value of 0.64). The TSS versus metals correlation was particularly strong at the CFROU monitoring stations near Drummond, near Garrison, and at Deer Lodge.

The largest increases in TR arsenic, cadmium, lead and zinc loads during the second quarter (June) 2011 monitoring event occurred between the near Galen and Deer Lodge stations (arsenic and copper) and from near Drummond to Turah (cadmium, lead, and zinc). The second largest increases in arsenic and lead loading were noted in the CFROU reach from Deer Lodge to near Garrison.

Overall, TR and dissolved metals concentrations at CFROU monitoring stations during the first, third and fourth quarters of 2011 were comparable to those measured during 2010, but peak concentrations measured in June 2011 were generally higher than those measured in June 2010.

In-stream sediment samples collected at the seven CFROU sites during the third quarter (August–September) 2011 were analyzed for total concentrations of COC metals (arsenic, cadmium, copper, lead and zinc) in each of three size fractions.

For most of the metals and monitoring sites, there was a strong inverse correlation between the sediment particle size and the respective total metal concentration. Highest metals concentrations were consistently found in the smallest sediment particle size class (less than 0.065 mm), and lowest metals concentrations occurred in the largest size class (1–2 mm). Spatially, highest sediment metals concentrations tended to be found at the upper river monitoring locations, particularly at the near Galen, near Garrison, Gold Creek and Deer Lodge monitoring sites, in decreasing order of concentrations. Lowest concentrations were observed in the Clark Fork at Turah and in SBC at Warm Springs.

The relative proportion by weight of each fraction (i.e., the sediment gradation) also was determined for each sediment sample, and weighted mean concentrations of COC metals calculated. Weighted mean concentrations of total arsenic, copper, lead and zinc exceeded the Threshold Effect Concentration (TEC) and/or Probable Effects Concentration (PEC) at several to many of the CFROU monitoring stations during the September 2011 monitoring event. Copper showed the greatest frequency of excursions. Total cadmium in the smallest size fraction of sediment showed excursions of the TEC threshold at all seven of the monitoring stations, but the weighted mean concentrations showed no excursions.

Sediment metals concentrations in the CFROU in September 2011 were generally within the same range as concentrations measured in September 2010. The inverse relationship between the sediment particle size and total metal concentration was not as strong as was observed in 2010, likely due to greater overall variability between samples in 2011 as demonstrated in duplicate sample analysis results.

Macroinvertebrate taxonomic data were evaluated using a suite of metrics and indices calculated to assess attainment of metals pollution remediation and restoration goals at each CFROU monitoring site. The primary goal for the macroinvertebrate community stated in the Clark Fork River Monitoring Plan is a bioassessment rating of “nonimpaired”, as indicated by a mean score above 80 percent for the metals pollution metrics subset established by McGuire (2008). Four sites did not meet the goal in 2011: SBC at Warm Springs (mean score 75 percent); Clark Fork at Gold Creek (mean score 69.4 percent); Clark Fork near Drummond (mean score 72.2 percent); and Clark Fork at Turah (mean score 68.1 percent). Sites that met the remedial actions goal in 2011 with mean scores greater than 80 percent were the Clark Fork near Galen, Clark Fork at Deer Lodge and Clark Fork near Garrison. In 2010, the only CFROU monitoring site that failed to meet the stated remedial actions goal of greater than 80 percent for McGuire’s metals pollution subset was Clark Fork near Garrison, where the mean score was 69.4 percent.

On the basis of the taxonomic composition of the macroinvertebrate community and the performance of the metals tolerance index, the influence of metals contamination could not be ruled out at six of the seven CFROU sites, including: SBC at Warm Springs and the Clark Fork sites near Galen, at Deer Lodge, near Garrison, at Gold Creek, and near Drummond; metals contamination appeared less likely at the Clark Fork at Turah.

The various macroinvertebrate indices employed in this study gave highly variable results in terms of classifying the degree of impairment at CFROU sites. Some indices (e.g., the Montana Valleys and Foothill Prairies [MVFP] and Bukantis indices) may not be appropriate for a higher-order riverine system. Based on the mean of the coefficient of variation for scores among replicates at each site, McGuire’s index gave the most consistent results for overall biointegrity, while the Bukantis (1998) index results were the most variable.

Periphyton taxonomic data evaluations for CFROU sites were based on known autecological requirements and preferences of the soft-bodied algae and diatom components. Slight to moderate nutrient enrichment was indicated by the relative abundance of filamentous green algae at all CFROU sites in September 2011. Nitrogen-limiting conditions were suggested by the high relative abundance of blue-green algae (cyanobacteria) and phosphorphilic diatoms at several CFROU sites, and particularly the Clark Fork near Galen (below the confluence of Warm Springs Creek) and the Clark Fork at Gold Creek (below the confluence of the Little Blackfoot River). At the Clark Fork site near Drummond (below the confluence of Flint Creek), sediment impairment and organic nitrogen enrichment were indicated by the diatom flora. Although diatoms are not currently used by MDEQ as a tool for assessing metals contamination, criteria proposed by Teply and Bahls (2005) to determine the probability of metals impairment were applied to the 2011 CFROU diatom analyses. Based on the relative abundance of metals-tolerant diatom "increaser taxa", the probability of metals impairment was 34 percent in SBC at Warm Springs, and steadily decreased downstream to about 14 percent in the Clark Fork near Galen, about 8 percent in the Clark Fork at Deer Lodge, and only 7 percent in the Clark Fork near Garrison. Probability of metals impairment increased downstream of Garrison to about 11 percent at Clark Fork at Gold Creek, 23 percent at Clark Fork near Drummond, and nearly 78 percent at Clark Fork at Turah.

Fish mortality data for *in-situ* caged fish bioassays at seven CFROU and three control sites were collected from April 1 to August 31, 2011. By June 20 there were fewer than 25 fish per treatment cage at the Clark Fork near Galen site and the site's replicate was lost. Mean mortality observed until June 20 from Warm Springs downstream was as follows: SBC at Warm Springs (0 percent), Clark Fork near Galen (30 percent), Clark Fork at Deer Lodge (2 percent), Clark Fork upstream of Little Blackfoot River near Garrison (2 percent), Little Blackfoot River near mouth (10 percent), Clark Fork at Gold Creek (2 percent), Flint Creek near mouth (6 percent), Clark Fork near Drummond (0 percent), Rock Creek near mouth (14 percent), Clinton spring creek control (0 percent) and Clark Fork at Turah (8 percent). At the majority of sites, mortalities occurred as water temperatures rose following peak runoff. The sites deviating from this trend included Clark Fork near Galen, the Little Blackfoot River and Flint Creek, which exhibited more consistent mortality.

Mean and maximum daily water temperatures were recorded at each site by water temperature data loggers (HOBO U22 Pro v2). These data show maximum daily temperatures exceeded 20°C at eight of the 11 sites. On the SBC and the Clark Fork mainstem, water temperatures exceeded 20°C on 27 days at Warm Springs, 11 days at Deer Lodge, 17 days near Garrison, nine days at Gold Creek, 12 days near Drummond and five days at Turah. In control tributaries, water temperatures exceeded 20°C on 10 days in the Little Blackfoot River, and eight days in Flint Creek.

Water samples collected by FWP in conjunction with the caged fish study indicated concentrations of toxic metals were elevated or exceeded ALS in 2011 during the study. The ALS values were calculated using the hardness relationships described by MDEQ or obtained from the table of standards for Montana waters (MDEQ, 2010). Levels of dissolved copper in the mainstem Clark Fork River exceeded the established acute ALS at four sites in late June. These included the sites at Deer Lodge, near Garrison, at Gold Creek and near Drummond. Cadmium concentrations never exceeded the acute ALS, while arsenic concentrations exceeded neither the acute nor chronic ALS. Concentrations of dissolved zinc exceeded the acute ALS in one observation at the Clark Fork at Deer Lodge site.

INTRODUCTION

Heavy metals originating from historic mining activities, milling and smelting processes associated with the Anaconda Company operations in Butte and Anaconda have accumulated on the Clark Fork River stream banks and floodplain over a period of at least 100 years. The primary sources of contamination are tailings and contaminated sediments mixed with soils in the stream banks and floodplains, which erode during high flow events and enter the river and other surface waters. In addition to erosion, heavy metals are leached from the contaminated sediments and tailings directly into the groundwater and eventually to surface water. These contaminant transport pathways result in impacts to terrestrial and aquatic life along the Clark Fork River as described in the Record of Decision for the site (USEPA 2004).

The MDEQ as lead agency will oversee, manage, coordinate, design, and implement the Remedial Action for the Clark Fork Site, in consultation with the Environmental Protection Agency (EPA) and the National Park Service (NPS) for remedial activities on the Grant-Kohrs Ranch). MDEQ will coordinate with the Natural Resource Damages Program (NRDP) for the implementation and integration of Restoration components into the Work. The MDEQ will coordinate with NPS to implement the Federal Restoration Plan at the Grant-Kohrs Ranch. A primary function of consultation and coordination between the agencies is to understand and receive the information to be collected, understand how that information is to be analyzed, provide review and comment, and maximize the use of the resources available for and the environmental benefits

The *Interim Comprehensive Long-Term Monitoring Plan for the Clark Fork River Operable Unit* (PBS&J 2010a) established monitoring activities to evaluate the environmental effectiveness of remediation and restoration actions within the CFROU as they are implemented.

This report contains the results of the second year of monitoring at each of the six Clark Fork monitoring stations and the first year at one site on lower SBC (Figure 1-1, in Section 1.0). Monitoring was conducted by Atkins personnel beginning in the spring of 2010, prior to initiation of any remediation and restoration actions within the CFROU. Surface water sampling was conducted once during each calendar quarter of 2011, while in-stream sediment, periphyton and aquatic macroinvertebrate samples were collected only during the third quarter event in September 2011. Fisheries monitoring was conducted by Montana Fish, Wildlife, and Parks, as described in Section 4.0 .

1.0 SURFACE WATER MONITORING

Remediation and restoration goals for the Upper Clark Fork River, set forth by the MDEQ and the NRDP of the Department of Justice include goals specific to surface water quality. These call for the COC to meet the most restrictive water quality standard for each pollutant (Table 1-1). When remedial/restoration activities are completed, it is expected that state surface water quality standards will be attained, and that the Clark Fork will be fully supporting its beneficial uses with respect to water quality.

Table 1-1. Applicable numeric water quality standards.

Parameter	Water Quality Standards (mg/L)		
	Human Health[b]	Aquatic Life[a]	
		Chronic[b]	Acute[b]
Arsenic	0.01	0.150	0.340
Cadmium	0.005	0.00040	0.00366
Copper	1.3	0.015	0.023
Lead	0.015	0.0063	0.1604
Zinc	2.0	0.188	0.188
Nitrogen, Total[c]	0.300	0.300	0.300
Phosphorus, Total as P[c]	0.020	0.020	0.020

(Circular DEQ-7, updated August 2010).

a. Criteria for Cd, Cu, Pb, and Zn are water hardness-based. Representative values presented above are based on a hardness of 170 mg/L, measured as CaCO3, which is an average value computed from all CFROU monitoring stations during the 2010-2011 monitoring period. This differs slightly from the presentation of standards in the ROD, which were based on a hardness of 100 mg/L.

b. Both ALS, and human health standards for surface waters, are evaluated on the basis of the total recoverable metals analysis method.

c. Numeric water quality standards for nitrogen and phosphorus apply to the Clark Fork River from below the Warm Springs Creek confluence to the confluence with the Blackfoot River during the period from June 21 to September 21 (ARM 17.30.631). The standards are intended to protect against nuisance growths of attached algae, which can affect aesthetics and recreational and aquatic life uses of waters. Note that nitrogen and phosphorus are not specific contaminants of concern related to the CFROU.

1.1 Methods

Surface water samples were collected quarterly during 2011 at each of seven Clark Fork River monitoring sites following procedures outlined in the *Interim Comprehensive Long-Term Monitoring Plan for the Clark Fork River Operable Unit* (PBS&J, 2010a; Atkins, 2011) (Figure 1-1). Each of the four monitoring events were conducted prior to the implementation of remediation activities within the CFROU that are expected to begin in 2012 or later. Stations monitored during each of the four events in 2011 included SS-25, SBC at Warm Springs; CFR-03A, Clark Fork near Galen; CFR-27H, Clark Fork at Deer Lodge; CFR-42G, Clark Fork above the Little Blackfoot River near Garrison; CFR-53C, Clark Fork at Gold Creek; CFR-84F, Clark Fork near Drummond; and CFR-116A, Clark Fork at Turah. Timing of the monitoring events was designed to capture early spring (April), late summer (September), and winter (December) low flow conditions, as well as the rising limb of the spring runoff hydrograph (June). The September monitoring event coincided with the in-stream sediment and biological monitoring components of the CFROU monitoring program (Sections 2.0 and 3.0).

Surface water samples were collected for the parameters specified in the Record of Decision (USEPA, 2004, pp. 2–134) (Table 1-2). Samples for suspended sediment and water chemistry analysis were collected using an isokinetic DH-81 depth integrating sampler when the river channel was wadeable, or with the aid of a bridge crane-mounted D-95 sampler operated from bridge decks when the channel could not be waded safely. Methods followed USGS protocols for Equal Width Increment sampling (USGS, 2006). Water samples were composited in a churn

splitter and apportioned into subsamples for the required analyses, also following USGS protocols (USGS, 2006). Samples for analysis of dissolved metals and common ions were field-filtered with a syringe type 0.45 micron membrane filter with a glass fiber pre-filter.

Physical parameters, including water temperature, pH, DO, and electrical conductance, were measured during each monitoring event with a *YSI Professional Plus* field multi-meter. Field turbidity was measured during each monitoring event with a *Hach Model 2100P Portable Turbidimeter* field turbidity meter. The field meters were calibrated prior to the start of each monitoring event. Field measurement data and site conditions were recorded on a standardized site visit form. Surface water quality monitoring quality assurance/quality control (QA/QC) procedures described in the project monitoring plan were routinely followed during each monitoring episode. These included the routine collection of field duplicate and field blank samples.

Energy Laboratories, Inc. in Helena, Montana conducted laboratory analyses for all sampling events in 2011. Laboratory analyses were conducted according to the project monitoring plan, including all applicable laboratory QA/QC measures. Analytes included total recoverable (TR) and dissolved metals, common ions, TSS, and algal nutrients (Table 1-2). Contaminants of concern included metals commonly associated with contaminated stream channel and floodplain sediments in the CFROU area (arsenic, cadmium, copper, lead, and zinc).

Table 1-2. Constituents analyzed in Clark Fork surface water samples at Energy Laboratories.

Parameter	Category	EPA Analytical Method
Arsenic, Dissolved	Contaminants of Concern	E200.8
Arsenic, TR		E200.8
Cadmium, Dissolved		E200.8
Cadmium, TR		E200.8
Copper, Dissolved		E200.8
Copper, TR		E200.8
Lead, Dissolved		E200.8
Lead, TR		E200.8
Zinc, Dissolved		E200.8
Zinc, TR		E200.8
Calcium	Common Ions and Suspended Sediment	E200.8
Magnesium		E200.8
Sulfate		E300.0
Alkalinity, Total as $CaCO_3$		A2320 B
Bicarbonate as HCO_3		A2320 B
Hardness as $CaCO_3$ (Calculated)		A2340 B
TSS		A2540 D
Nitrogen, Ammonia as N	Algal Nutrients	E350.1
Nitrogen, Nitrate+Nitrite as N		E353.2
Nitrogen, Total		A4500 N-C
Phosphorus, Total as P		E365.1

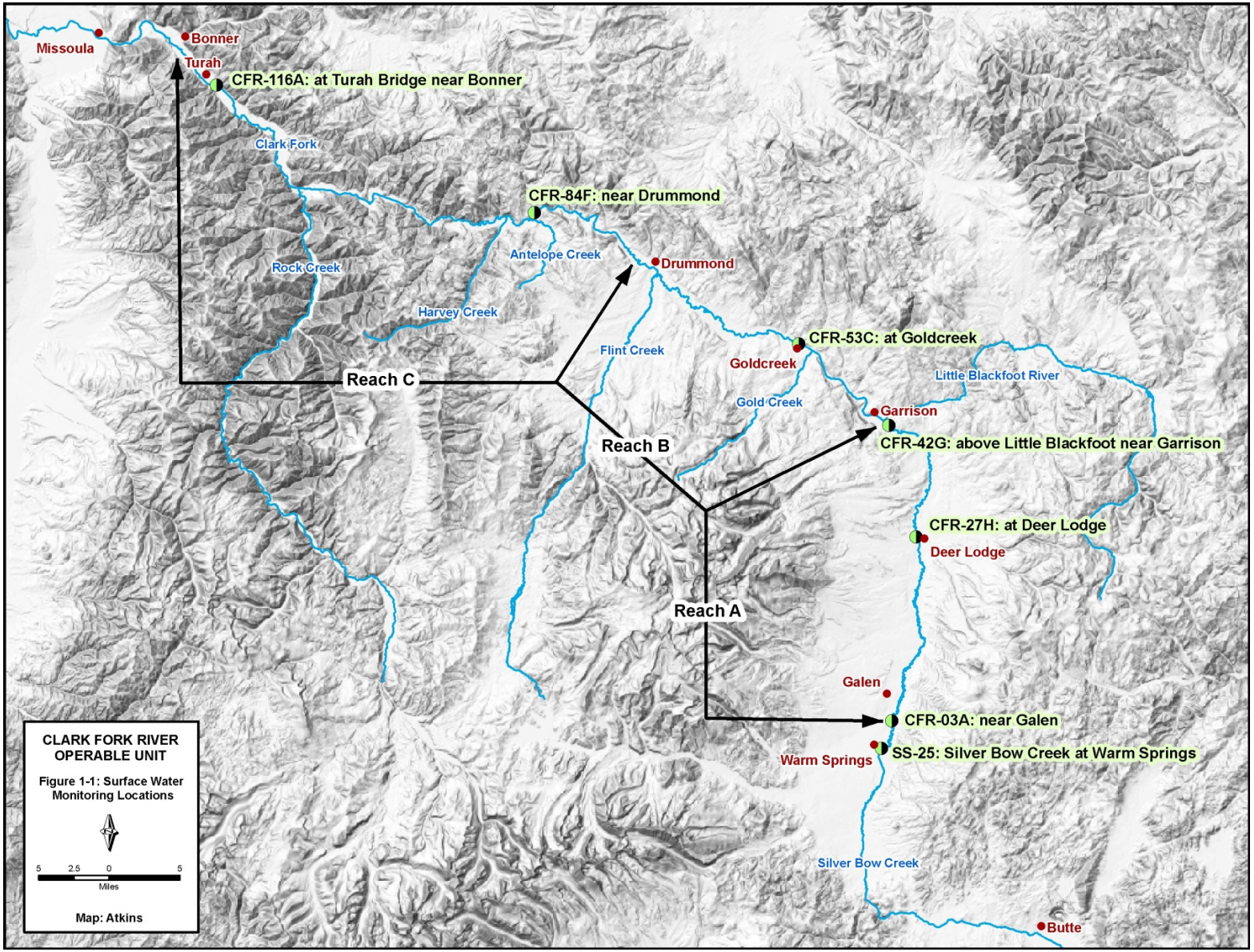

Figure 1-1. 2011 surface water monitoring locations.

Analysis of the 2011 surface water data allowed inferences on water quality status within the CFROU. These included comparisons of concentrations of water quality parameters between stations to evaluate spatial trends. In addition, comparisons of water chemistry results among sampling dates allowed inference on seasonality and other factors affecting water quality in the Upper Clark Fork River. Comparisons of in-stream concentrations to water quality standards allowed evaluation of attainment of remediation performance standards. Finally, examination of spatial and temporal trends in pollutant loading provided insight into transport dynamics, timing, and potential pollutant source areas.

Note that correct interpretation of ALS for chronic toxicity requires that in-stream concentrations be sustained for 96 hours. Although no data are available to evaluate short-term variability in concentrations of various metals, the following analyses assumed measured concentrations were stable over a 96-hour period. Aquatic Life Standards for acute toxicity require that in-stream concentrations be sustained for one hour. Also, as noted in the footnote to Table 1-1, the water quality standards for TN and TP only apply during the June 21 to September 21 period, and thus are only relevant to the third quarter (August–September) 2011 monitoring event.

1.2 Results and Discussion

1.2.1 Data Validation

Data derived from laboratory analysis of surface water and in-stream sediment samples collected at Upper Clark Fork River locations were validated through field quality control samples (field duplicates and field blanks, Appendix A) as well as laboratory control samples (lab duplicates, blanks, spikes, and reference and calibration standards, Appendix B).

Field duplicate sample analysis results were within acceptable limits for all chemical parameters and suspended sediment during all quarters of 2011, with the exception of one sediment total lead result. Dissolved zinc was detected in filtered field blank samples during the first and second quarters at levels twice the reporting limit, and TSS was measured at four times the limit in the field blank collected during the second quarter; associated data was flagged.

Laboratory control samples were within acceptable limits for all surface water parameters during all quarters of 2011. Data quality objectives (representativeness, comparability and completeness) were met, and data quality indicators (sensitivity, precision, bias and accuracy) were acceptable as established in the CFROU Long-Term Monitoring Plan.

A completed QA/QC Checklist, summary tables of field duplicate and field blank results, and assessments of data quality objectives and data quality indicators are included in Appendix A. Results from the analytical laboratory are included in Appendix B. The 2010 surface water data are included in Appendix C, and sediment data are included in Appendix D.

1.2.2 Streamflows

Concentrations of sediment, metals and other pollutants in the Clark Fork are strongly tied to streamflows. Streamflows during and immediately prior to monitoring events are an important variable influencing water quality conditions and must be considered when interpreting the monitoring results from this program. Streamflows at each of the seven permanent Clark Fork monitoring stations are co-located at active USGS streamflow gauging stations and the gauging station records were accessed for this report.

Overall, streamflows in the upper Clark Fork watershed during the 2011 calendar year were above normal. Baseflows were generally elevated compared to long-term averages. The

spring snowmelt runoff period showed well above average peak flows and sustained high water well into July at most of the CFROU monitoring stations. As will be discussed later in this report, these high flow conditions contributed to higher than normal suspended sediment transport and associated contaminants, including metals.

First quarter surface water quality monitoring was conducted at each of the seven permanent upper Clark Fork River monitoring locations on April 12–13, 2011 during typical early spring conditions but with streamflows slightly above the long-term average for those dates. Second quarter monitoring was performed on June 7 and 8, 2011 during well above average flows for those dates during a rising hydrograph and close to the seasonal peak flows. Third quarter monitoring was completed over four days between August 30 and September 2, in conjunction with a synoptic monitoring event at selected upper river stations. Streamflows during the four-day, third quarter monitoring event were above normal compared to historical streamflows for that period of the year. The fourth quarter monitoring event on December 1 and 2, 2011 coincided with streamflows that were normal to above average for those dates depending on the monitoring site.

Streamflows at the CFROU monitoring stations during the 2011 calendar year are depicted in hydrographs for USGS gauging stations SBC at Warm Springs (USGS 12323750), Clark Fork near Galen (USGS 12323800), at Deer Lodge (USGS 12324200), above Little Blackfoot River near Garrison (USGS 12324400), at Gold Creek (USGS 12324680), near Drummond (USGS 12331800), and at the Turah Bridge (USGS 12334550) in Figure 1-2 through Figure 1-8. The hydrographs also show the median daily streamflows at those locations based on the available (2 to 34 years of) records. These dates vary by station and are shown for each graph below.

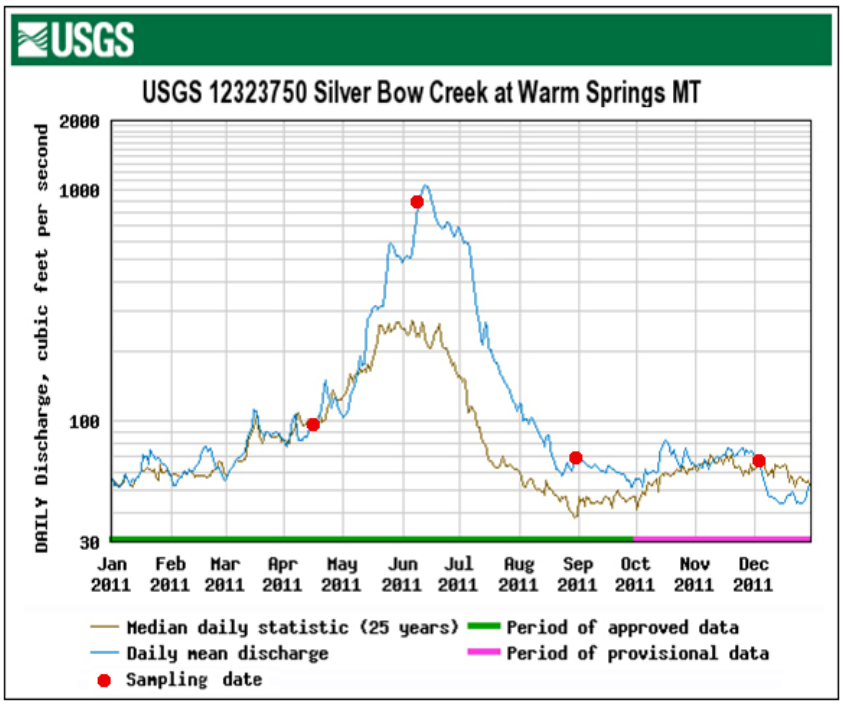

Figure 1-2. Hydrograph for 2011 calendar year for SBC at Warm Springs Creek USGS gauging station.

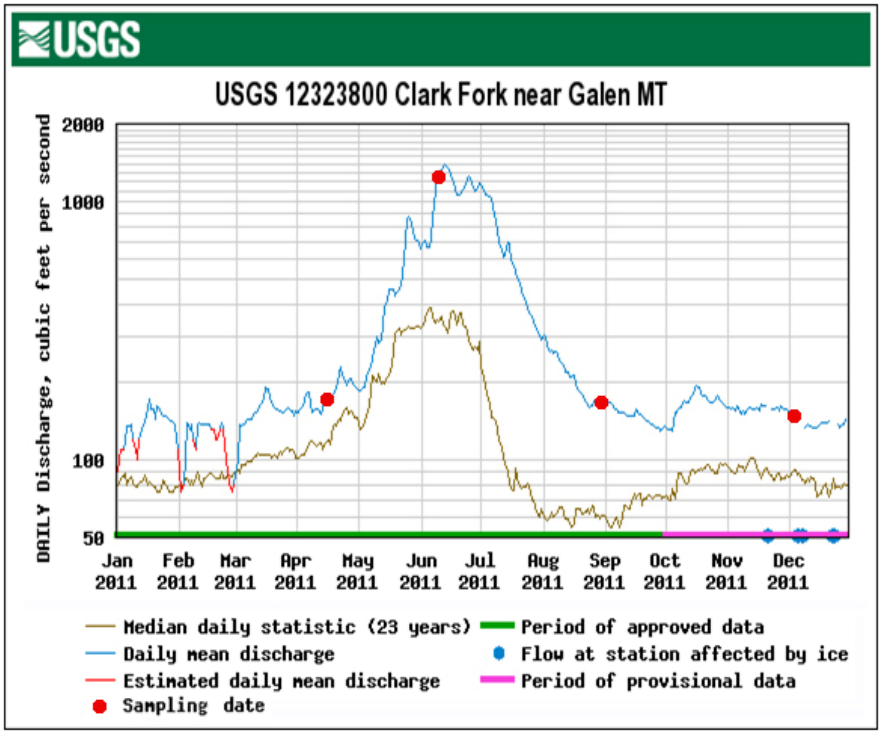

Figure 1-3. Hydrograph for 2011 calendar year for Clark Fork near Galen USGS gauging station.

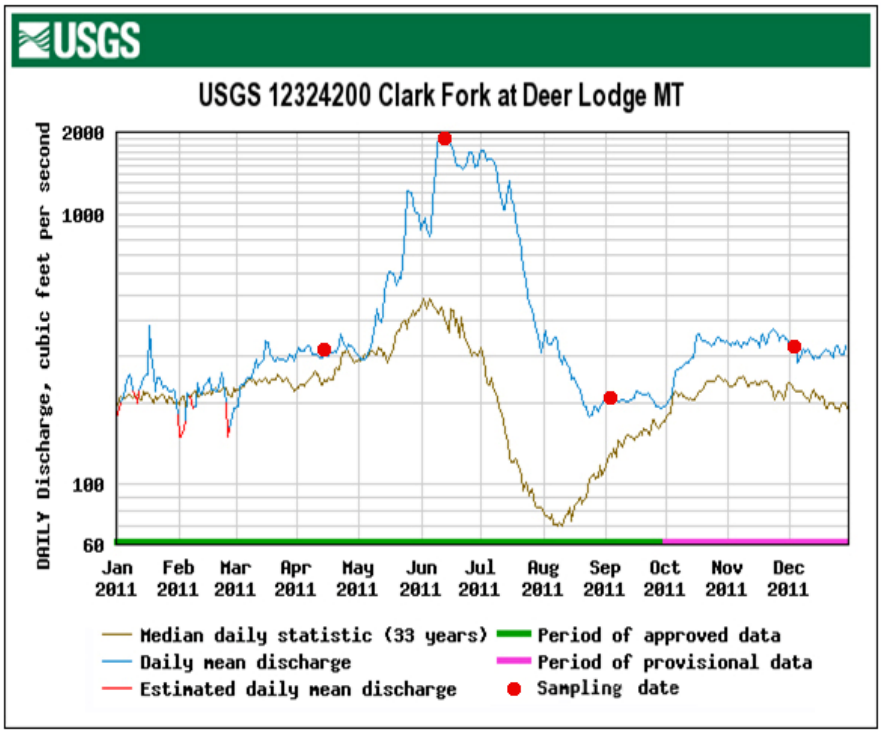

Figure 1-4. Hydrograph for 2011 calendar year for Clark Fork at Deer Lodge USGS gauging station.

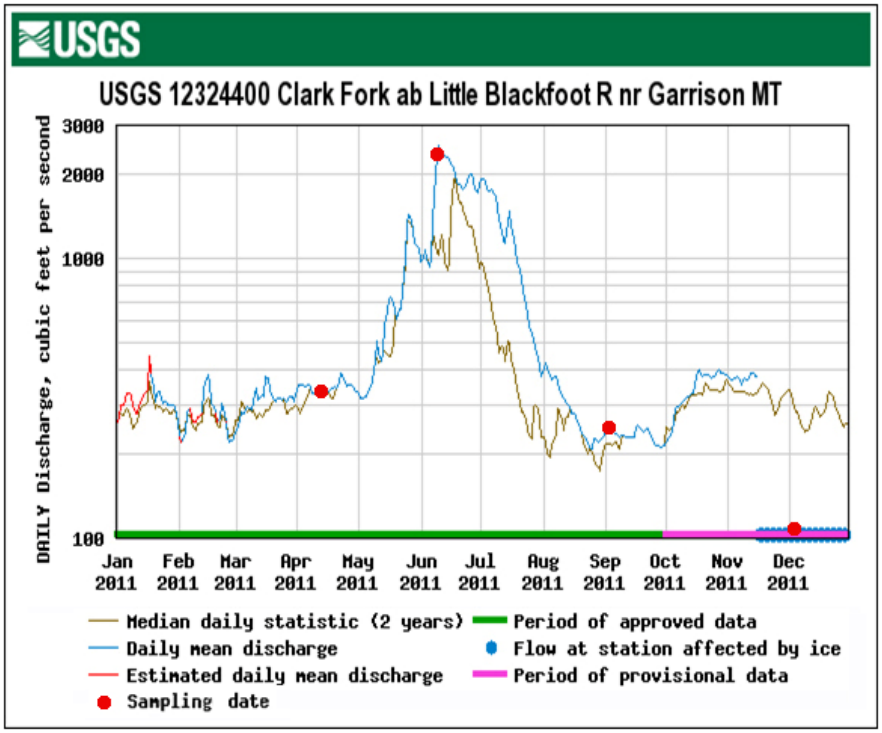

Figure 1-5. Hydrograph for 2011 calendar year for Clark Fork above Little Blackfoot River near Garrison USGS gauging station.

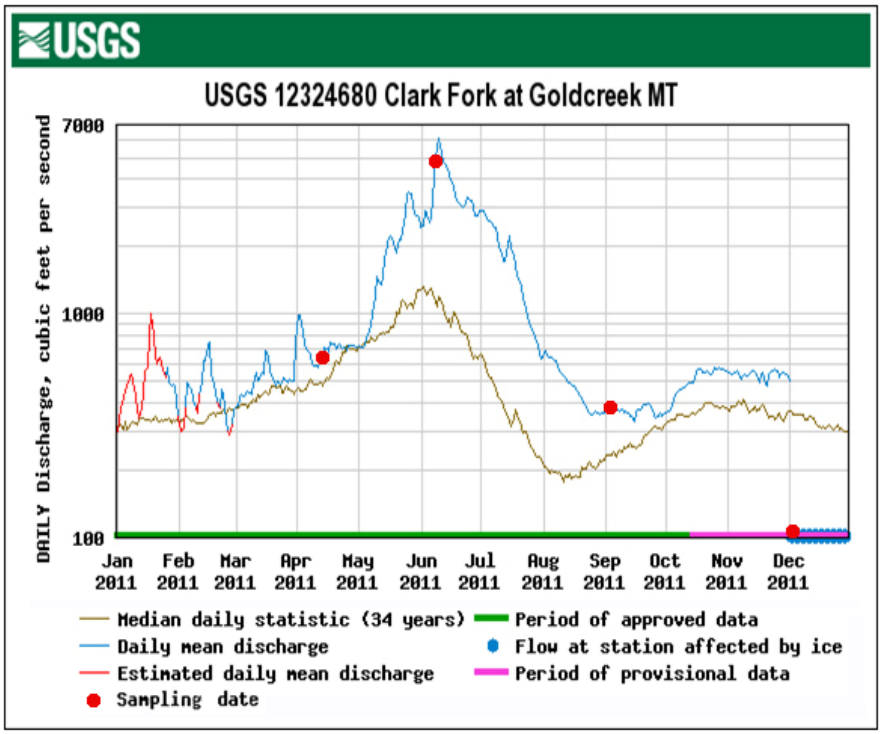

Figure 1-6. Hydrograph for 2011 calendar year for Clark Fork at Gold Creek USGS gauging station.

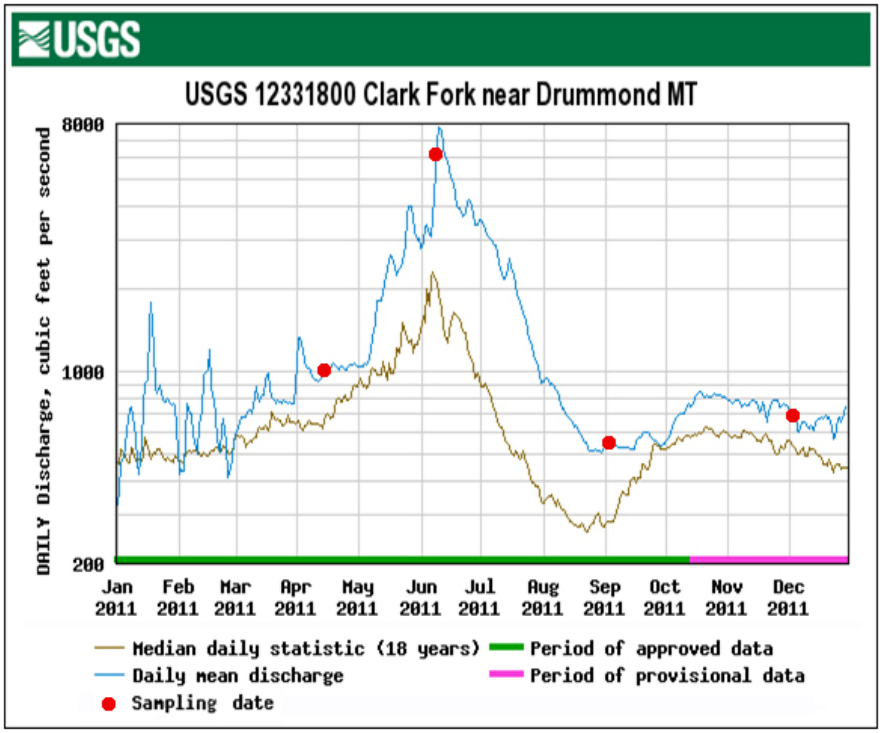

Figure 1-7. Hydrograph for 2011 calendar year for Clark Fork near Drummond USGS gauging station.

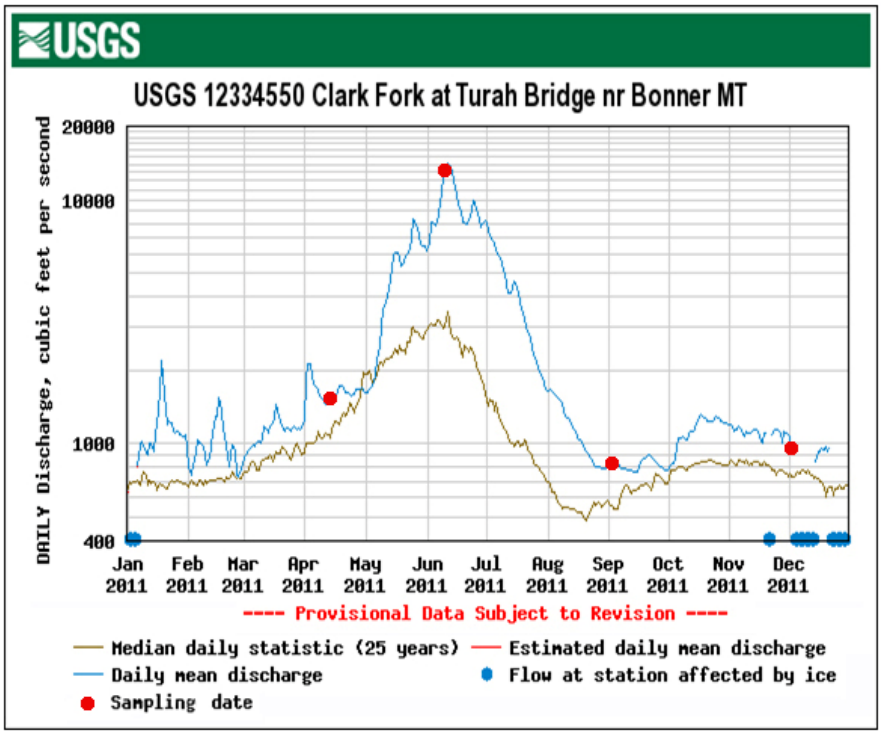

Figure 1-8. Hydrograph for 2011 calendar year for Clark Fork at Turah Bridge USGS gauging station.

1.2.3 Field Parameters

Results of the field parameter measurements recorded during each monitoring event, including water temperature, pH, DO, electrical conductance, and turbidity, are summarized below.

1.2.3.1 Water Temperature

Water temperature has considerable chemical and biological significance in riverine systems. Stream temperatures reflect seasonal changes in net solar radiation as well as daily changes in air temperature, and vary as a function of stream morphological characteristics, groundwater inputs, shading, the presence of particulate matter in the water column, and other variables. Optimal water temperatures for most salmonid fish species is approximately 12–14ºC. Sustained temperatures in the 20–25ºC temperature range can be fatal.

Temperature results for upper Clark Fork monitoring stations during 2011 indicated modest seasonal and spatial variations that were consistently within the preferred range for most cold water aquatic life forms (Figure 1-9). It should be noted that some inter-site differences are undoubtedly due to diel warming effects in relation to time of day that monitoring occurred. Peak water temperatures tend to occur late in the afternoon, and minimum temperatures occur just before dawn.

Maximum water temperatures during the four quarterly monitoring events were noted in September, when temperatures at some sites exceeded the 12–14ºC optimal temperature range for trout. Minimum temperatures in the less than 1–2ºC range were observed in December. The only notable spatial trend in water temperature across the seven monitoring stations was an apparent downstream to upstream increase in water temperature at some sites during some of the quarterly monitoring events. This pattern is believed to have resulted primarily from the sequence in which monitoring was performed, which was typically from downstream to upstream (beginning at Turah and progressing to near Garrison on day one, and from Deer Lodge to Warm Springs on day two).

Diel warming between monitoring stations during the course of each day is believed to be the primary factor contributing to the observed water temperature spatial trends. A secondary factor in the observed spatial water temperature trends is likely to have been the influences of tributary inflows, particularly the Little Blackfoot River entering the Clark Fork between the near Garrison and Gold Creek monitoring stations, Flint Creek entering the river between the Gold Creek and near Drummond stations, and Rock Creek entering the river between the near Drummond and Turah stations.

Water temperatures at CFROU monitoring stations during 2011 quarterly monitoring events were generally comparable to temperatures recorded during the 2010 monitoring year, with some exceptions. Third quarter (August–September) 2011 temperatures ranged from about 11 to 18ºC, while temperatures during the third quarter of 2010 (one week later in September) were cooler, ranging from about 10.5 to 13.5ºC.

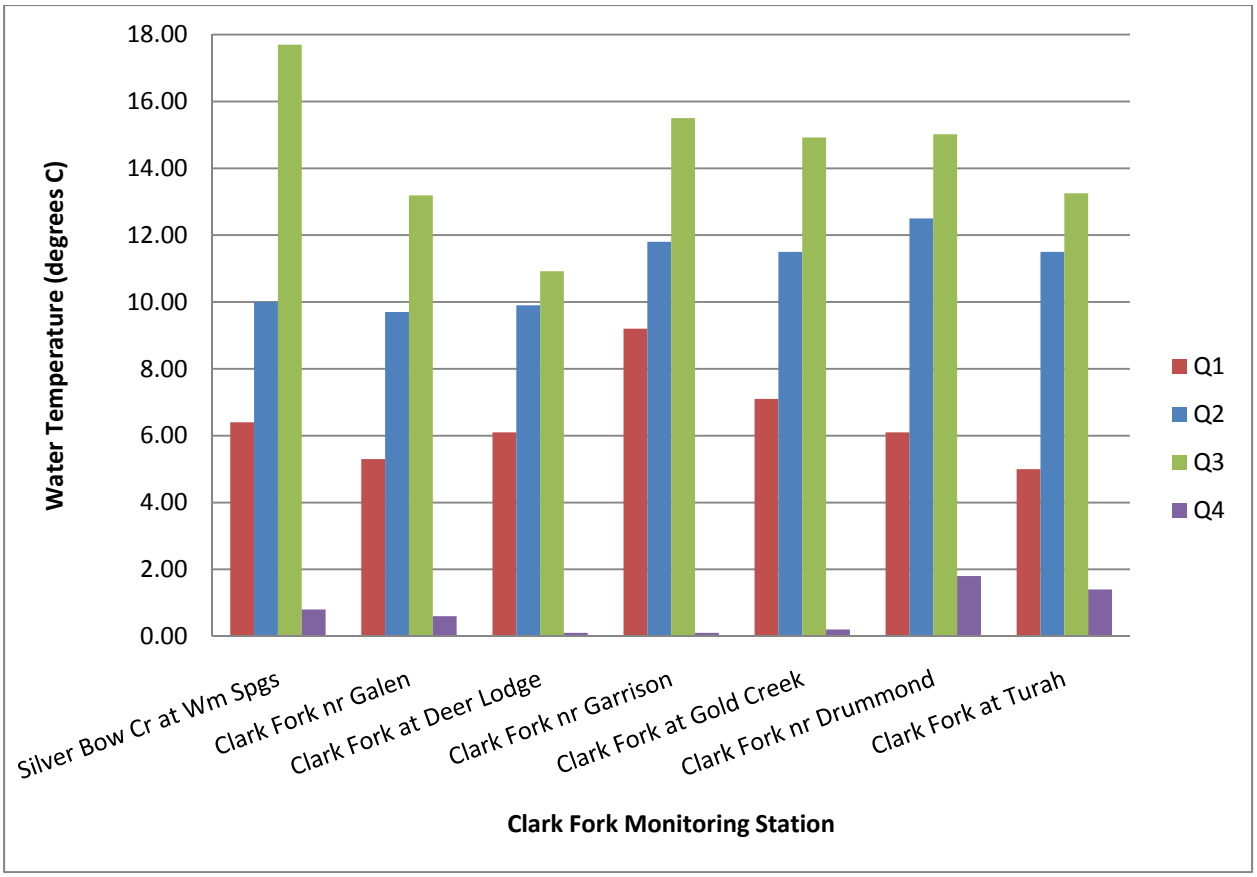

Figure 1-9. Surface water temperatures measured at CFROU monitoring stations during 2011.

1.2.3.2 pH

pH measures the acidity or alkalinity of water as the concentration of hydrogen ions on a logarithmic scale. pH is influenced by water temperature, although the relationship is not linear and typically shows a weak inverse relationship to streamflow levels as concentrations of base minerals tend to become diluted during runoff conditions. pH typically shows diel fluctuations associated with water temperature and the metabolism of primary producers. Both alkalinity and pH need to be measured to evaluate changes in water chemistry due to natural versus anthropogenic activities.

pH levels can have both direct and indirect effects on water chemistry and the biota of aquatic systems. Declines in pH below 6.5 can reduce salmonid egg production and hatching, and can reduce the emergence of some aquatic insects. MDEQ has concluded that pH levels need to be maintained within the 6.5 to 9.0 range to protect aquatic life. The solubility of many metals varies greatly with pH. This is important in systems such as the Clark Fork where metal concentrations in sediments are elevated. pH also affects a variety of other in-stream chemical equilibria, for example the proportion of ammonia present in the toxic, unionized form.

pH levels at upper Clark Fork monitoring stations during the four quarterly 2011 monitoring events ranged from a low of 7.74 to a high of 9.25 (Figure 1-10). Only a single value of 9.25 was outside the optimal 6.5 to 9.0 range for the protection of aquatic life, and it occurred in SBC at Warm Springs downstream of the Warm Springs Ponds where lime is added to intentionally increase ph levels. There was no clear temporal or spatial pattern in pH during the 2011 monitoring year, except that highest pH values tended to be measured at the SBC at Warm

Springs station and lowest pH values tended to be observed at the Deer Lodge monitoring station.

pH at CFROU monitoring stations during 2011 quarterly monitoring events showed less variability than during the 2010 monitoring year. As noted earlier, pH measurements in 2011 ranged from 7.74 to 9.25. In 2010, the range of pH field measurements was from 7.07 to 8.49.

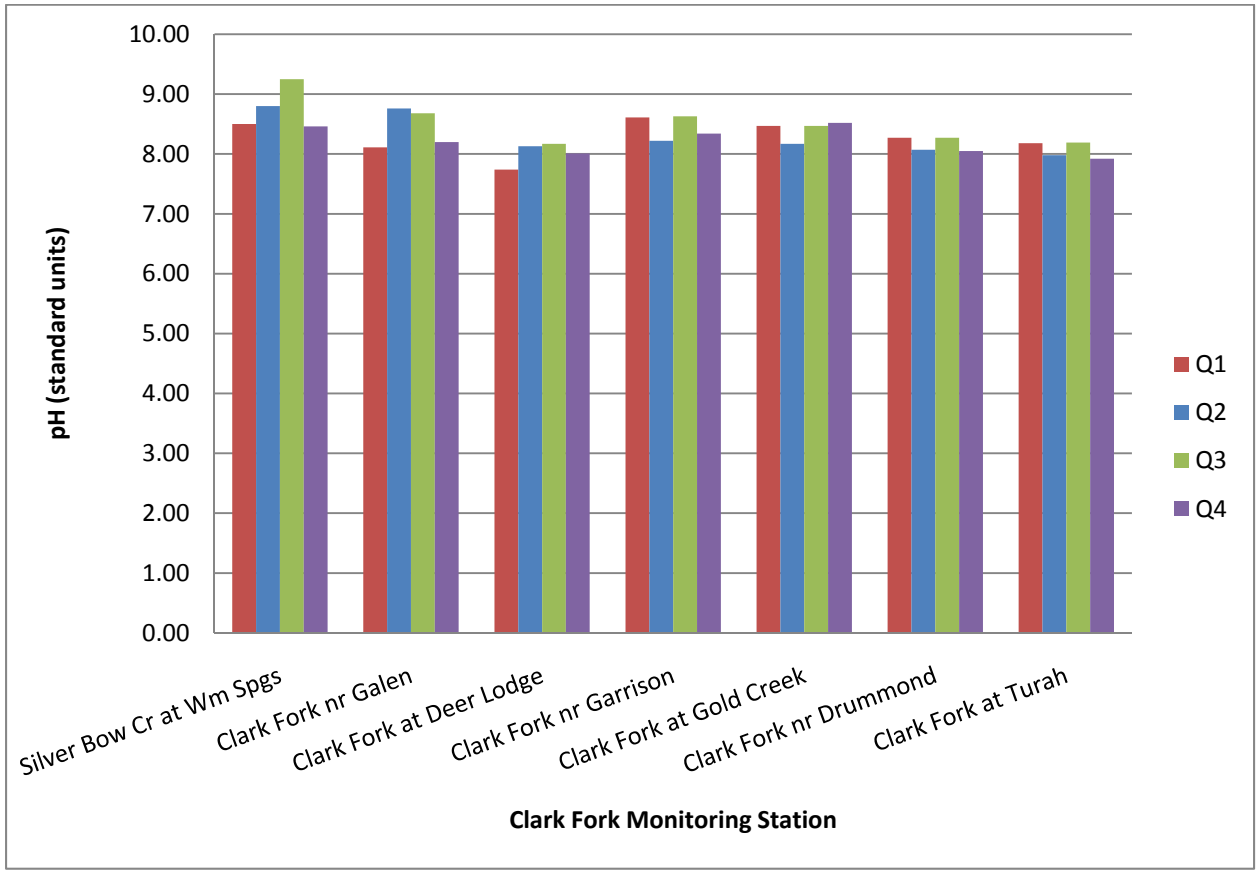

Figure 1-10. pH measured at CFROU monitoring stations during 2011.

1.2.3.3 Conductivity

Conductivity is a quantitative measure of the ability of an aqueous solution to convey an electrical current and is a function of water temperature and the concentration of dissolved ions in water. Conductivity provides a quick approximation of the concentration of dissolved solids in water as well as its potential suitability for uses that may be limited by excessive salinity, and gives general insight into spatial and seasonal changes in water chemistry.

Elevated levels of conductivity reflecting high dissolved solids may limit some water uses, such as irrigation or drinking water. Very low conductivity, as affected by watershed geology, may contribute to low productivity of associated biological systems. Conductivity tends to be inversely proportional to streamflow due to dilutional influences of runoff.

Conductivity in the upper Clark Fork River during 2011 showed seasonal variations associated with seasonal changes in streamflows. Highest conductivities were noted during April and September, when streamflows were lowest. Lowest conductivities were observed in June and December, when streamflows were elevated. During each of four quarterly monitoring events, specific conductance declined in the Clark Fork below the confluences of the Little Blackfoot

River (Gold Creek station) and Rock Creek (Turah station), and increased downstream of Flint Creek at the near Drummond station. Conductivity values ranged from 113 microsemens/cm at Turah in June 2011 to 439 microsemens/cm at the near Drummond station in August–September 2011, all of which can be described as representing moderate levels of dissolved solids (Figure 1-11).

Conductivity at CFROU monitoring stations during 2011 quarterly monitoring events showed comparable variability but lower values overall than during the 2010 monitoring year (range of 113 to 439 microsiemens/cm in 2011 versus 176 to 466 microsiemens/cm in 2010). Higher streamflows in 2011 likely contributed to this pattern.

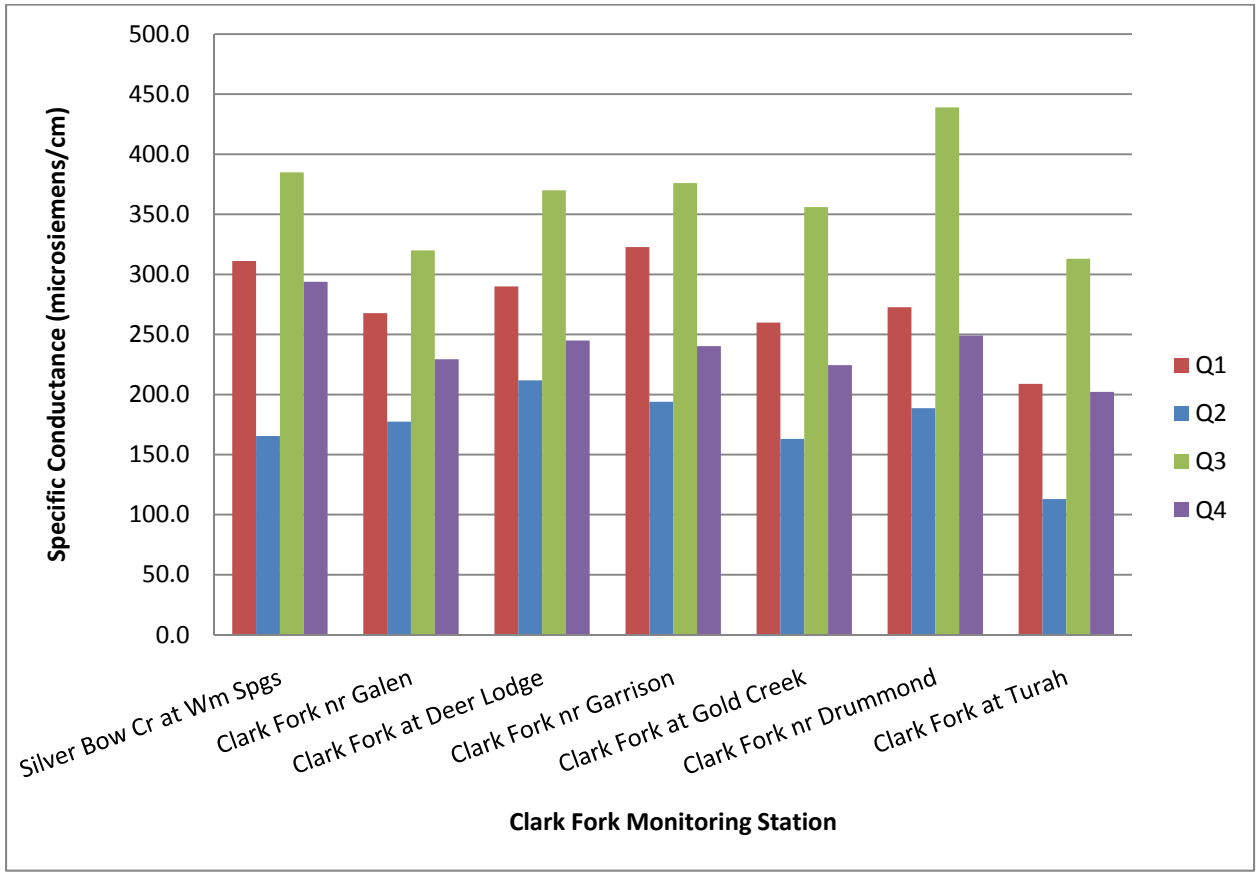

Figure 1-11. Conductivity measured at CFROU monitoring stations during 2011.

1.2.3.4 Dissolved Oxygen

Dissolved oxygen refers to the amount of oxygen dissolved in water. The capacity of water to hold oxygen in solution is inversely proportional to water temperature. In addition to water temperature, in-stream DO concentrations are affected by respiration of organisms, photosynthesis of aquatic plants, the biochemical oxygen demand of substances in the water, and the dissolution of atmospheric oxygen in the water by rapid movement. Dissolved oxygen levels fluctuate seasonally and over a 24-hour period due to the stream ecosystem's ability to produce and consume oxygen.

Adequate levels of DO are required by biological stream communities and for the decomposition of organic matter in the stream. Acceptable levels of DO for the protection of aquatic life are defined in the Montana water quality standards (Circular DEQ-7, 2010). Values that apply to the

upper Clark Fork range from a high of 9.5 mg/L, measured as a seven-day mean concentration where sensitive early life stages are present, to a low of 4.0 mg/L measured as a one day minimum for settings where other than early life stages of aquatic life are present (Circular DEQ-7, 2010).

Field determined DO concentrations in the upper Clark Fork during the four quarterly 2011 monitoring events ranged from a low of 8.60 mg/L at the near Drummond station in June to a high of 14.85 mg/L at the Gold Creek station in December (

Figure 1-12). None of the measured values suggested water quality or water use limitations associated with inadequate DO levels. No major temporal or spatial trends in DO were noted in the 2011 dataset, although highest values at each monitoring station were observed during the colder months of either December or April. Some of the between-station differences during any given quarterly monitoring event may be due to normal diel fluctuations in algal metabolism and water temperatures.

Dissolved oxygen concentrations at CFROU monitoring stations during 2011 quarterly monitoring events were very comparable to values recorded during the 2010 monitoring year (range of 8.60 to 14.85 mg/L in 2011 versus 8.69 to 15.03 mg/L in 2010).

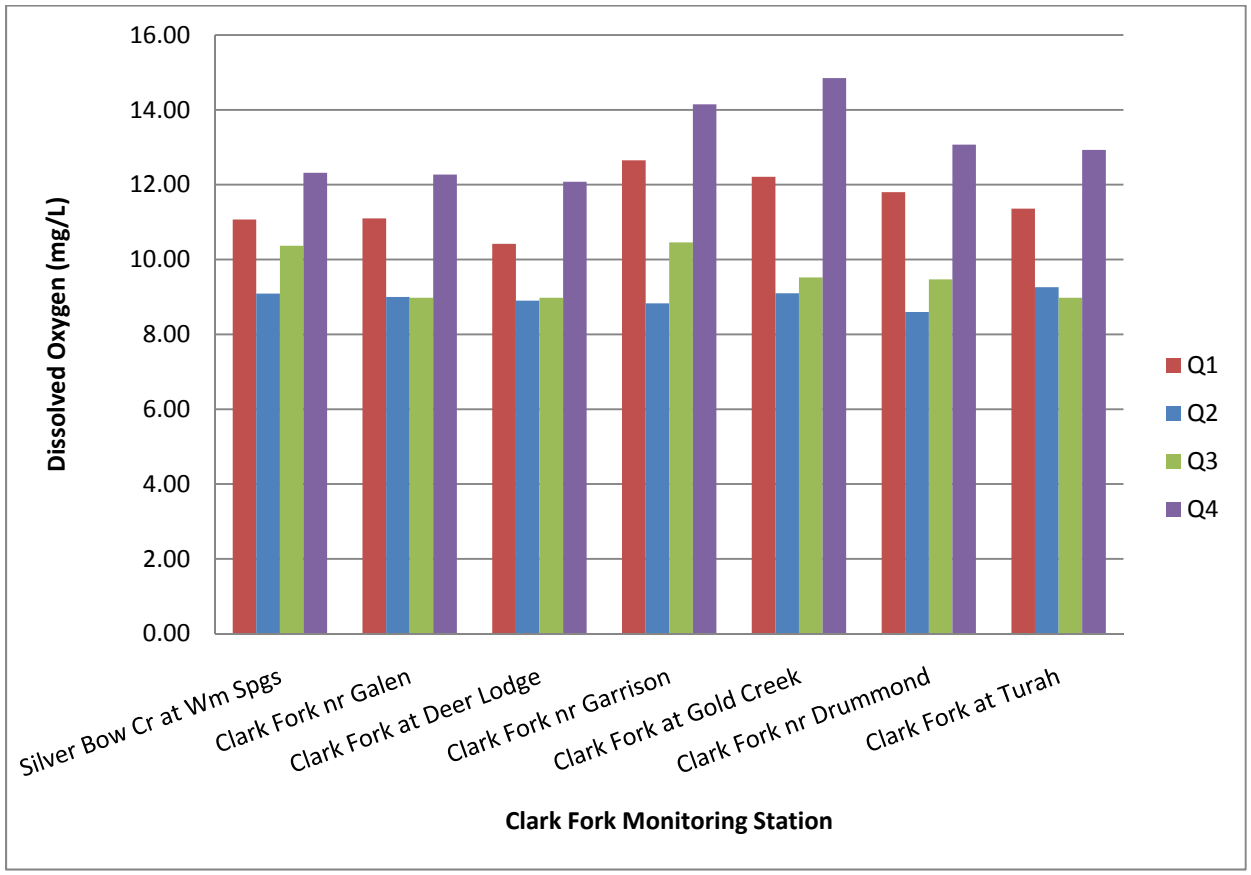

Figure 1-12. DO concentrations measured at CFROU monitoring stations during 2011.

1.2.3.5 Turbidity

Turbidity refers to the amount of light that is absorbed or scattered by water, and is an optical property of water. Increasing turbidity or "cloudiness" in surface waters usually results from the

presence of suspended silt or clay particles, organic matter, colored organic compounds, and microorganisms. Turbidity does not always correlate well with the weight of suspended matter, as is discussed further in Section 1.2.4, because of different particle sizes, weights and refractive properties of the substances that contribute to turbidity in any given setting.

Elevated levels of turbidity can impede recreational and aesthetic uses of water, and turbidity is an important parameter for drinking water. High turbidity adversely affects feeding, growth, and suitable habitat of salmonid fishes, and it may contribute to increases in surface water temperatures. The MDEQ has established maximum allowable increases above naturally occurring turbidity. The allowable increase is 10 nephelometric turbidity units (NTU) for C-2 class streams (Clark Fork from Warm Springs Creek to Cottonwood Creek), and five units for C-1 (Clark Fork from Cottonwood Creek to the Little Blackfoot River) and B-1 (remainder of Clark Fork) class streams (ARM 17.30.623, 2007; ARM 17.30.626–627, 2007).

Turbidity during the second quarter (June) 2011 monitoring event was significantly elevated compared to other monitoring events due to the presence of near-peak spring snowmelt runoff. The June turbidity readings showed a general spatial pattern of downstream increases, with a peak at the near Garrison monitoring station, followed by decreases in the reaches below the Little Blackfoot River (Gold Creek station) and Flint Creek (near Drummond station) confluences (Figure 1-13). First, third and fourth quarter monitoring events in April, September and December showed lower, more consistent turbidity readings in the two to 10 NTU range. Some of those site values were influenced by localized rain events. First quarter 2011 turbidity measurements were somewhat elevated at many CFROU stations compared to the third and fourth quarters, suggesting the influence of ice effects on streambanks and streambeds during a colder than normal winter.

Turbidity field measurements at CFROU monitoring stations during first, third and fourth quarterly monitoring events in 2011 were very comparable to values recorded during the 2010 monitoring year. Second quarter 2011 readings during peak spring snowmelt runoff conditions were generally higher than during the same period in 2010 due to significantly higher streamflows.

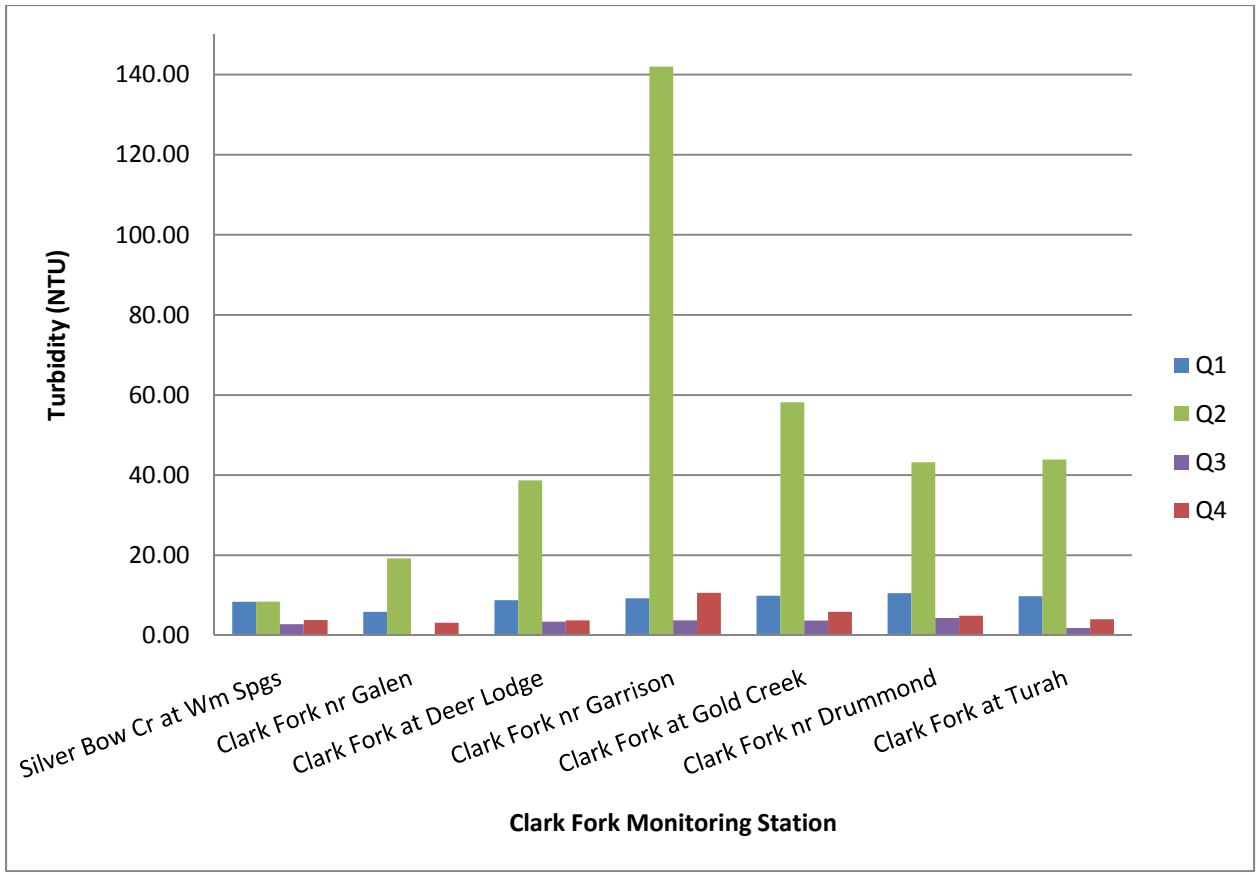

Figure 1-13. Turbidity measured at CFROU monitoring stations during 2011.

1.2.4 Total Suspended Sediment

Suspended sediment refers to sediment suspended in the water column, as opposed to sediment transported along the stream bottom which is known as bedload. Suspended sediment in streams generally includes a range of particle sizes which will vary with watershed geology, stream velocity, bed forms and turbulence. Excess fine sediment interferes with most water uses and has particularly adverse effects on benthic invertebrate and salmonid fish growth and reproduction. Increased suspended sediment can reduce light penetration and affect primary production by aquatic plants, and can affect the morphology of alluvial stream channels. In the Clark Fork system, transport of many of the COCs is directly correlated with suspended sediment (Section 1.2.7 and Section 2.0).

Total suspended sediment concentrations measured in the upper Clark Fork during 2011 were somewhat elevated in early spring (April), very high during spring snowmelt runoff (June), and generally very low during the late summer (August–September) and winter (December) monitoring events. The second quarter (June) snowmelt runoff monitoring event showed a spatial pattern of downstream increases in TSS, beginning at 8 mg/L in the headwaters at Warm Springs and peaking at 268 mg/L near Garrison (Figure 1-14).

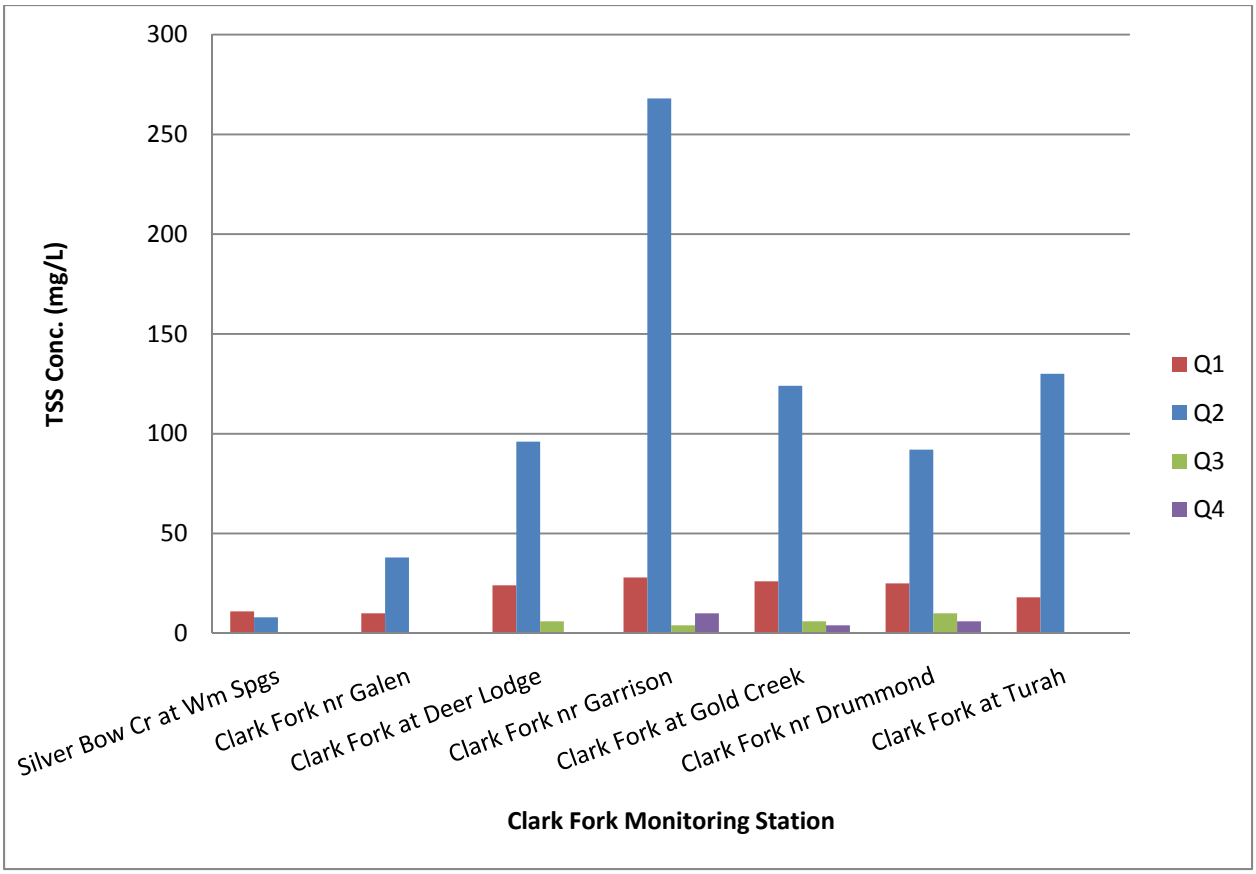

Figure 1-14. TSS concentrations at CFROU monitoring stations during 2011.
(no bars indicate values less than the analytical detection limit).

Total suspended sediment concentrations increased most significantly in the reach from Deer Lodge to near Garrison during early June monitoring. Total suspended sediment concentrations declined markedly (from 268 to 124 mg/L) from above to below the Little Blackfoot River confluence (near Garrison to Gold Creek stations) during the June monitoring event, and remained comparable at downstream stations near Drummond and at Turah. Highest TSS concentrations during the early spring (April) monitoring event were observed at the four intermediate stations from Deer Lodge to near Drummond, with lower concentrations noted at upstream and downstream monitoring stations. Monitoring events in June and April 2011 showing elevated TSS concentrations also produced elevated water column metals concentrations (Section 1.2.7).

Similar to turbidity, TSS concentrations at CFROU monitoring stations during first, third and fourth quarter monitoring events in 2011 were very comparable to values recorded during the 2010 monitoring year. Second quarter 2011 TSS concentrations were much higher than during the same period in 2010 due to significantly higher streamflows.

Load estimates for TSS were calculated from the in-stream TSS concentration measurement data and daily mean streamflows obtained from the USGS for their co-located streamflow gauging stations (Figure 1-15). These estimates provide some insight into temporal and spatial characteristics of suspended sediment loading in the upper Clark Fork. However, it should be noted that these data do not take into account river travel times (monitoring was not performed with regard to river travel times) or the potential influences of rapidly changing in-river conditions

during some monitoring events. Those factors may account for some of the apparent gains or losses in TSS loading between monitoring stations during any of the four monitoring events.

The load data suggest that much of the annual suspended sediment load was transported during the spring snowmelt runoff hydrograph. Loading during the second quarter (June) monitoring event far surpassed loading during any of the other three quarterly events. During the June event, loading increased in a stepwise fashion from the headwaters at Warm Springs downstream to Gold Creek. The TSS load then declined modestly at the near Drummond station, and then increased several-fold downstream of the Rock Creek confluence represented by the Clark Fork at Turah monitoring station. Largest increases in TSS loading between monitoring stations during June were in the reach between the Deer Lodge and near Garrison stations, and from near Drummond to Turah. Total suspended sediment loads increased in a more subtle manner from upstream to downstream stations, or not at all, during the other quarterly monitoring events. Total suspended sediment load data could not be calculated for the monitoring station near Garrison for the December 2011 monitoring event due to the unavailability of USGS streamflow data resulting from river ice effects. June 2011 TSS concentrations were frequently two to four times higher than during the same period in 2010.

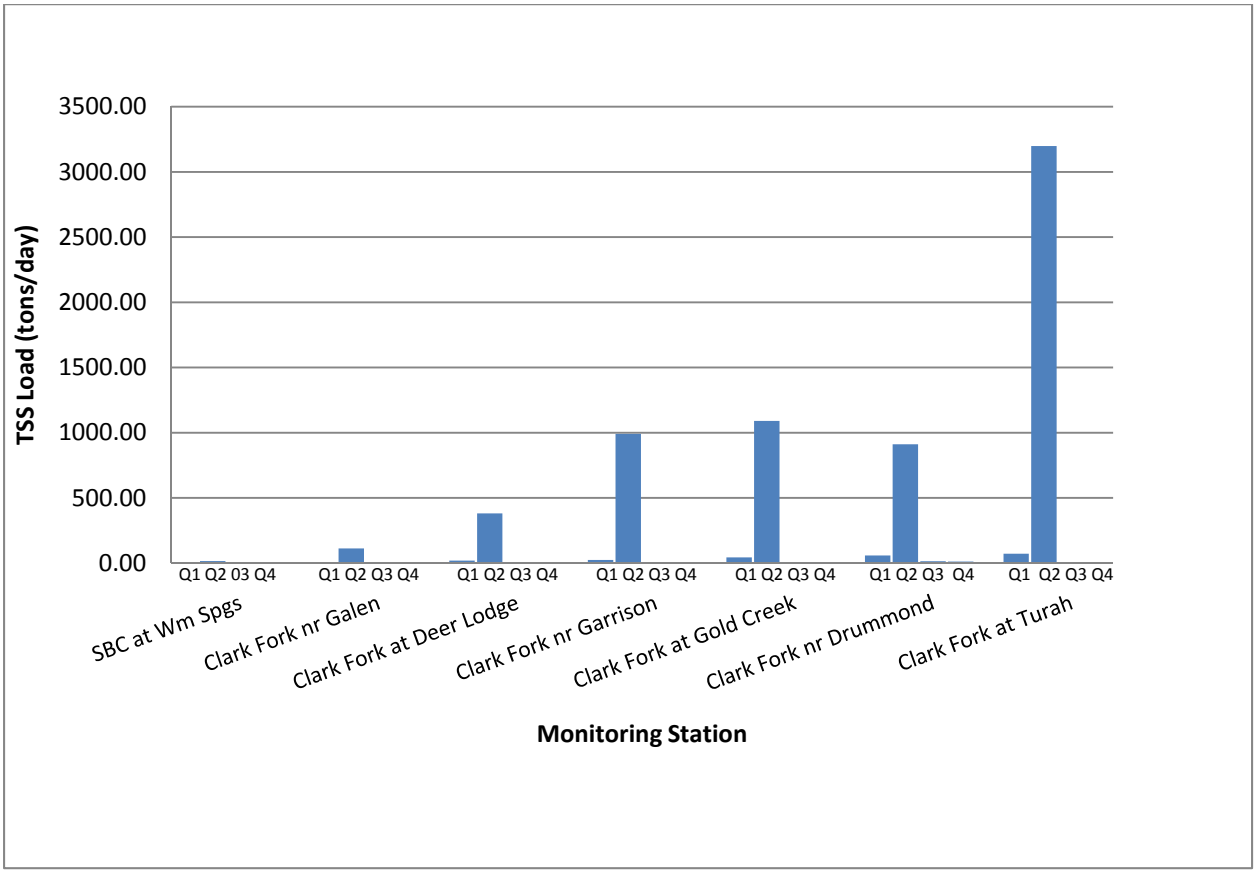

Figure 1-15. TSS loads at CFROU monitoring stations during 2011.
(no bars indicate values less than the analytical detection limit or, in the case of the 4th quarter value for the Clark Fork near Garrison site, a lack of streamflow measurement data due to ice.)

1.2.5 Common Ions

Common cations and anions dissolved in water, including calcium, magnesium, carbonate, bicarbonate, and sulfate were routinely analyzed in water samples collected from upper Clark Fork monitoring stations during 2011. These common ions describe the basic water chemistry of the river, and certain ions such as sulfate can be used as indicators for the presence of mine-related contaminants. Calcium and magnesium ions contribute to water hardness, which helps to buffer the toxic effects of some heavy metals. Aquatic life toxicity criteria for cadmium, copper, lead and zinc and other metals are determined on the basis of water hardness. Hardness mitigates metals contamination by preventing aquatic organisms from absorbing metals. Carbonate and bicarbonate alkalinity contribute to the buffering system of surface waters to resist changes in pH. Levels of water hardness and alkalinity also strongly influence the productivity of aquatic systems. Western freshwater fisheries typically show alkalinity values of 100–200 mg/L.

Figure 1-16 through Figure 1-19 depict 2011 quarterly monitoring results for water hardness, total and bicarbonate alkalinity, and sulfate at the network of CFROU monitoring stations.

Calcium was the dominant cation at the upper Clark Fork network of monitoring stations. Levels of water hardness in the upper Clark Fork during 2011 can be described as hard to very hard, except during major runoff conditions which diluted concentrations of calcium and magnesium that contribute to hardness (Figure 1-16). Water hardness in Warm Springs Creek, one of two headwater tributaries to the Clark Fork, is naturally high due to the limestone geology of the watershed. The other headwater tributary, SBC, has unnaturally high water hardness due to the addition of lime at several locations along that stream. Hardness of these upper tributaries contributes to high hardness in the Clark Fork at its headwaters. Hardness in the upper Clark Fork study reach was lowest at the Turah station, presumably due to the inflow of lower hardness water from the Rock Creek drainage. Water hardness during 2011 quarterly monitoring events was comparable to values recorded during the 2010 monitoring year.

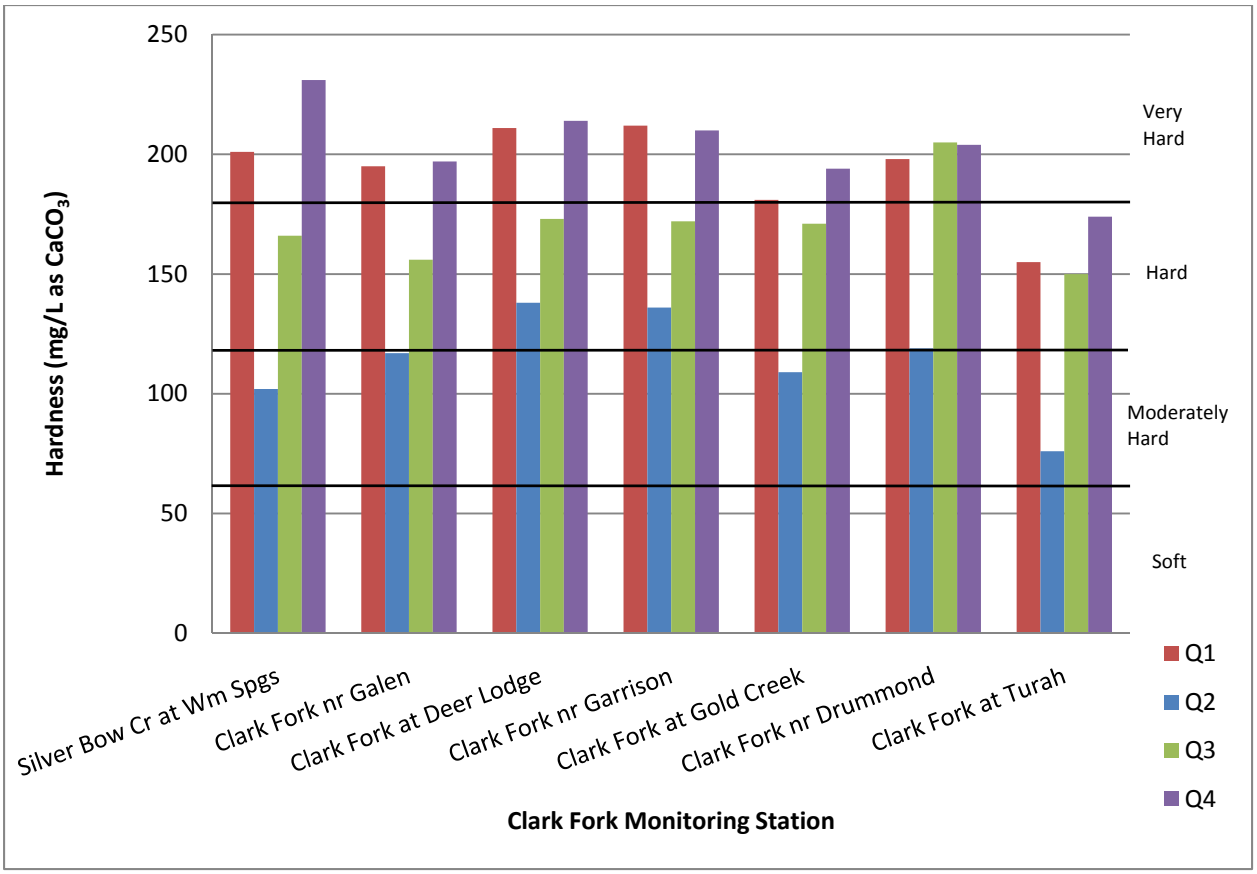

Figure 1-16. Water hardness at CFROU monitoring stations during 2011.

Total and bicarbonate alkalinity in the upper Clark Fork during 2011 showed a modest increasing trend from the Warm Springs to near Drummond stations, with decreases noted below the Little Blackfoot River at the Gold Creek site, and below Rock Creek at the Turah site (Figure 1-17 and Figure 1-18). Moderate levels of alkalinity describe the upper Clark Fork as a well buffered system, with good potential for fish production barring other limitations. Alkalinity was reduced during the dilutional influences of runoff conditions in June and attained highest levels in September (third quarter monitoring event). Total and bicarbonate alkalinity at CFROU monitoring stations during quarterly monitoring events in 2011 were very similar to values measured in 2010.

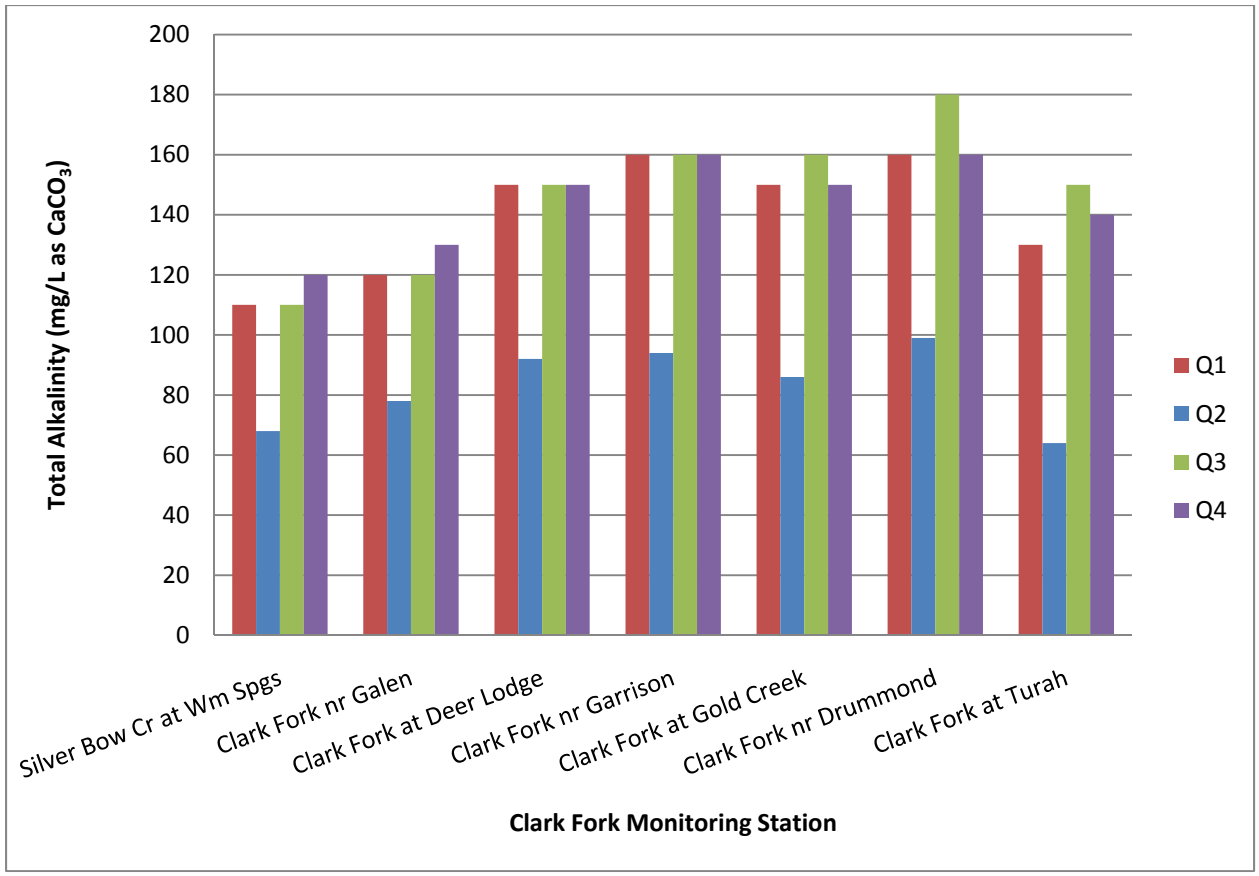

Figure 1-17. Total alkalinity at CFROU monitoring stations during 2011.

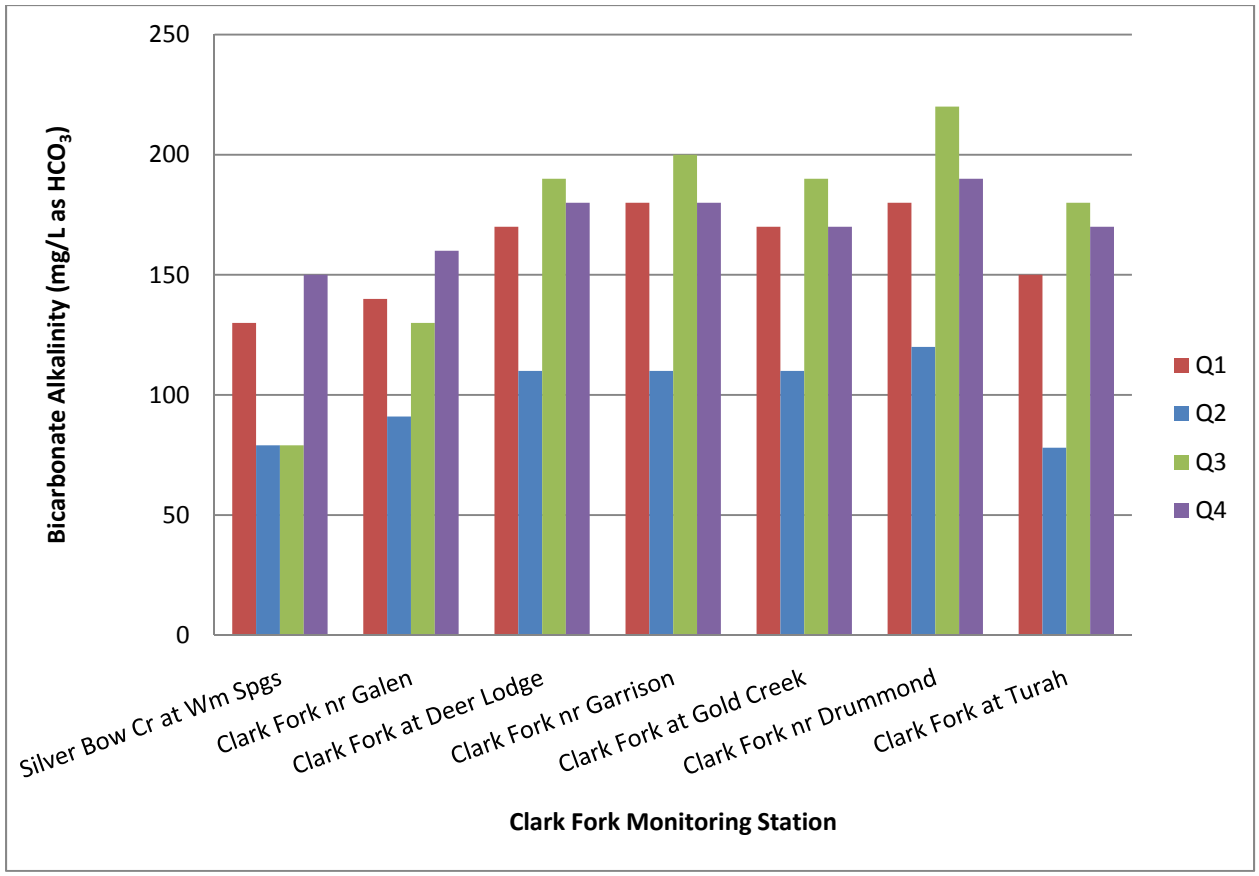

Figure 1-18. Bicarbonate alkalinity at CFROU monitoring stations during 2011.

Sulfate concentrations showed a decreasing spatial trend from the Warm Springs monitoring site in the headwaters to Turah, with consistent but spatially short-lived increases noted in the Drummond area (Figure 1-19). This pattern may result from increasing distance from, and tributary dilution of, mining-related or natural geologic influences in the Butte area, coupled with the addition of sulfate from the Flint Creek drainage. The Flint Creek watershed contains hundreds of former mine sites and is known to be a source of mining-related contaminants to the upper Clark Fork. Sulfate has previously been shown to be the second most prevalent anion in the upper Clark Fork watershed, behind bicarbonate. Concentrations of sulfate were reduced by half during spring runoff conditions. Sulfate concentrations during 2011 were slightly lower overall than during the 2010 monitoring year due to the presence of higher streamflows and associated dilution.

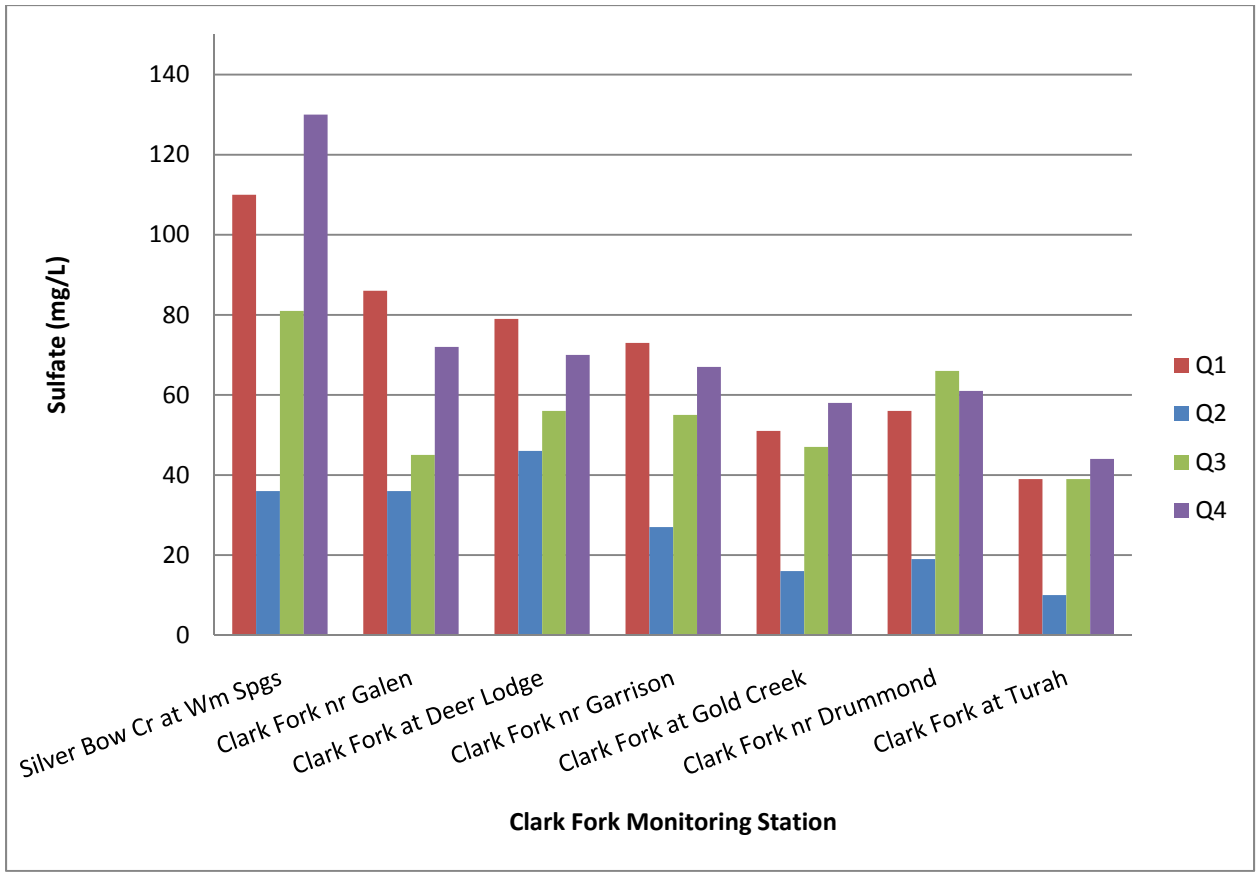

Figure 1-19. Sulfate concentrations at CFROU monitoring stations during 2011.

1.2.6 Algal Nutrients

Monitoring for algal nutrients (nitrogen and phosphorus variables) at CFROU monitoring stations was begun during the 2011 calendar year, and included analysis of ammonia, nitrate plus nitrite nitrogen, TN, and TP concentrations. Assessment of nutrient monitoring results included: 1) comparisons of TN, nitrate plus nitrite nitrogen, and TP concentrations to criteria designed to prevent nutrient enrichment/nuisance algae problems in surface waters and their associated impacts to beneficial water uses; 2) examination of spatial patterns for nitrogen and phosphorus loads in SBC and the upper Clark Fork as indicators of nutrient sources; and 3) evaluation of ammonia concentrations in relation to pH and water temperature-dependent ammonia toxicity water quality standards for the protection of aquatic life.

Numeric water quality standards have been adopted for nutrients in the Clark Fork River from below Warm Springs Creek to the Blackfoot River confluence, which encompasses most of the CFROU. The standards apply only to the summer season, defined as the period from June 21 through September 21, and thus are relevant only to the third quarter (August–September) 2011 monitoring results. The standards for this segment of the Clark Fork River are 0.300 mg/L for TN and 0.020 mg/L for TP (ARM 17.30.631). The standards do not apply to CFROU monitoring station SS-25, SBC at Warm Springs. Additionally, MDEQ has developed ecoregion-based nutrient threshold values that are also designed to prevent nutrient enrichment/nuisance algae problems in surface waters that may eventually be proposed as new water quality standards for the Clark Fork River and other water bodies within the Middle Rockies Ecoregion. These values are 0.320 mg/L for TN, 0.10 mg/L for nitrate plus nitrite nitrogen, and 0.048 mg/L for TP. These

criteria only apply to the summer period when eutrophication problems are most likely to occur. Lastly, while ammonia nitrogen is an important algal nutrient, levels in excess of the recommended limits may harm aquatic life. The degree of toxicity is influenced by in-stream pH values and water temperature, which determine the amount of unionized ammonia that is present. In general, higher pH values and warmer water temperatures increase the toxicity potential for a given concentration of total ammonia.

1.2.6.1 Total Nitrogen

Compared to the Clark Fork water quality standards, concentrations of TN were frequently elevated in SBC and in the segment of the Clark Fork River from near Galen to Gold Creek (Table 1-3). Infrequent excursions were also noted at the near Drummond monitoring station. However, summertime exceedances of the TN standard were observed only at the SBC at Warm Springs and Clark Fork near Galen monitoring stations (Figure 1-20).

Total nitrogen concentrations during lower flow periods in the fourth quarter tended to be highest in SBC, and in the segment of the Clark Fork from Deer Lodge to Gold Creek. Lowest TN concentrations were observed at Turah, below the Rock Creek confluence. Very high TN concentrations were noted in the Clark Fork near Galen during peak spring runoff conditions in June, which was most likely attributable to agricultural nonpoint source runoff.

Table 1-3. Results of 2011 monitoring for TN at CFROU monitoring stations.

Parameter: Total Nitrogen (mg/L)	SBC at Warm Spgs	CFR nr Galen	CFR at Deer Lodge	CFR nr Garrison	CFR at Gold Creek	CFR nr Drummond	CFR at Turah
Q1 (April)	0.49	0.37	0.65	0.47	0.35	0.24	0.27
Q2 (June)	0.59	1.94	0.57	0.51	0.36	0.40	0.25
Q3 (Aug–Sept)	1.18	0.31	0.25	0.22	0.19	0.19	0.14
Q4 (December)	0.54	0.25	0.39	0.70	1.11	0.12	0.15

Remedy performance standard attained *ND = Not detected at parameter reporting limit*
MDEQ aquatic life nutrient criteria exceeded

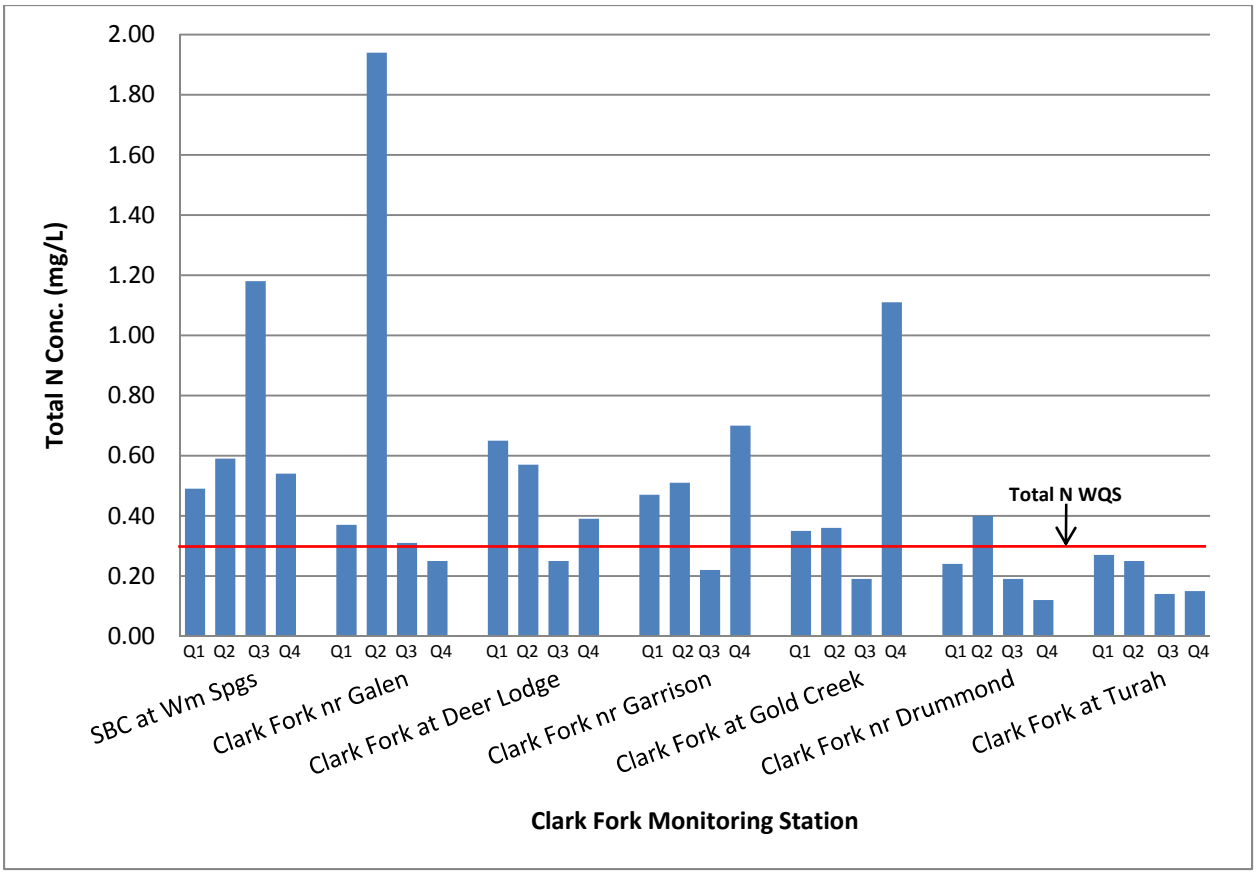

Figure 1-20. TN concentrations at CFROU monitoring stations during 2011.
The TN summertime water quality standard (Total N WQS) for the upper Clark Fork River is shown for reference.

Load estimates for TN were calculated from the in-stream concentration measurement data and daily mean streamflows obtained from the USGS for their co-located streamflow gauging station (Figure 1-21). These estimates provide some insight into temporal and spatial characteristics of TN loading and source areas within and upstream from the CFROU. However, it should be noted that these data do not take into account river travel times (monitoring was not performed with regard to river travel times) or the potential influences of rapidly changing in-river conditions during some monitoring events. Those factors may account for some of the apparent gains or losses in loading between monitoring stations during any of the four monitoring events.

The load estimates showed that the highest rates of TN transport occurred during spring runoff conditions in June (Q2), likely as a result of cumulative nonpoint source inputs throughout the upper Clark Fork watershed (Figure 1-21). With the exception of the high TN load measured at the near Galen monitoring station, TN loads in early June tended to increase downstream with increasing watershed drainage area and streamflows (Figure 1-21). The largest load was measured at the downstream-most monitoring station at Turah (Figure 1-21).

During the other quarterly monitoring events, spatial trends in TN loading also tended to show incremental downstream increases in load (Figure 1-21). A very large increase in TN load was noted within the segment of the Clark Fork from Deer Lodge to Gold Creek during the fourth quarter (December) monitoring event. The absence of available streamflow data for the near Garrison monitoring site located between Deer Lodge and Gold Creek precluded load estimation there. As a result, it was not possible to determine the source of the load increase.

Possible sources of TN loading within the CFROU include, but are not limited to, agricultural nonpoint sources, groundwater inputs, and municipal wastewater discharges from the communities of Butte (via SBC), Warm Springs, Deer Lodge, and Drummond.

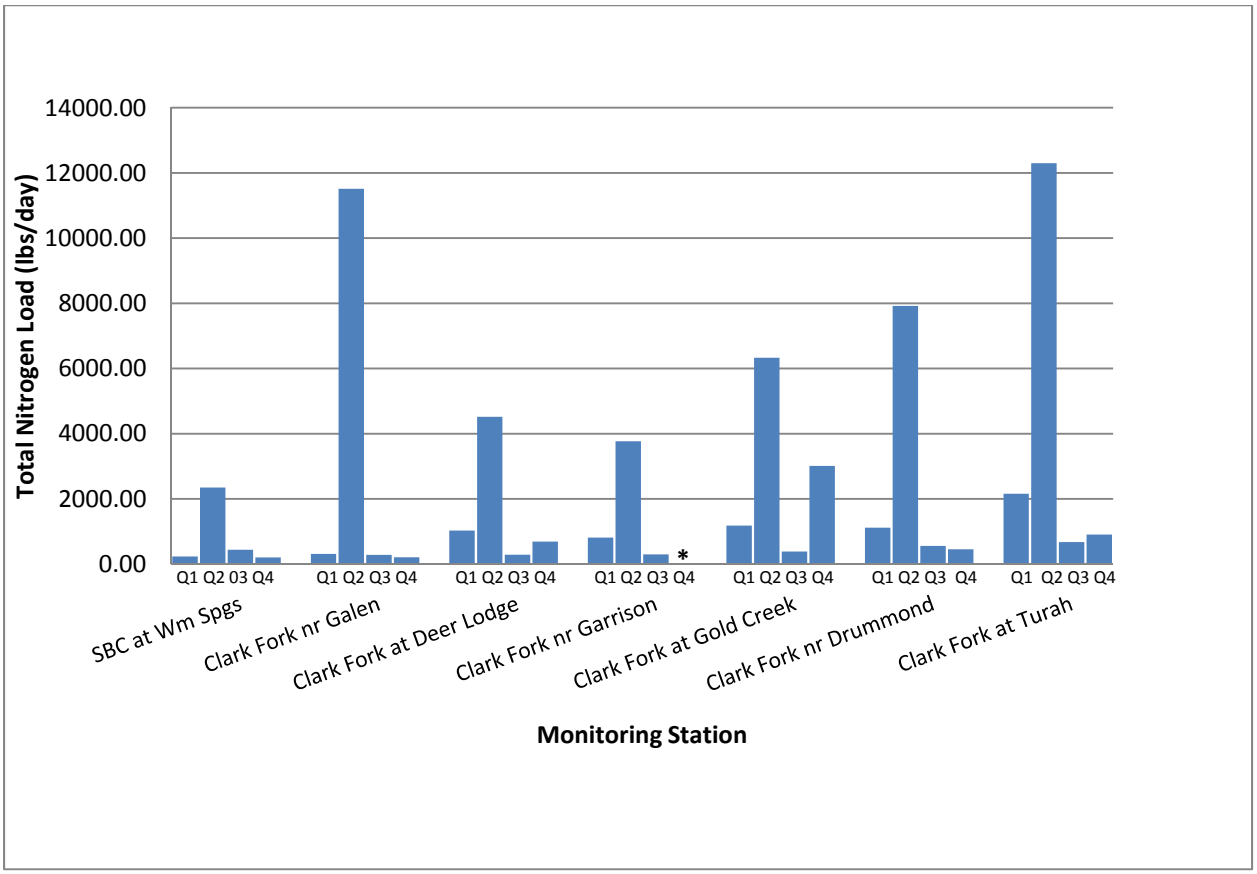

Figure 1-21. TN loads at CFROU monitoring stations during 2011.
(* = no load data available due to ice at streamflow gauging station).

1.2.6.2 Nitrate plus Nitrite Nitrogen

Concentrations of nitrate plus nitrite nitrogen were periodically elevated at the Deer Lodge, near Garrison, and Gold Creek monitoring stations during the 2011 calendar year (Figure 1-22). However, no exceedances of MDEQ's recommended threshold value of 0.10 mg/L were observed during the third quarter monitoring event, which was within the applicable summertime period (Table 1-4). The spatial trend for nitrate plus nitrite concentrations increased at the three intermediate monitoring stations mentioned above followed by a downstream decline. Nitrate plus nitrite nitrogen concentrations were frequently below the analytical detection limit in SBC at Warm Springs, and in the Clark Fork River near Drummond and at Turah. Loading patterns for nitrate plus nitrite nitrogen were not examined, but are represented in the loading estimates for TN.

Table 1-4. Results of 2011 monitoring for nitrate plus nitrite nitrogen at CFROU monitoring stations.

Parameter: $NO_3 + NO_2$-N (mg/L)	SBC at Warm Spgs	CFR nr Galen	CFR at Deer Lodge	CFR nr Garrison	CFR at Gold Creek	CFR nr Drummond	CFR at Turah
Q1 (April)	ND	ND	0.15	0.18	0.05	ND	ND
Q2 (June)	0.06	0.10	0.09	0.10	0.05	ND	ND
Q3 (Aug–Sept)	ND	0.06	0.08	ND	ND	ND	ND
Q4 (December)	ND	0.07	0.27	0.22	0.12	0.07	ND

Remedy performance standard attained *ND = Not detected at parameter reporting limit*

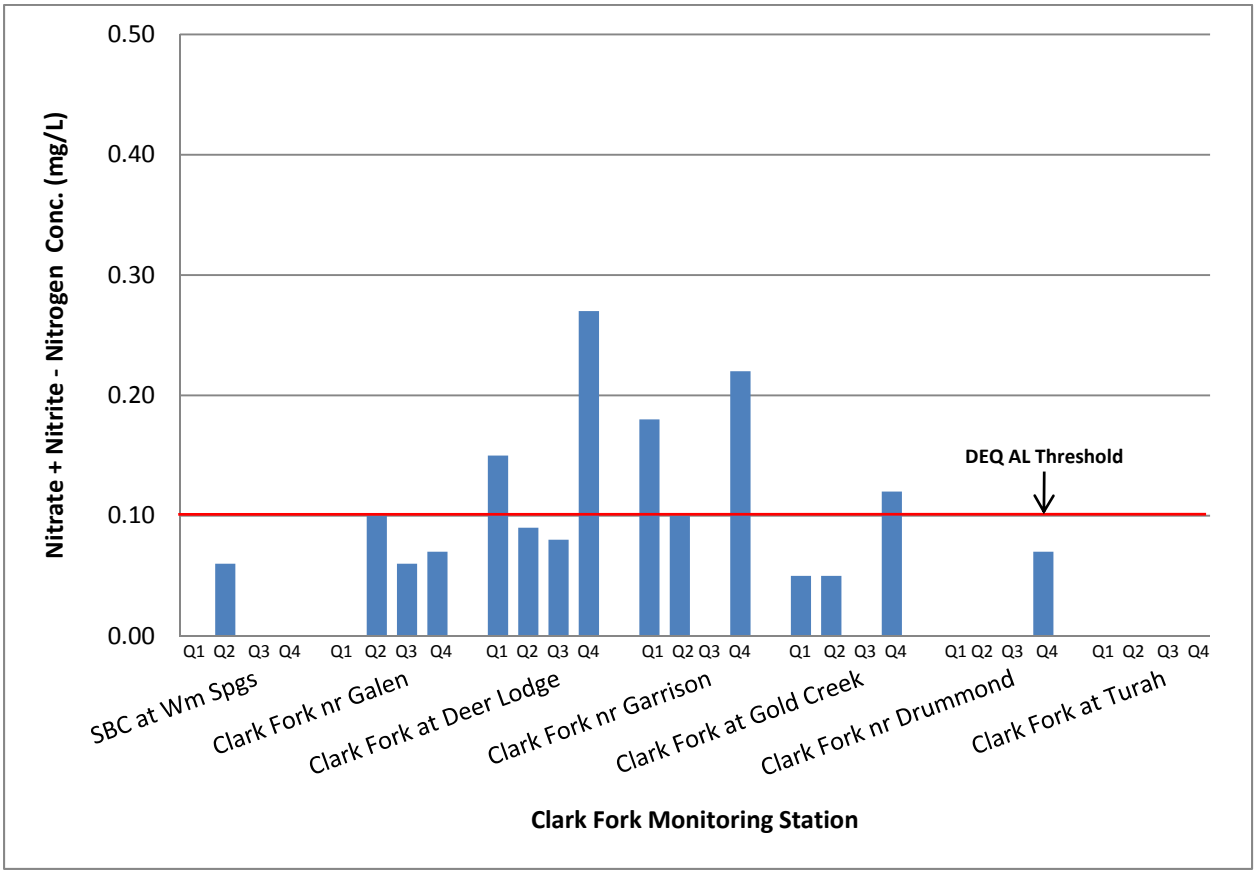

Figure 1-22. Nitrate+nitrite nitrogen concentrations at CFROU monitoring stations during 2011. **(no bars indicate values less than the analytical detection limit). DEQ's recommended aquatic life water quality criterion (MDEQ aquatic life Threshold) for nitrate+nitrite is shown for reference.**

1.2.6.3 Total Phosphorus

Total phosphorus (TP) concentrations in SBC and the upper Clark Fork River during 2011 commonly exceeded the Clark Fork TP water quality standard of 0.020 mg/L during most of the four quarterly monitoring events (Figure 1-23). Magnitude of the exceedances was greatest during the June 2011(Q2) spring runoff monitoring event. This was likely attributable to correspondingly high concentrations of TSS present during the June monitoring event (Figure 1-14). Phosphorus readily adsorbs to sediment particles and there is a strong correlation between TP and TSS concentrations in surface water. However, summertime exceedances of the TP standard (when the standard applies) were only observed at four of the seven monitoring

stations: SBC at Warm Springs, Clark Fork near Galen, Gold Creek, and near Drummond monitoring stations (Table 1-5).

Total phosphorus concentrations during lower flow periods were highest in SBC, and tended to be similar throughout much of the Clark Fork within the CFROU. Lowest TP concentrations were observed at Turah, below the Rock Creek confluence. Highest TP concentrations were noted in the Clark Fork near Garrison during peak spring runoff conditions in June, which also corresponded to the highest measured TSS concentration (Figure 1-23 and Figure 1-14).

Table 1-5. Results of 2011 monitoring for total phosphorus at CFROU monitoring stations.

Parameter: Total Phosphorus (mg/L)	SBC at Warm Spgs	CFR nr Galen	CFR at Deer Lodge	CFR nr Garrison	CFR at Gold Creek	CFR nr Drummond	CFR at Turah
Q1 (April)	0.036	0.025	0.027	0.032	0.032	0.027	0.020
Q2 (June)	0.062	0.093	0.176	0.300	0.170	0.134	0.133
Q3 (Aug–Sept)	0.078	0.023	0.017	0.020	0.022	0.030	0.013
Q4 (December)	0.047	0.020	0.013	0.021	0.014	0.009	0.006

Remedy performance standard attained
MDEQ nutrient criteria exceeded
ND = Not detected at parameter reporting limit

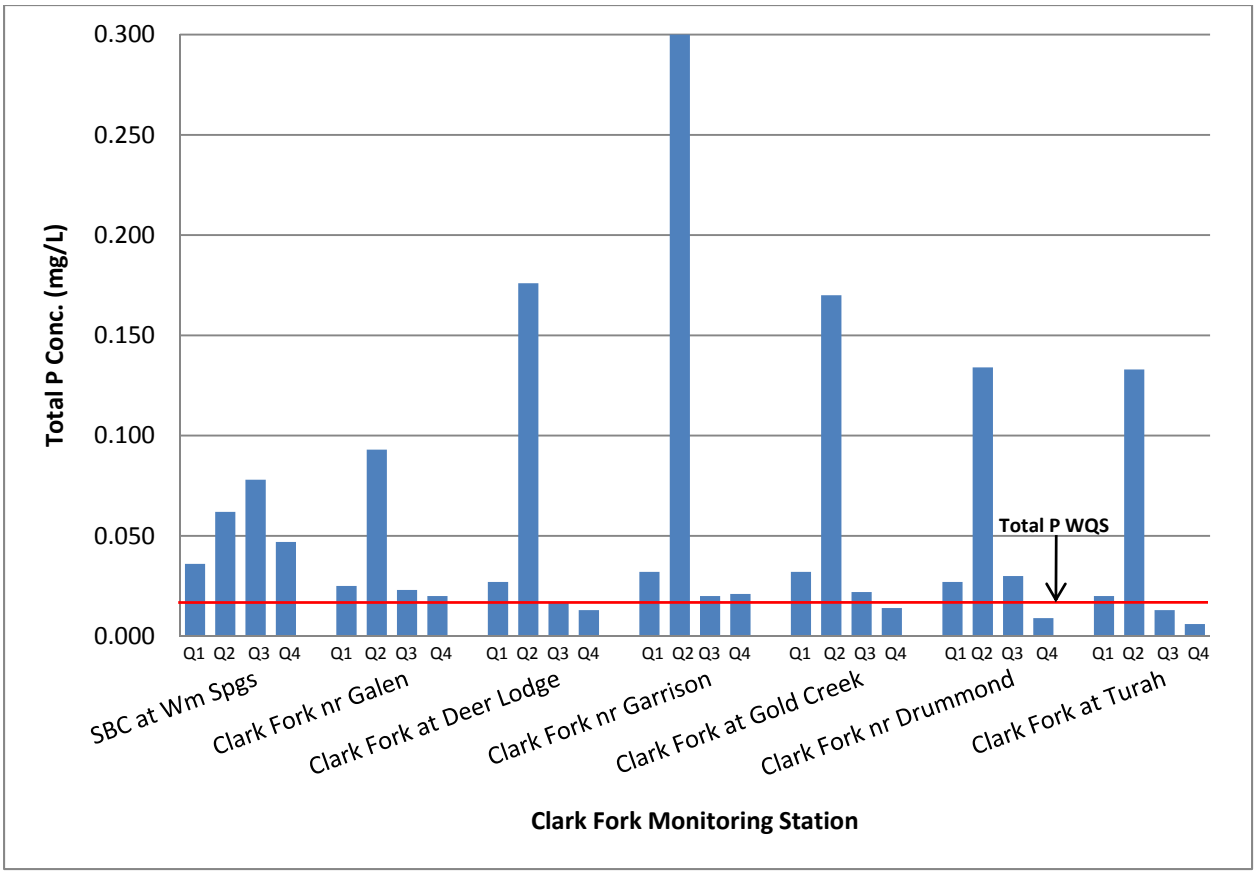

Figure 1-23. TP concentrations at CFROU monitoring stations during 2011.
The total phosphorus summertime water quality standard (Total P WQS) for the upper Clark Fork River is shown for reference.

Load estimates for TP were calculated from the in-stream concentration measurement data and the USGS streamflows (Figure 1-24). As for TN, these estimates provide some insight into temporal and spatial characteristics of TP loading and source areas within and upstream from the CFROU. Also, as with TN, it should be noted that these data do not take into account river travel times (monitoring was not performed with regard to river travel times) or the potential influences of rapidly changing in-river conditions during some monitoring events. Those factors may account for some of the apparent gains or losses in loading between monitoring stations during any of the four monitoring events.

The load estimates showed that the highest rates of TP transport occurred during spring runoff conditions in June (Q2) likely as a result of cumulative nonpoint source inputs throughout the upper Clark Fork watershed, and in association with greatly elevated TSS concentrations present during that period. Total phosphorus loads in early June tended to increase downstream with increasing watershed drainage area and streamflows, similar to TN. During the other quarterly monitoring events, spatial trends in TP loading also tended to show incremental downstream increases in load. Largest non-runoff season increases in TP load were noted within the segment of the Clark Fork from near Garrison to Gold Creek (53 lbs/day in the first quarter), from Gold Creek to near Drummond (43 lbs/day in the third quarter), and from near Drummond to Turah (34 lbs/day in the first quarter). The absence of available streamflow data due to ice for the near Garrison monitoring site during the fourth quarter monitoring event precluded load estimation there. Possible sources of TP loading within the CFROU include, but are not limited to, agricultural nonpoint sources, groundwater seepage,

natural geologic sources, and municipal wastewater discharges from the communities of Butte (via SBC), Warm Springs, Deer Lodge, and Drummond.

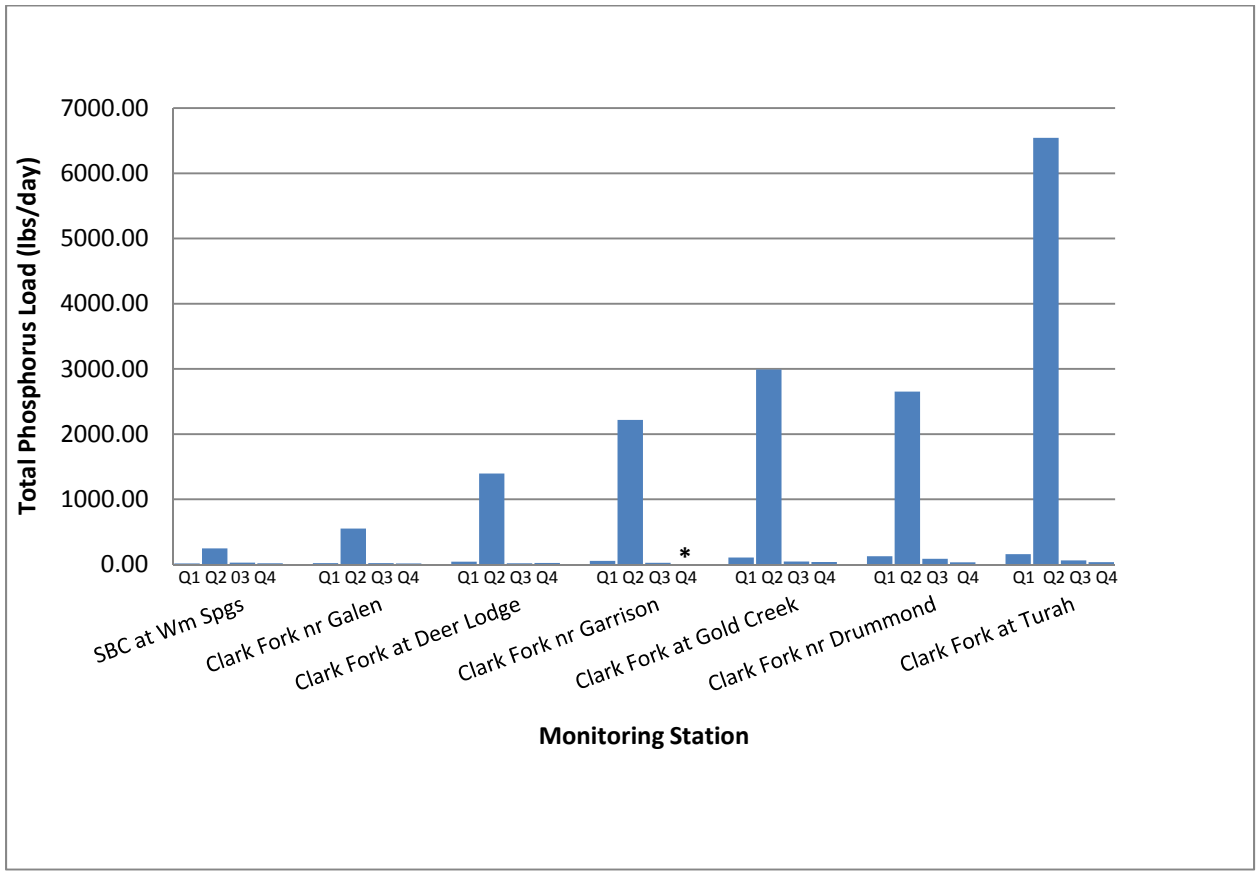

Figure 1-24. TP loads at CFROU monitoring stations during 2011.
(* = no load data available due to ice at streamflow gauging station).

1.2.6.4 Ammonia Nitrogen

Ammonia nitrogen concentrations were consistently below the analytical reporting level at all CFROU monitoring stations during all of the four quarterly 2011 monitoring events (Table 1-6). As a result, the data are not presented graphically and loading estimates were not completed. None of the 2011 CFROU ammonia concentrations exceeded either of the aquatic life chronic or acute toxicity thresholds.

Table 1-6. Results of 2011 monitoring for total ammonia at CFROU monitoring stations.

Parameter: Total Ammonia (mg/L)	SBC at Warm Spgs	CFR nr Galen	CFR at Deer Lodge	CFR nr Garrison	CFR at Gold Creek	CFR nr Drummond	CFR at Turah
Q1 (April)	ND	ND	ND	ND	ND	ND	ND
Q2 (June)	ND	ND	ND	ND	ND	ND	ND
Q3 (Aug–Sept)	ND	ND	ND	ND	ND	ND	ND
Q4 (December)	ND	ND	ND	ND	ND	ND	ND

Remedy performance standard attained *ND = Not detected at parameter reporting limit*

1.2.7 Primary Contaminants of Concern

Metals and metalloids analyzed under the CFROU monitoring plan included TR and dissolved concentrations of arsenic, cadmium, copper, lead, and zinc. The Clark Fork monitoring plan established performance standards for metals in surface waters which are based on published chronic and acute toxicity criteria for freshwater aquatic life as well as human health standards for drinking water. The aquatic toxicity criteria apply to the TR concentrations of metals and are expressed as a function of total hardness for cadmium, copper, lead and zinc. Human health standards for metals in surface waters are based upon TR concentrations while standards for metals in groundwater are based on dissolved concentrations. Aquatic toxicity thresholds were calculated from the water hardness at each station during each monitoring event.

The following discussion addresses spatial (upstream to downstream) and temporal (by quarterly monitoring event) patterns in concentrations and loads of both TR and dissolved forms of the metals of concern, which reflect dissolved, adsorbed, and solid phases. Results are presented for arsenic, cadmium, copper, lead, and zinc at each of the seven permanent monitoring stations within the CFROU for each of the four 2011 quarterly monitoring events.

1.2.7.1 Arsenic

Average concentrations of TR and dissolved arsenic during 2011 were highest at the upper four monitoring stations in the CFROU network (SBC at Warm Springs, Clark Fork near Galen, at Deer Lodge, and near Garrison) and lowest at the lower three stations (Clark Fork at Gold Creek, near Drummond, and at Turah) (Figure 1-25). Arsenic concentrations generally decreased in the reach from above to below the confluences of the Little Blackfoot River (at the Gold Creek station), presumably due to a dilution effect. Decreases were also noted from above to below the Rock Creek confluence at the Turah station in three of four quarters during 2011. Excluding the spring snowmelt runoff monitoring event in the second quarter (June) of 2011, highest overall arsenic concentrations, and the highest percentage of dissolved arsenic, was observed at the SBC at Warm Springs station.

Highest concentrations of TR arsenic at most of the seven monitoring stations were measured during the second quarter (June) high streamflow monitoring event, with maximum concentrations in 2011 recorded near Garrison (0.072 mg/L), at Deer Lodge (0.048 mg/L), and at the SBC at Warm Springs station (0.042 mg/L). Second quarter 2011 TR arsenic concentrations were substantially higher than those measured during the second quarter of 2010 (maximum 2010 concentration of 0.040 mg/L recorded near Garrison). The Clark Fork at Turah monitoring station was unique in that it produced its highest TR arsenic concentration during the first quarter (April) monitoring event in 2011, with an unusually high concentration for that station of 0.031 mg/L. That value was the highest recorded at any of the CFROU monitoring stations during the first quarter monitoring event and appears to be unusual.

Highest concentrations of dissolved arsenic were measured at each station during either the second quarter (five of seven stations) or the third quarter monitoring event (two of seven stations), with highest concentrations recorded in SBC at Warm Springs (0.039 mg/L and 0.037 mg/L) on June 8 and August 31, respectively. With the exception of the first quarter 2011 monitoring event, the lowest concentrations of dissolved and TR arsenic were typically found at Turah, below the Rock Creek confluence. With the exception of the second quarter 2011 monitoring event when streamflows were unusually high, arsenic concentrations at CFROU monitoring stations during the 2011 calendar year were comparable to those measured in 2010.

A high percentage of arsenic was present in the dissolved form during three of the four 2011 quarterly monitoring events (Figure 1-25). However, during the second quarter (June) runoff monitoring, a significant portion of the arsenic measured was present in the non-dissolved (TR)

form at most of the monitoring stations (Figure 1-25). SBC at Warm Springs and Clark Fork near Galena were the exceptions. The arsenic concentrations measured at these stations were represented by the dissolved phase.

TR arsenic concentrations commonly exceeded the 0.010 mg/L HH/DW standard at CRFOU during the 2011 monitoring year (100 percent of the quarterly observations at four of seven monitoring sites; 50 percent of the observations at three of seven sites) (Table 1-7). None of the measured arsenic values during 2011 exceeded the aquatic life acute or chronic toxicity thresholds. Both the frequency and magnitude of arsenic drinking water standards excursions was higher in 2011 than in 2010, likely due to the sustained high streamflow conditions and its influence on pollutant transport. In 2011, 22 of 28 individual site measurements for TR arsenic (seven stations, four quarterly measurements) exceeded the drinking water standard, as compared to 22 of 24 measurements (six stations, four monitoring events) in 2010.

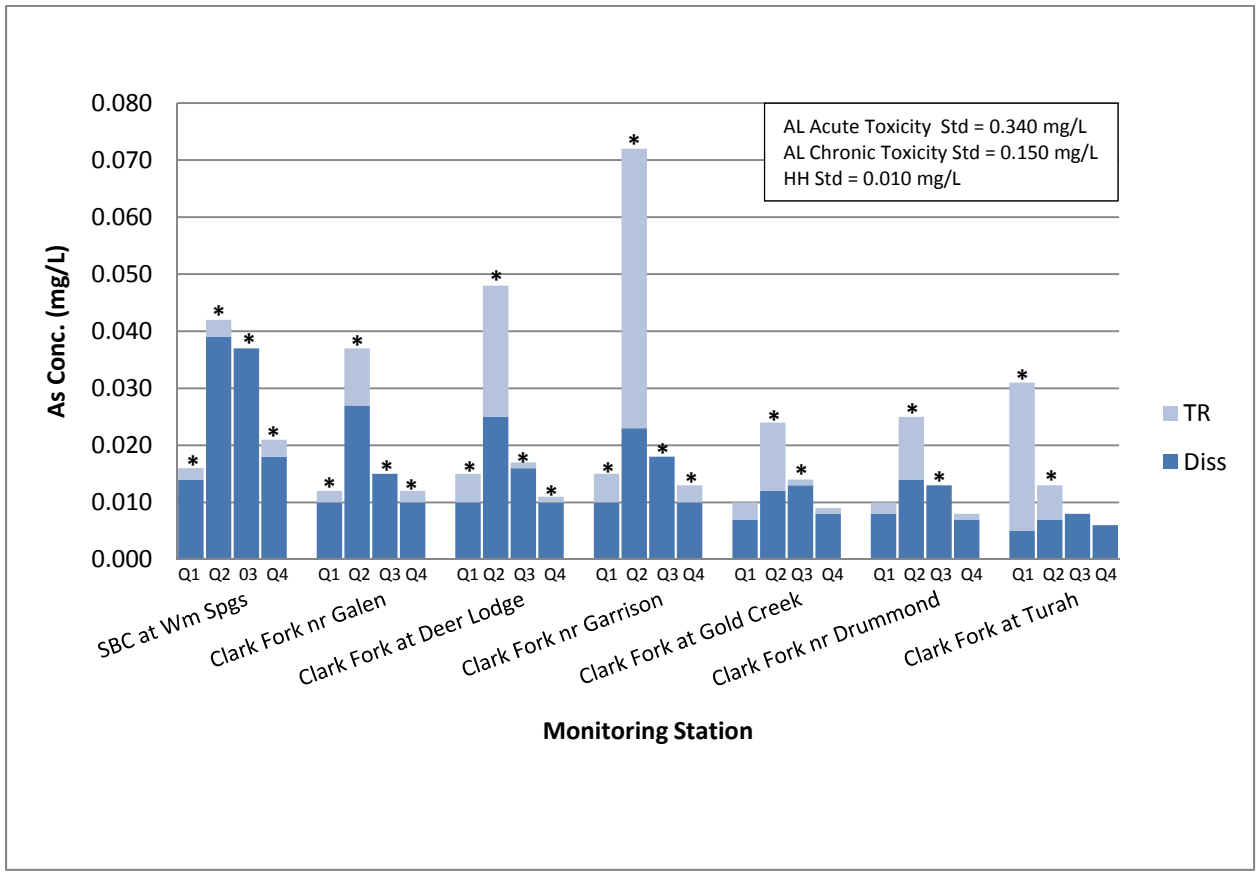

Figure 1-25. TR and dissolved arsenic concentrations in the Upper Clark Fork River during 2011.
Human health (HH) and aquatic life water quality standards for TR arsenic are shown for reference. Asterisks indicate values exceeding one or more of the standards (see Table 1-7 for details).

Table 1-7. Results of 2011 monitoring for arsenic compared to remediation performance standards for the CFROU.

Parameter: TR Arsenic (mg/L)	SBC at Warm Spgs	CFR nr Galen	CFR at Deer Lodge	CFR nr Garrison	CFR at Gold Creek	CFR nr Drummond	CFR at Turah
Q1 (April)	0.016	0.012	0.015	0.015	0.010	0.010	0.031
Q2 (June)	0.042	0.037	0.048	0.072	0.024	0.025	0.013
Q3 (Aug–Sept)	0.037	0.015	0.017	0.018	0.014	0.013	0.008
Q4 (December)	0.021	0.012	0.011	0.013	0.009	0.008	0.006

Remedy performance standard attained
HH performance standard exceeded

Load estimates for TR and dissolved arsenic were calculated from the in-stream concentration measurement data and daily mean streamflows obtained from the USGS for co-located streamflow gauging stations (Figure 1-26). These load estimates provide some insight into temporal and spatial characteristics of arsenic loading to the upper Clark Fork. However, it should be noted that these data do not take into account river travel times (monitoring was not performed with regard to river travel times) or the potential influences of rapidly changing in-river conditions during some monitoring events. Those factors may account for some of the apparent gains or losses in arsenic loading between monitoring stations during any of the four monitoring events during 2011.

The load data show that peaks rates of TR and dissolved arsenic transport likely occurred during spring snowmelt runoff in June (Figure 1-26). TR and dissolved arsenic loads during this monitoring event increased by an order of magnitude. During all four quarterly monitoring events, loading tended to increase in a stepwise fashion from the headwaters station at Warm Springs downstream to near Drummond or, in some quarters, beyond to the Turah monitoring station. Largest inter-site increases in TR arsenic loading during the June monitoring event were noted from near Galen to Deer Lodge (161 lbs/day increase), and from Deer Lodge to near Garrison (151 lbs/day). A very large TR arsenic load increase (201 lbs/day) was also noted from near Drummond to Turah in the first quarter (April) 2011. This was due to the unexplained very high arsenic concentration recorded at Turah, which reflected the highest value of any station during the April 2011 monitoring event.

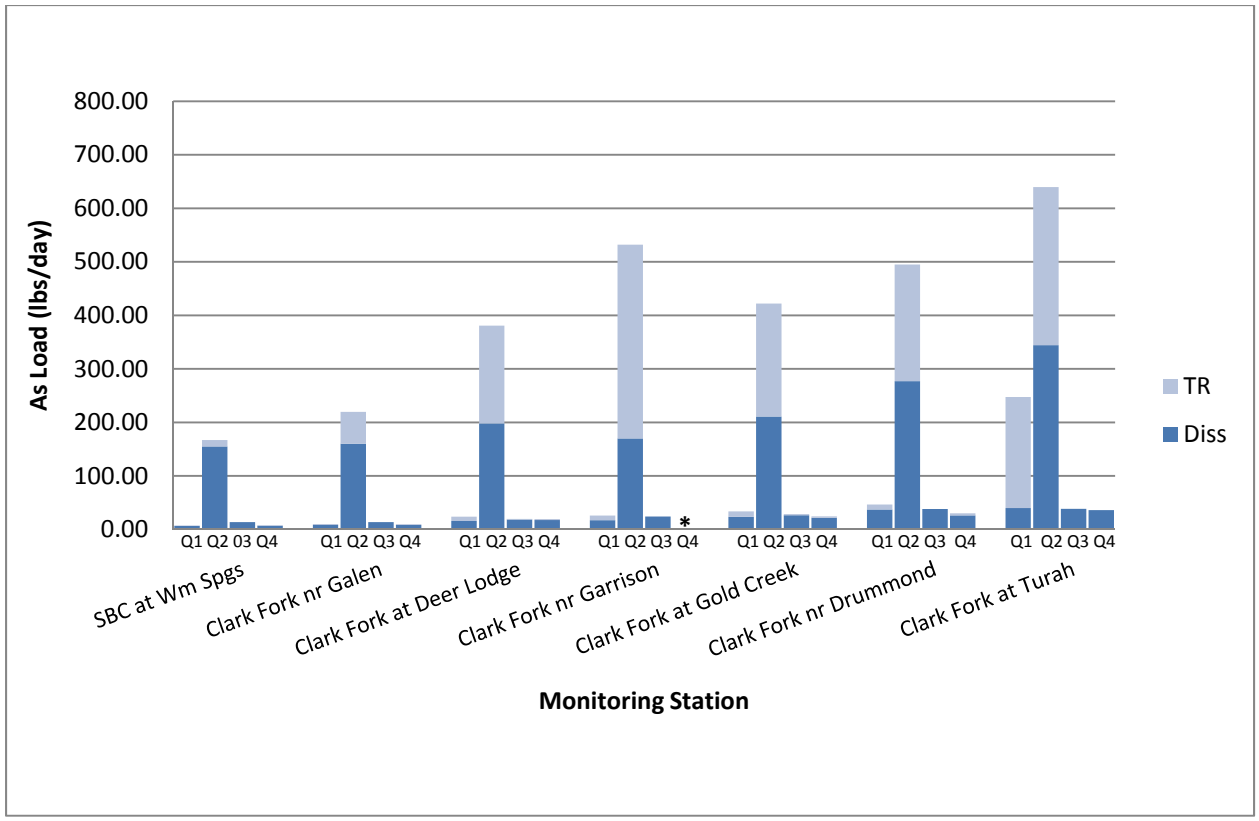

Figure 1-26. TR and dissolved arsenic loads in the Upper Clark Fork River during 2011.
(* = no load data available due to ice at streamflow gauging station).

As an additional interpretive tool to help understand metals transport dynamics in the upper Clark Fork system, regression analyses were performed on paired metals and TSS concentration data for six of the seven monitoring stations and for all quarterly monitoring events in each of 2010–2011 (48 paired metal totals). The seventh monitoring station, SBC at Warm Springs, was newly added in 2011 and was therefore excluded from the analysis due to a partial dataset.

The regression analysis for arsenic showed a relatively weak correlation between TR arsenic and suspended sediment when all CFROU monitoring station data are pooled (R-squared value of 0.64) (Figure 1-27). Arsenic tends to have a higher dissolved component than cadmium, copper, lead or zinc, which may explain the relatively poor fit. However, when individual motoring station data are analyzed (eight data pairs for each station), the results were highly variable (Table 1-8). A weak TSS versus TR arsenic relationship persisted at many of the monitoring stations, but several stations, notably the Clark Fork near Garrison and Clark Fork near Drummond, showed surprisingly good fits (R-squared values of 0.97 and 0.95, respectively). These individual stations also showed slightly higher than average TR to dissolved arsenic ratios (Figure 1-25), which may help to explain the stronger correlation to suspended sediment concentrations.

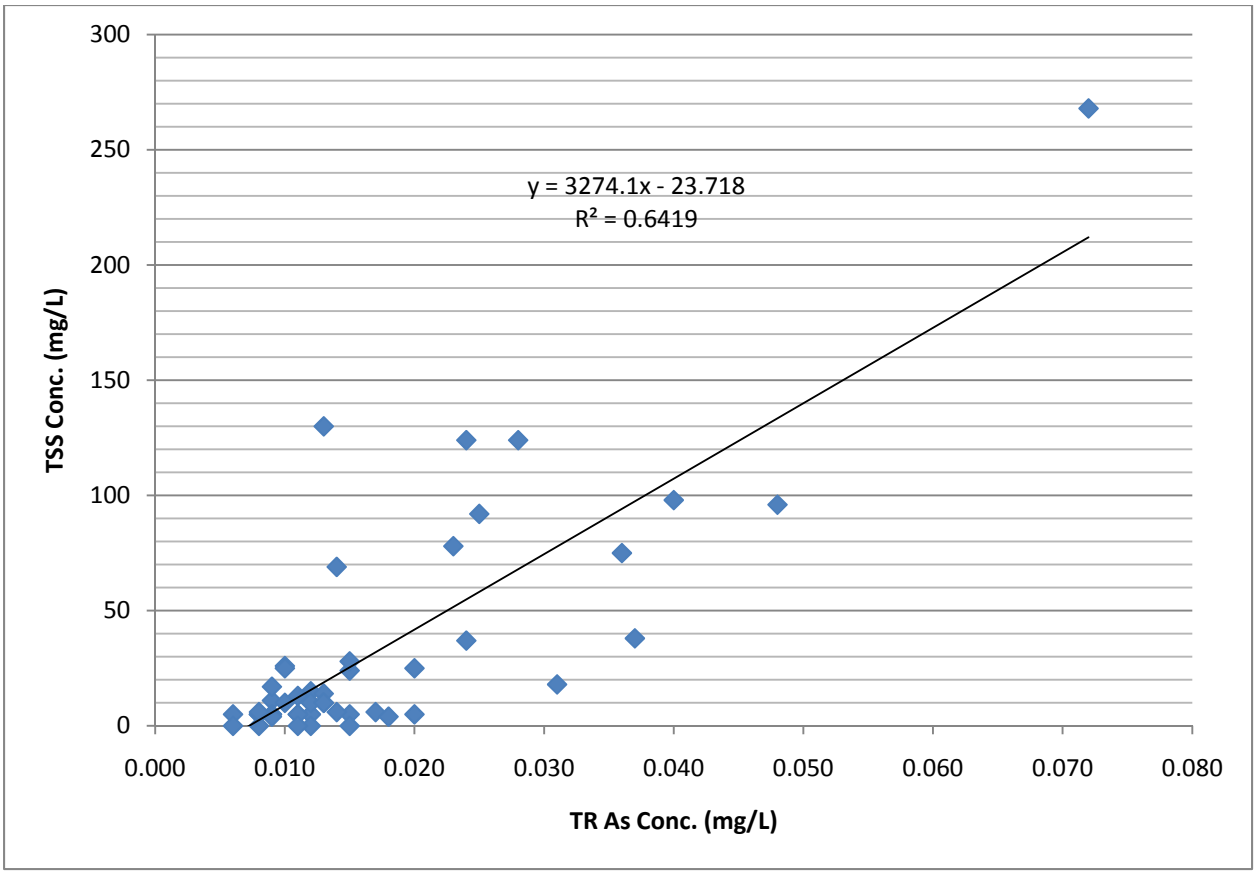

Figure 1-27. Regression analysis of TR arsenic concentration versus TSS concentration at upper Clark Fork monitoring stations during 2010–2011
(all quarterly data pooled).

Table 1-8. Regression analysis results (R-squared values) for TR arsenic concentrations versus TSS concentrations at individual CFROU monitoring stations.*

Clark Fork near Galen	Clark Fork at Deer Lodge	Clark Fork near Garrison
0.6763	0.7725	0.9713
Clark Fork at Gold Creek	**Clark Fork near Drummond**	**Clark Fork at Turah**
0.8135	0.9460	0.0480

**four quarterly monitoring events per year during calendar years 2010–2011.*

1.2.7.2 Cadmium

Concentrations of TR cadmium during 2011 were highest at the Clark Fork at Deer Lodge and Clark Fork near Garrison monitoring stations; concentrations were intermediate and comparable at the SBC at Warm Springs and Clark Fork near Galen, Gold Creek and near Drummond stations; and lowest at the Turah station (Figure 1-28). Total recoverable cadmium concentrations generally decreased in the reaches from above to below the confluences of the Little Blackfoot River (from Garrison to Gold Creek stations) and Rock Creek (from Drummond to Turah stations), presumably due to a dilution effect. Increasing cadmium concentrations from Gold Creek to Drummond observed during 2010 were not evident during 2011. Concentrations of dissolved cadmium were consistently below detection during 2011 monitoring events at

stations from Gold Creek downstream to Turah, and only occasionally detectable at the other four upstream monitoring sites. It can be concluded that most cadmium was present in a sediment-associated state based on the low ratio of dissolved to TR cadmium.

Highest concentrations of TR cadmium at all seven Clark Fork River stations were measured during the second quarter (June) high streamflow monitoring event, with maximum concentrations in 2011 recorded near Garrison (0.00123 mg/L), at Deer Lodge (0.00086 mg/L), and at Gold Creek (0.00059 mg/L). Total recoverable cadmium concentrations during June were several-fold higher than during the other three quarterly monitoring events, except in SBC at Warm Springs where concentrations were seasonally less variable, even during the June runoff event. Lowest concentrations of TR cadmium were found at Turah, below the Rock Creek confluence, except during the second quarter (June) spring runoff monitoring event when lowest TR cadmium concentrations were found at the upper-most monitoring station, SBC at Warm Springs. Concentrations of TR cadmium were below detection at three of the seven Clark Fork monitoring stations during the third quarter (August–September) monitoring event, and below detection at one station (Turah) in the fourth quarter.

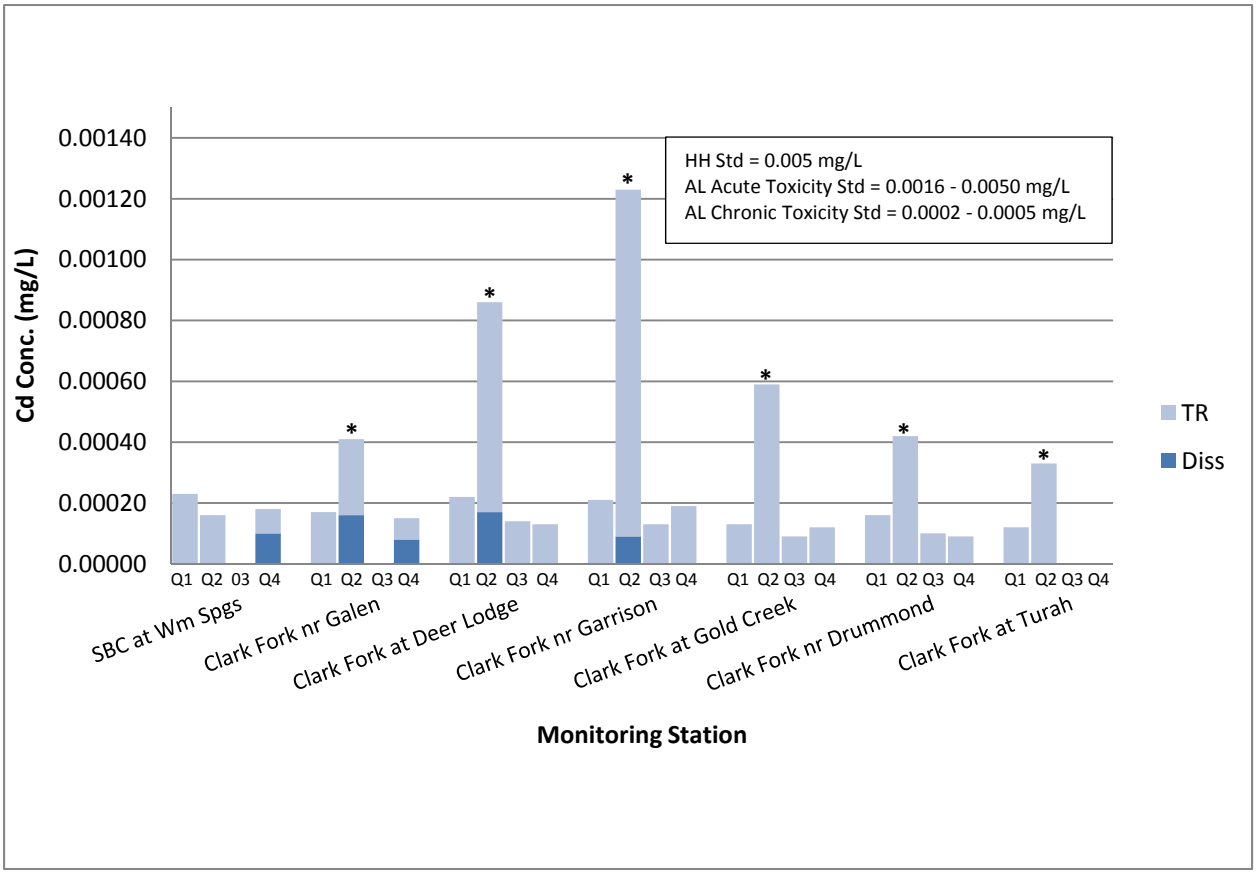

Figure 1-28. TR and dissolved cadmium concentrations in the Upper Clark Fork River during 2011.
(no bars indicate values less than the analytical detection limit). Human health (HH) and aquatic life water quality standards for TR cadmium are shown for reference. Asterisks indicate values exceeding one or more of the standards (see Table 1-9 for details).

TR cadmium concentrations measured during 2011 exceeded the hardness-based aquatic life chronic toxicity standard at six of the seven CFROU monitoring stations during the June spring snowmelt runoff event (Table 1-9). Excursions ranged from about 1.4 to more than 3.6 times

the standard. The SBC at Warm Springs monitoring station was below the aquatic life threshold during all four quarterly monitoring events in 2011. No other 2011 quarterly TR cadmium values exceeded the chronic toxicity threshold, and none of the measured concentrations exceeded the aquatic life acute toxicity or human health standards at the time of sampling. The frequency and magnitude of the aquatic life chronic toxicity standards excursions during 2011 were slightly higher than during 2010, likely due to the very high streamflow conditions in 2011 and its effect on pollutant source inputs and transport.

Table 1-9. Results of 2011 monitoring for cadmium compared to remediation performance standards for the CFROU.

Parameter: TR Cadmium (mg/L)	SBC at Warm Spgs	CFR nr Galen	CFR at Deer Lodge	CFR nr Garrison	CFR at Gold Creek	CFR nr Drummond	CFR at Turah
Q1 (April)	0.00023	0.00017	0.00022	0.00021	0.00013	0.00016	0.00012
Q2 (June)	0.00016	0.00041	0.00086	0.00123	0.00059	0.00042	0.00033
Q3 (Aug–Sept)	ND	ND	0.00014	0.00013	0.00009	0.00010	ND
Q4 (December)	0.00018	0.00015	0.00013	0.00019	0.00012	0.00009	ND

Remedy performance standard attained *ND = Not detected at parameter reporting limit*

aquatic life chronic toxicity performance standard exceeded

Load estimates for TR and dissolved cadmium were determined from the in-stream concentration and daily mean streamflow data, as was done for arsenic (Figure 1-29). Cadmium load estimates showed that the highest rates of TR cadmium transport occurred during runoff conditions in June, most likely in association with high suspended sediment loads. Loading increased in a stepwise fashion from the headwaters at Warm Springs downstream to Gold Creek, followed by a slight decline near Drummond, and a subsequent increase at Turah. Largest apparent increases in cadmium loading during the June monitoring event occurred between the near Galen and Deer Lodge sites (4.4 lbs/day increase), and from near Drummond to Turah (7.9 lbs/day). Spatial patterns in cadmium loading were less distinct at other times of the year. As was mentioned previously under the arsenic loading discussion, between-station differences in metals loading should be interpreted with caution due to potentially rapidly changing in-river conditions and timing of actual monitoring relative to river travel times during any given quarterly monitoring event.

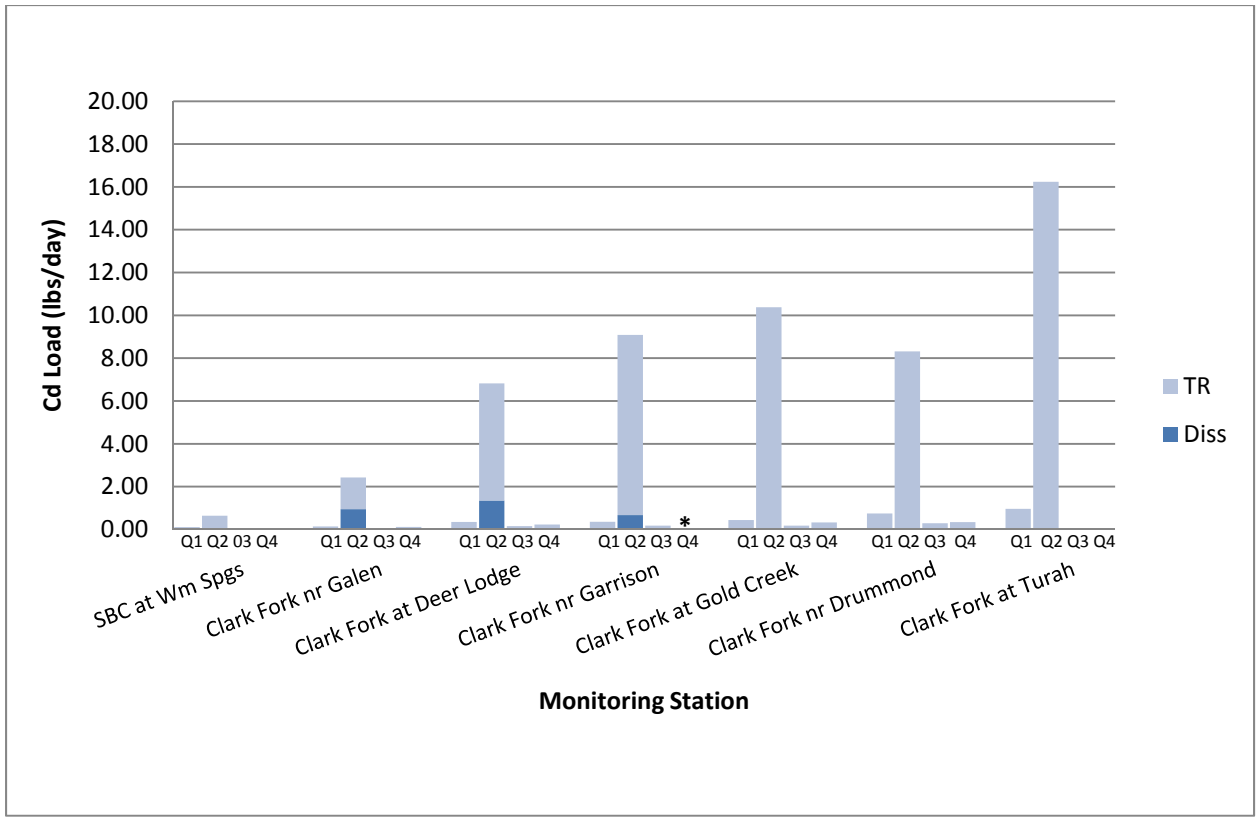

Figure 1-29. TR and dissolved cadmium loads in the Upper Clark Fork River during 2011.
(* = no load data available due to ice at streamflow gauging station).

Similar to arsenic, a regression analysis was performed on paired cadmium and TSS concentration data from six of the seven monitoring stations and for all quarterly 2010–2011 monitoring events (48 data pairs). The regression analysis showed a positive correlation between TR cadmium and suspended sediment, with an R-squared value of 0.84 (Figure 1-30). The 2010–2011 pooled data correlation was slightly weaker than was observed based on only the 2010 dataset (R-squared value of 0.90).

Regressions were also run on the individual motoring station data (eight data pairs for each station) and, like arsenic, the results were highly variable (Table 1-10). Several of the monitoring stations, notably the Clark Fork stations near Drummond, at Gold Creek, and near Garrison, showed very strong correlations between TSS and TR cadmium concentrations (R-squared values of 0.97, 0.97 and 0.93, respectively). The weakest correlation among individual stations' datasets was the Clark Fork near Galen, with an R-squared value of 0.71.

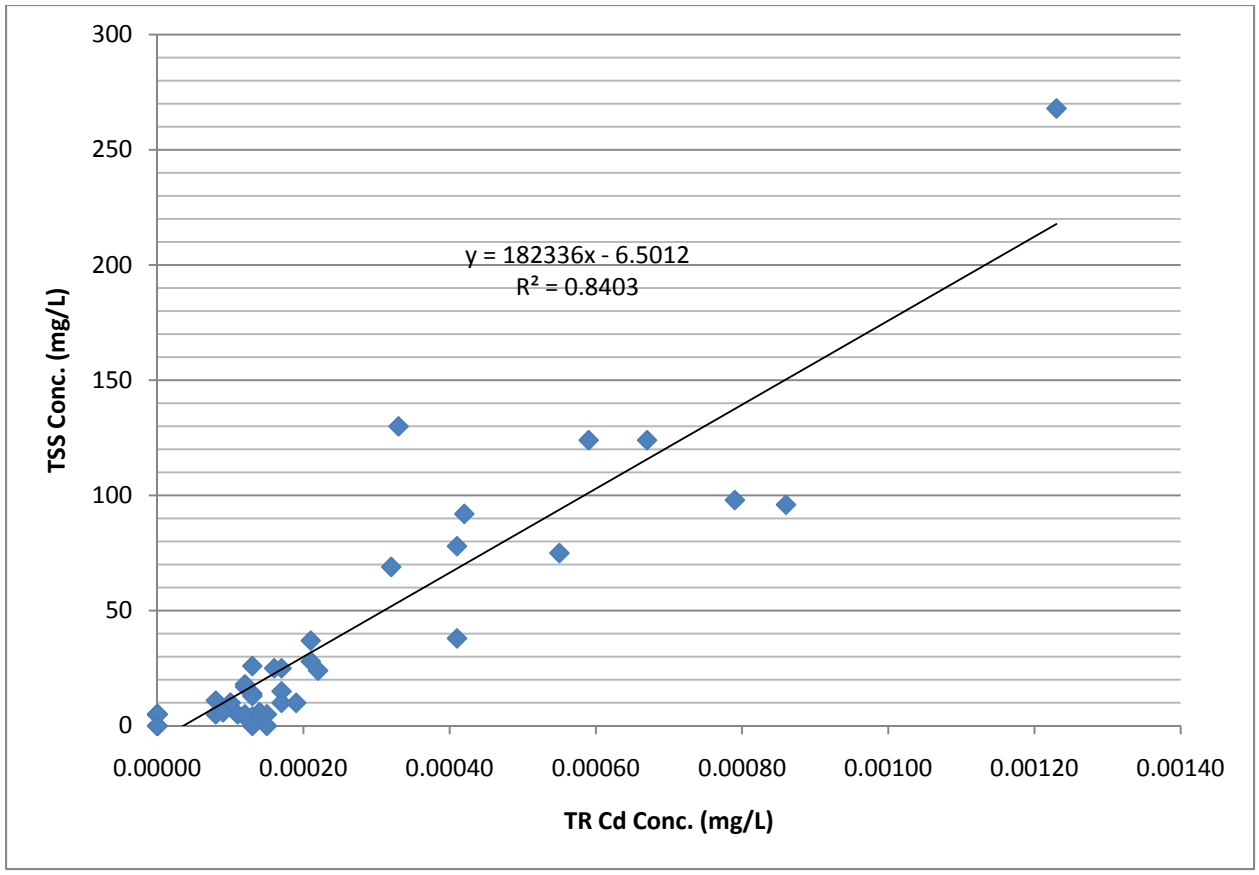

Figure 1-30. Regression analysis of TR cadmium concentration versus TSS concentration at upper Clark Fork monitoring stations during 2010–2011.
(all quarterly data pooled).

Table 1-10. Regression analysis results (R-squared values) for TR cadmium concentrations versus TSS concentrations at individual CFROU monitoring stations.*

Clark Fork near Galen	Clark Fork at Deer Lodge	Clark Fork near Garrison
0.7065	0.8445	0.9337
Clark Fork at Gold Creek	**Clark Fork near Drummond**	**Clark Fork at Turah**
0.9659	0.9683	0.8462

**four quarterly monitoring events per year during calendar years 2010–2011.*

1.2.7.3 Copper

Concentrations of TR and dissolved copper during 2011 were highest at the near Garrison and Deer Lodge stations; intermediate at the Gold Creek, near Drummond, and near Galen stations, and lowest in SBC at Warm Springs and in the Clark Fork at Turah (Figure 1-31). This spatial pattern was similar to that observed in 2010. Total recoverable and dissolved copper concentrations in 2011 increased in the reach of the Clark Fork from near Galen to near Garrison and decreased in the reaches from above to below the confluences of the Little Blackfoot River (from near Garrison to Gold Creek) and Rock Creek (from near Drummond to Turah), presumably due to the effects of dilution. Total recoverable and dissolved copper concentrations were generally static or declined in the reach bracketing the Flint Creek

confluence (Gold Creek to near Drummond), which is similar to the pattern noted for arsenic and cadmium in 2011.

Highest concentrations of TR copper at each station were consistently measured during the second quarter (June) high streamflow monitoring event, with maximum concentrations in 2011 recorded near Garrison (0.303 mg/L), and at Deer Lodge (0.214 mg/L). Total recoverable copper concentrations in the Clark Fork were several-fold higher during the June 2011 monitoring event than during any of the other three quarters. Highest concentrations of dissolved copper at each station mirrored the pattern for TR copper, with peak values consistently found during June, and maximum concentrations noted at Deer Lodge (0.044 mg/L), near Galen (0.025 mg/L), and near Garrison (0.021 mg/L). Lowest concentrations of dissolved and TR copper were found in SBC at Warm Springs and at Turah below the Rock Creek inflow.

Dissolved copper was consistently detectable but not highly variable in the upper Clark Fork River during 2011, especially during the first, third and fourth quarterly monitoring events (Figure 1-31). Most of the copper present during the second quarter (June) monitoring event was associated with sediment, with a low proportion of dissolved copper. During the other quarterly events, dissolved copper accounted for approximately 14 to 80 percent of the copper present. The ratio of dissolved to TR copper was highest in SBC at Warm Springs.

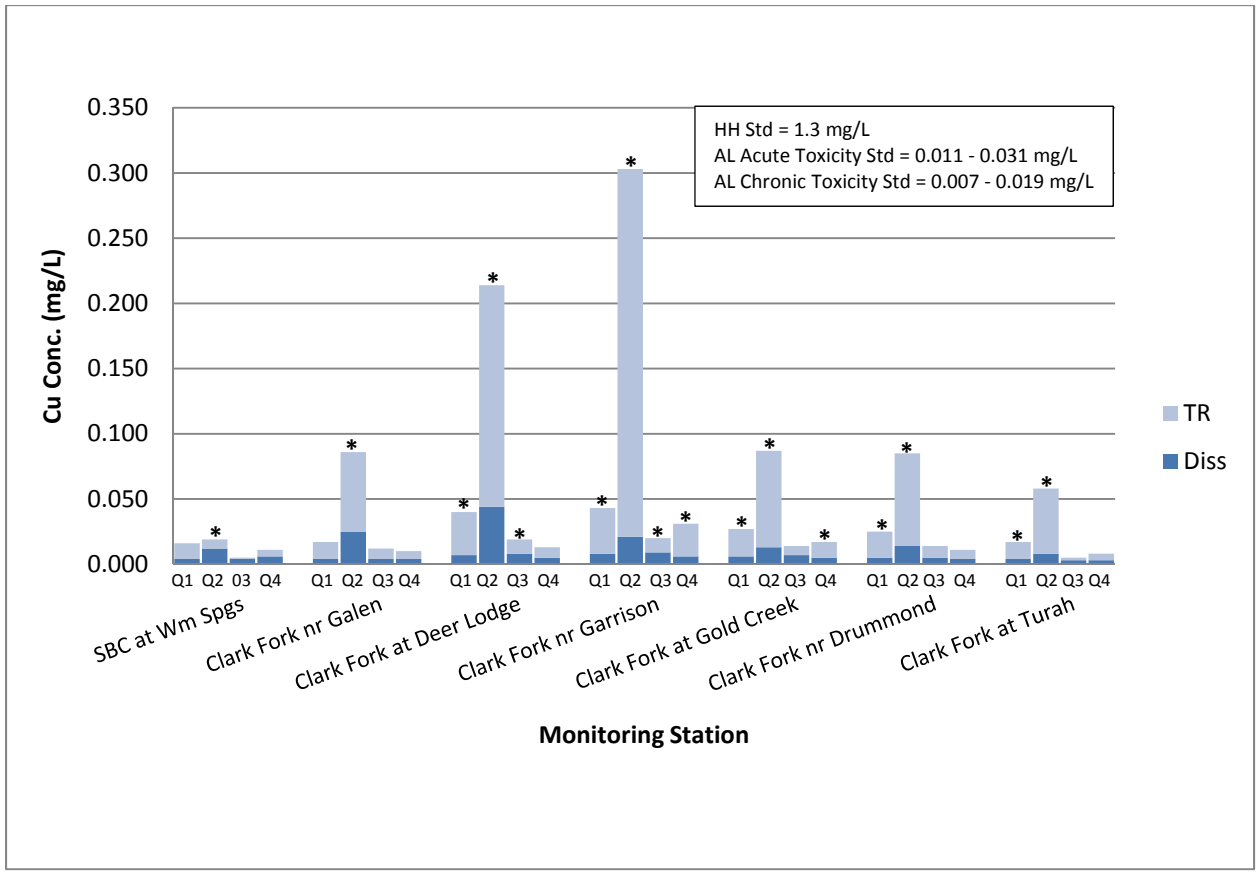

Figure 1-31. TR and dissolved copper concentrations in the Upper Clark Fork River during 2011.
Human health (HH) and aquatic life water quality standards for TR copper are shown for reference. Asterisks indicate values exceeding one or more of the standards (see Table 1-11 for details).

Total recoverable copper concentrations frequently exceeded the hardness-based aquatic life chronic toxicity standard (16 of 28 station measurements) during the 2011 monitoring year (Table 1-11). The aquatic life acute toxicity standard was exceeded in 11 of 24 measurements. This was similar to the copper excursions noted in 2010, when 15 of 24 station measurements exceeded the chronic toxicity standard, and eight of 24 measurements exceeded the acute toxicity standard. Most acute toxicity standards excursions in 2011 occurred during the June monitoring event, when that threshold was surpassed at all seven of the CFROU monitoring stations.

Elevated suspended sediment and associated copper concentrations during peak snowmelt runoff, coupled with lower water hardness due to the dilution effect of the runoff contributed to the higher magnitude June excursions. Exceedances of the aquatic life criteria were also common in early April during the first quarter monitoring event, when five of seven monitoring stations surpassed either the acute (three of seven stations) or chronic (two of seven stations) toxicity threshold. All of the monitoring sites from Deer Lodge to Turah exceeded either the chronic or the acute toxicity aquatic life thresholds during the first and second quarterly monitoring events in each of 2011 and 2010. Total suspended sediment concentrations were typically elevated at Clark Fork monitoring stations during monitoring events that showed excursions of the ALS, and the infrequent occurrences of no standards exceedances were usually associated with low TSS concentrations.

The lowest incidence of ALS violations was during the third quarter (August–September) monitoring event, when two of seven stations (Clark Fork at Deer Lodge and near Garrison) exceeded an aquatic criterion. Among the seven CFROU monitoring stations, the lowest frequency of performance standards excursions was observed at the upper two stations (SBC at Warm Springs and Clark Fork near Galen). None of the measured TR copper values at any station during 2011 exceeded the HH/DW standard.

Table 1-11. Results of 2011 monitoring for copper compared to remediation performance standards for the CFROU.

Parameter: TR Copper (mg/L)	SBC at Warm Spgs	CFR nr Galen	CFR at Deer Lodge	CFR nr Garrison	CFR at Gold Creek	CFR nr Drummond	CFR at Turah
Q1 (April)	0.016	0.017	0.040	0.043	0.027	0.025	0.017
Q2 (June)	0.019	0.086	0.214	0.303	0.087	0.085	0.058
Q3 (Aug–Sept)	0.005	0.012	0.019	0.020	0.014	0.014	0.005
Q4 (December)	0.011	0.010	0.013	0.031	0.017	0.011	0.008

Remedy performance standard attained
aquatic life chronic toxicity performance standard exceeded
aquatic life acute toxicity performance standard exceeded

Load estimates for TR and dissolved copper are presented in Figure 1-32, with the same qualifiers attached as for arsenic and cadmium.

The load data suggest that much of the TR and dissolved copper was transported during runoff conditions in springtime, as was observed for arsenic and cadmium. Total recoverable copper loading for June tended to increase in a stepwise fashion from the headwaters at Warm Springs downstream to near Garrison, followed by a slight decline at the Clark Fork at Gold Creek and near Drummond sites. Peak TR copper loading was noted at the Clark Fork at Turah site. Dissolved copper loading also peaked at Turah during the June 2011 monitoring event. Largest increases in TR copper load during the June monitoring event occurred between Galen and Deer Lodge (1,187 lbs/day), and between Drummond and Turah (1,171 lbs/day increase).

Spatial patterns in copper loading were less distinct at other times of the year, but peak loading rates were always noted at either the Turah or near Drummond monitoring stations. Estimated copper loads during early June 2011 were about twice the loads estimated for early June 2010 at many of the monitoring stations. Loading during the other three quarterly monitoring events of 2011 were comparable to 2010.

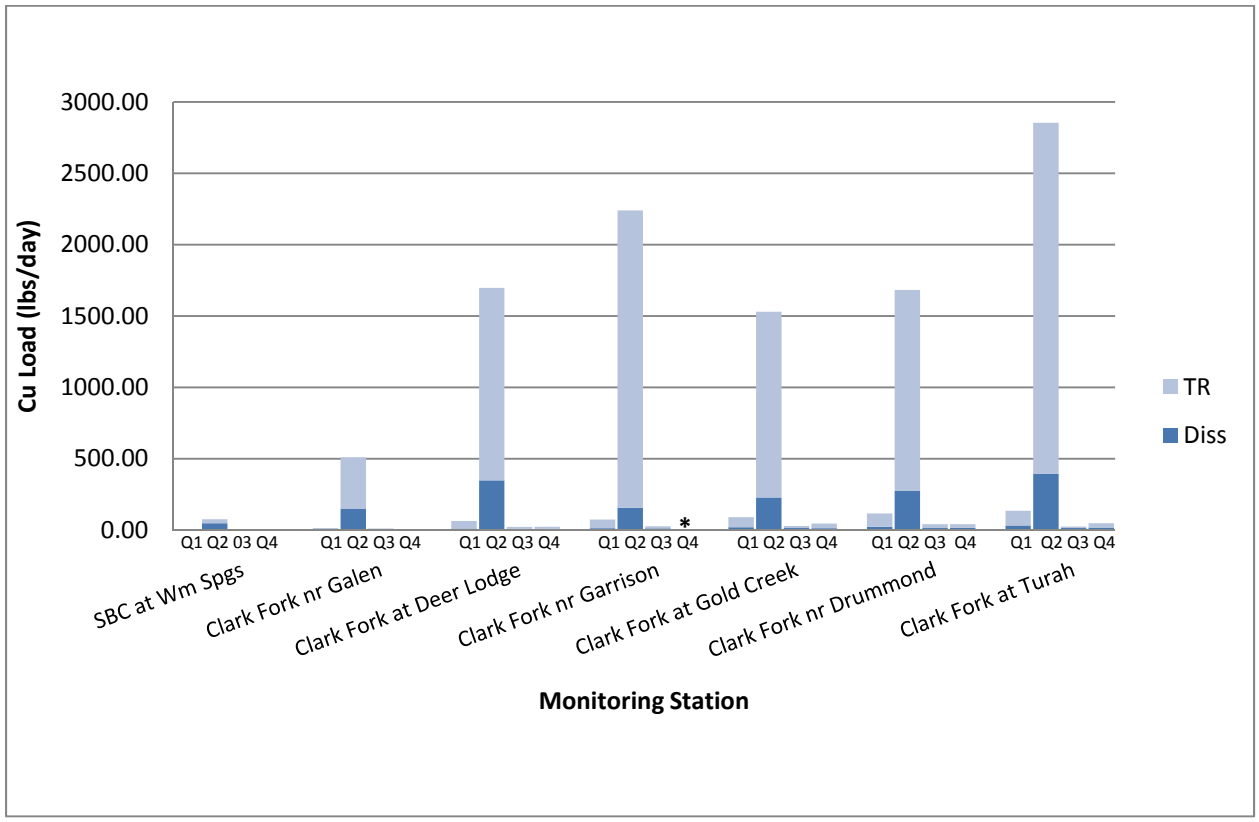

Figure 1-32. TR and dissolved copper loads in the Upper Clark Fork River during 2011.
(* = no load data available due to ice at streamflow gauging station).

Regression analysis was performed on paired TR copper and TSS concentration data from all seven monitoring stations and for all quarterly 2010–2011 monitoring events. The regression analysis showed a fairly strong positive correlation between TR copper and suspended sediment, with an R-squared value of approximately 0.79 (Figure 1-33). This compares to an R-squared value of 0.85 computed for the 2010 dataset only.

Regressions were also run on the individual motoring station data (eight data pairs for each of six stations). The results were less variable than for arsenic and cadmium (Table 1-12). Several of the monitoring stations, notably the Clark Fork stations near Drummond, at Deer Lodge, near Garrison, and near Galen, showed very strong correlations between TSS and TR copper concentrations (R-squared values of 0.99, 0.97, 0.93 and 0.93, respectively). The weakest correlation among individual stations' datasets was the Clark Fork at Gold Creek, with an R-squared value of 0.81.

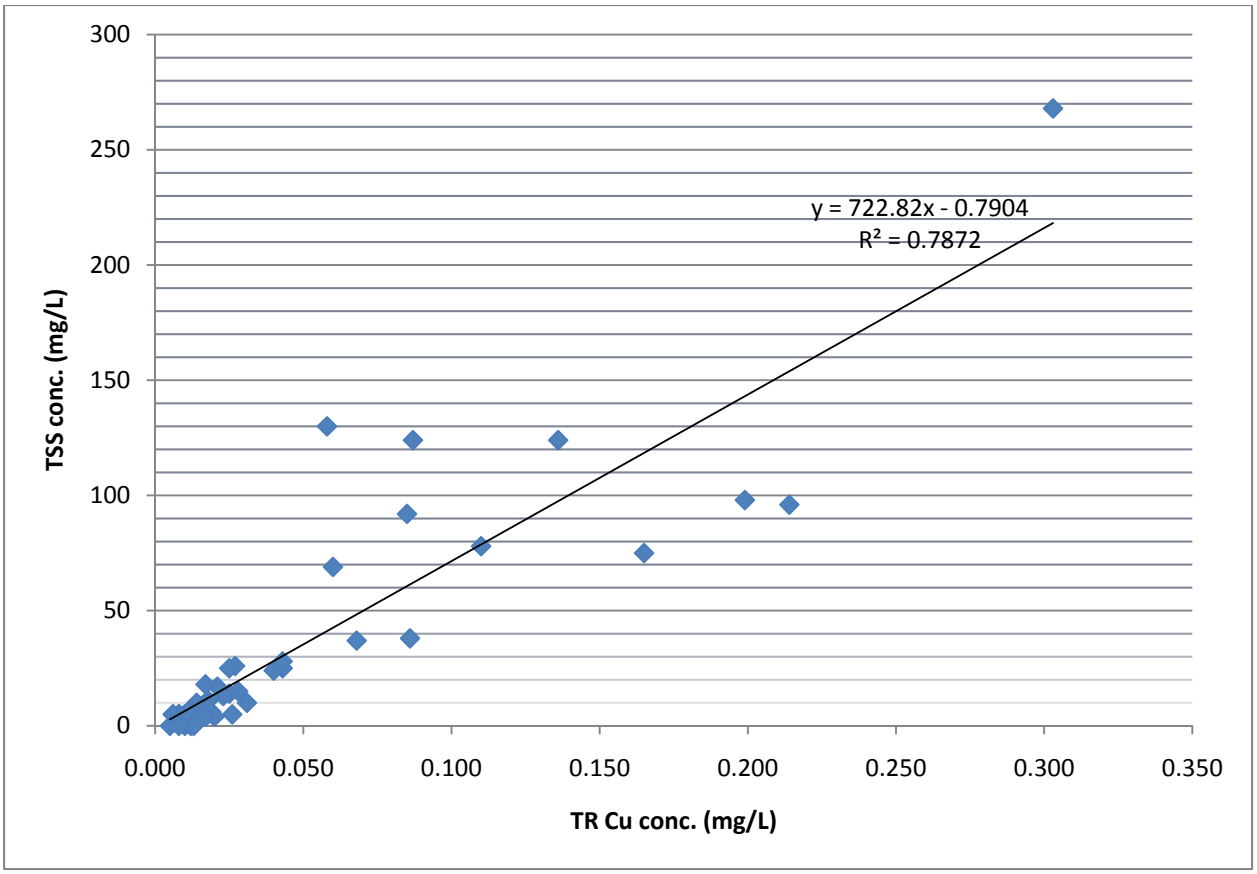

Figure 1-33. Regression analysis of TR copper concentration versus TSS concentration at upper Clark Fork monitoring stations during 2010-2011.
(all quarterly data pooled).

Table 1-12. Regression analysis results (R-squared values) for TR copper concentrations versus TSS concentrations at individual CFROU monitoring stations.*

Clark Fork near Galen	Clark Fork at Deer Lodge	Clark Fork near Garrison
0.9282	0.9729	0.9340
Clark Fork at Gold Creek	**Clark Fork near Drummond**	**Clark Fork at Turah**
0.8086	0.9865	0.8497

**four quarterly monitoring events per year during calendar years 2010-2011.*

1.2.7.4 Lead

Highest average concentrations of TR lead during 2011 were observed at the near Garrison and Deer Lodge monitoring stations; next highest concentrations were noted near Drummond and at Gold Creek; and lowest concentrations were found in SBC at Warm Springs, and in the Clark Fork at Turah and near Galen. The spatial pattern for in-stream concentrations from the headwaters area to Turah showed increasing concentrations downstream to near Garrison, coupled with apparent dilution effects below the Little Blackfoot River and Rock Creek inflows (Figure 1-34). Largest increases in in-stream TR lead concentrations were noted from the near Galen station to the near Garrison station. Highest TR lead concentrations were associated with elevated TSS concentrations. Concentrations of dissolved lead were consistently low, and

only detectable one time in 28 site measurements during 2011, at the uppermost CFROU monitoring site on SBC at Warm Springs.

Highest concentrations of TR lead were consistently measured at each station during the second quarter (June) high streamflow monitoring event, with maximum concentrations in 2011 recorded near Garrison (0.0515 mg/L), at Deer Lodge (0.0263 mg/L) and near Drummond (0.0142 mg/L). Total recoverable lead concentrations at CFROU monitoring stations were several-fold to more than ten-fold higher during the June 2011 monitoring event than during the other three quarters. Lowest concentrations of TR lead were found in the headwaters on SBC at Warm Springs, at Turah and near Galen, as was noted earlier. Second highest concentrations of TR lead during 2011 were measured in the first quarter (April). Total recoverable lead concentration during June 2011 were about two times the values measured in June 2010 at some of the CFROU monitoring stations (near Galen, near Garrison), comparable at other stations (Deer Lodge, Gold Creek and Turah) ,and less than during June 2010 at the Clark Fork near Drummond.

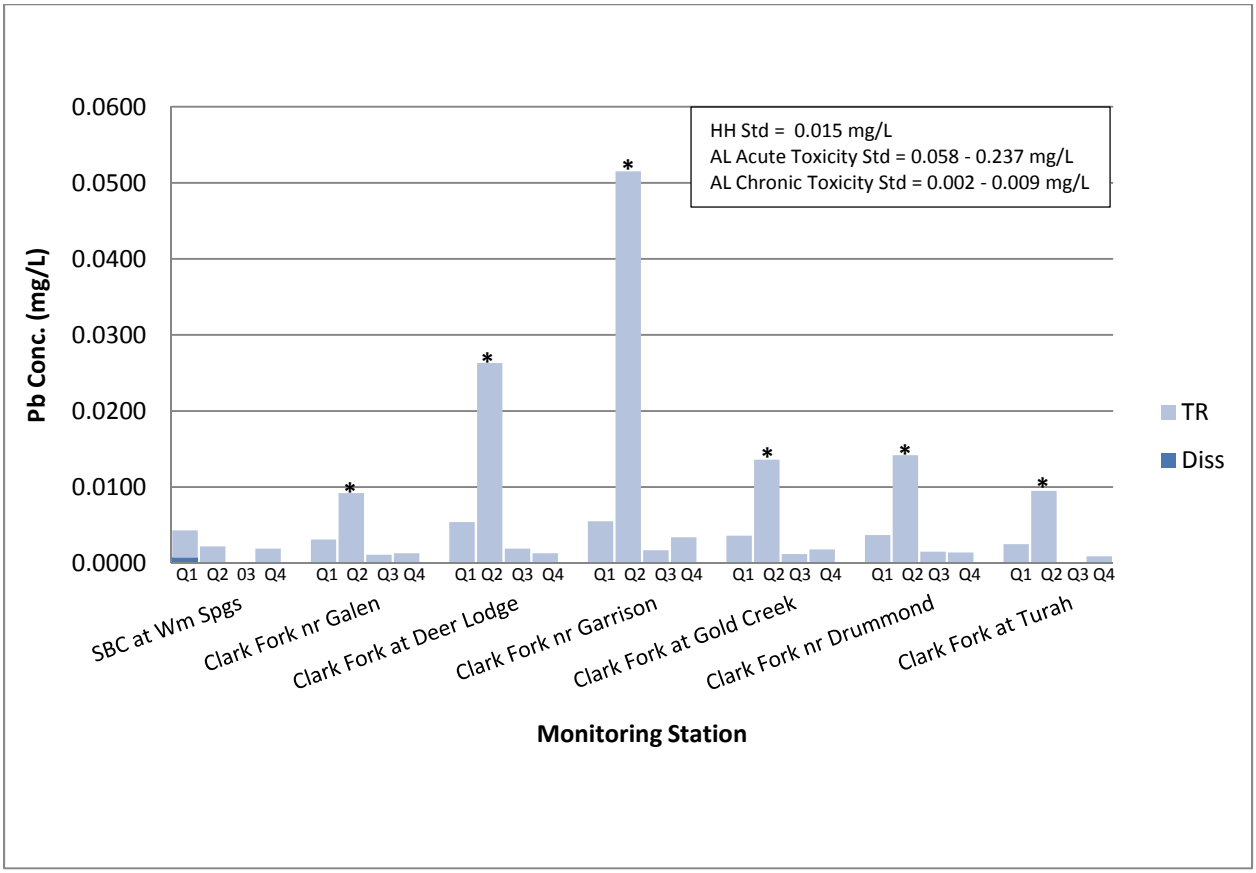

Figure 1-34. TR and dissolved lead concentrations in the Upper Clark Fork River during 2011.
Human health (HH) and aquatic life water quality standards for TR lead are shown for reference. Asterisks indicate values exceeding one or more of the standards (see Table 1-13 for details).

Total recoverable lead concentrations exceeded the hardness-based aquatic life chronic toxicity standard at six of the seven CRFOU monitoring stations during both the June 2011 and June 2010 snowmelt runoff monitoring events. Total recoverable lead concentrations during June also exceeded the HH/DW standard at two of the seven stations in June 2011 (Table 1-13) and at four of six stations in June 2010. During the other three 2011 quarterly monitoring events, none of the stations exceeded a water quality standard for TR lead.

Table 1-13. Results of 2011 monitoring for lead compared to remediation performance standards for the CFROU.

Parameter: TR Lead (mg/L)	SBC at Warm Spgs	CFR nr Galen	CFR at Deer Lodge	CFR nr Garrison	CFR at Gold Creek	CFR nr Drummond	CFR at Turah
Q1 (April)	0.0043	0.0031	0.0054	0.0055	0.0036	0.0037	0.0025
Q2 (June)	0.0022	0.0092	0.0263	0.0515	0.0136	0.0142	0.0095
Q3 (Aug–Sept)	ND	0.0011	0.0019	0.0017	0.0012	0.0015	ND
Q4 (December)	0.0019	0.0013	0.0013	0.0034	0.0018	0.0014	0.0009

Remedy performance standard attained *ND = Not detected at parameter reporting limit*

aquatic life chronic toxicity performance standard exceeded

aquatic life and HH performance standard exceeded

Load estimates for TR and dissolved lead are presented in Figure 1-35. The load data suggest that the only appreciable transport of TR lead was during elevated streamflows, as was noted in June. Estimated TR lead loading in the Clark Fork during June 2011 showed downstream increases from the headwaters at Warm Springs to near Garrison, and from Gold Creek to Turah. Total recoverable lead loads during the second quarter (June) 2011 monitoring event peaked at the Turah monitoring station. Largest inter-station increases in TR lead load during the June 2011 monitoring event occurred between Drummond and Turah (186 lbs/day), Deer Lodge to near Garrison (172 lbs/day), and from near Galen to Deer Lodge (154 lbs/day). Total recoverable lead loads peaked at the near Drummond or Turah stations during the first, third, and fourth quarter monitoring events. Overall TR lead transport was greater in 2011 than in 2010 based on the four quarterly load estimates.

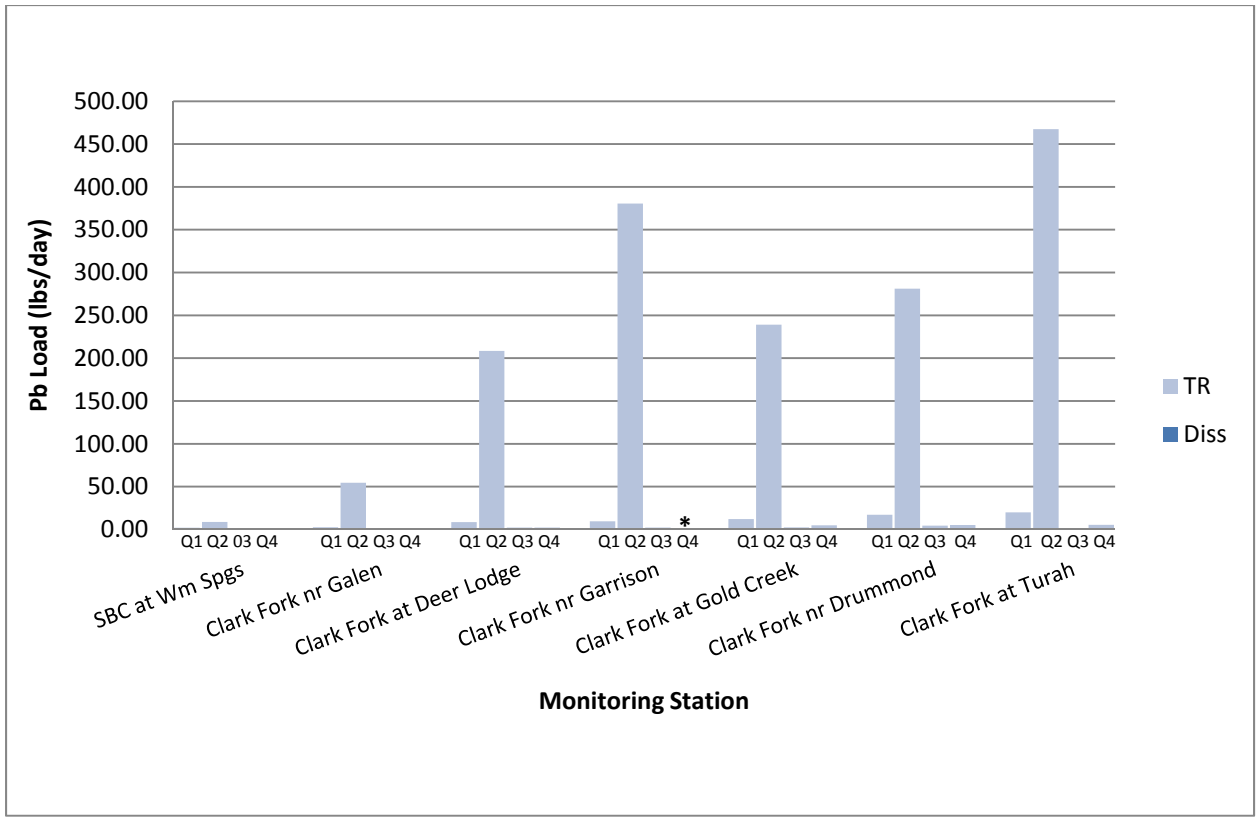

Figure 1-35. TR and dissolved lead loads in the Upper Clark Fork River during 2011.
(* = no load data available due to ice at streamflow gauging station)

The regression analysis performed on paired TR lead and TSS concentration data from all seven CFROU monitoring stations and for all quarterly 2010–2011 monitoring events showed a positive correlation that was similar in significance to zinc and copper. The resulting R-squared value was approximately 0.86 (0.90 calculated from the 2010 dataset alone), suggesting a strong relationship between TR lead and that of suspended sediment (Figure 1-36).

Regressions were also run on the individual monitoring station data (eight data pairs for each of six stations) (Table 1-14). The results were less variable than for TR arsenic and cadmium, and comparable to results for TR copper. Several of the monitoring stations, notably the Clark Fork stations near Drummond, at Deer Lodge, near Garrison, and near Galen showed very strong correlations between TSS and TR lead concentrations (R-squared values of 0.98, 0.97, 0.96 and 0.93, respectively). The weakest correlation among individual stations' datasets was the Clark Fork at Gold Creek, with an R-squared value of 0.84.

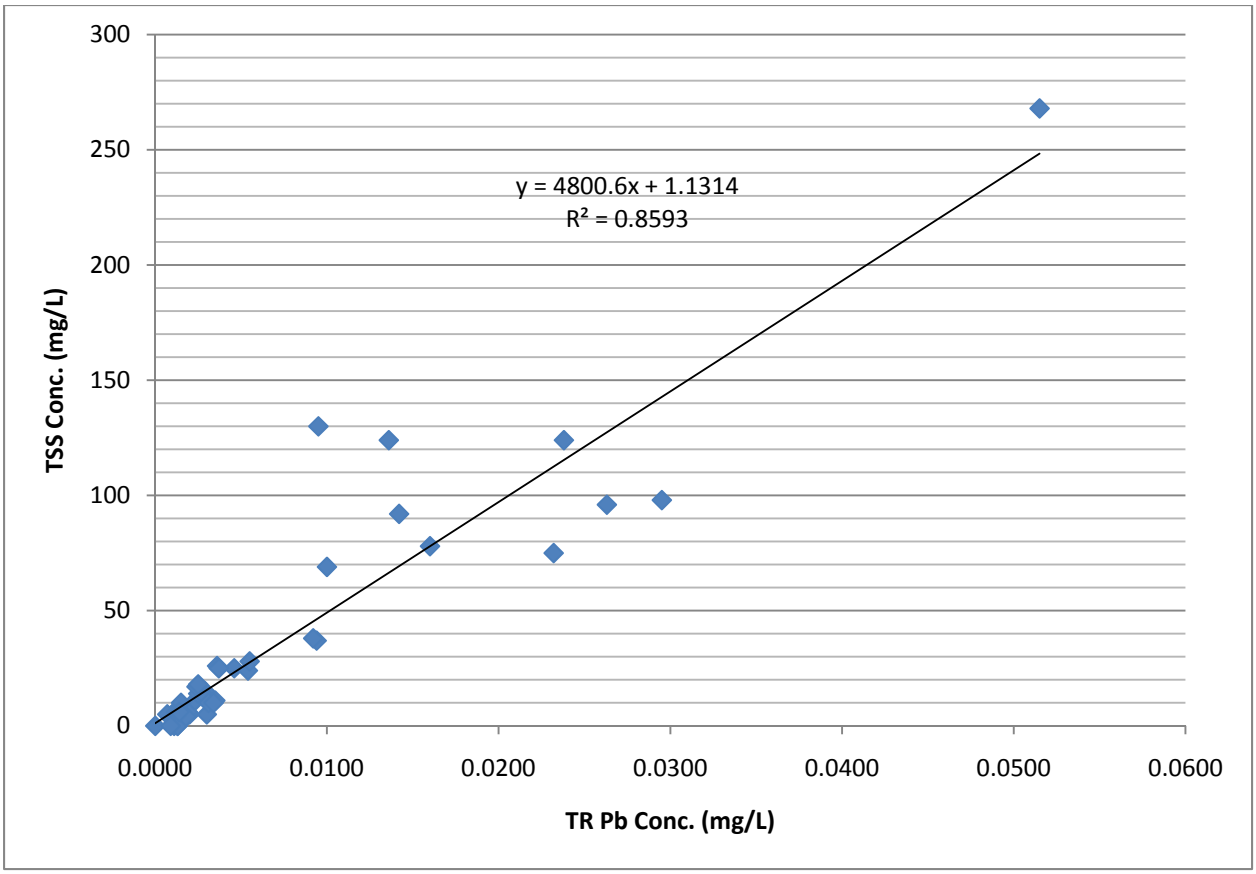

Figure 1-36. Regression analysis of TR lead concentration versus TSS concentration at upper Clark Fork monitoring stations during 2010-2011.
(all quarterly data pooled)

Table 1-14. Regression analysis results (R-squared values) for TR lead concentrations versus TSS concentrations at individual CFROU monitoring stations.*

Clark Fork near Galen	Clark Fork at Deer Lodge	Clark Fork near Garrison
0.9281	0.9677	0.9623
Clark Fork at Gold Creek	**Clark Fork near Drummond**	**Clark Fork at Turah**
0.8420	0.9823	0.8449

**four quarterly monitoring events per year during calendar years 2010-2011.*

1.2.7.5 Zinc

Base flow concentrations of TR zinc ranged from less than the analytical reporting level of 0.010 mg/L to 0.06 mg/L. Highest concentrations of TR zinc were observed during the second quarter snowmelt runoff monitoring event, when concentrations at most stations were several-fold higher than the base flow values (Figure 1-37). Highest mean TR zinc concentrations during 2011 were noted at the near Garrison and Deer Lodge stations in June, with values of 0.25 mg/L and 0.180 mg/L, respectively. Lowest average TR zinc concentrations were observed at the Silver Bow at Warm Springs and Clark Fork near Galen monitoring sites. The spatial trend for TR zinc was one of increasing concentrations from the headwaters area downstream to the near Garrison station, followed by downstream declining concentrations. Apparent dilution effects were noted from above to below the Little Blackfoot River (Gold Creek station) during all

2011 quarterly monitoring events, and from above to below the Rock Creek confluence (Turah station) during the second, third and fourth quarterly monitoring events. The first (April) quarterly monitoring event at the Turah station produced an unusually high TR zinc value (0.06 mg/L), which was the highest concentration measured at any of the seven CFROU monitoring sites during that event and showed no dilution benefit from Rock Creek.

Concentrations of dissolved zinc were detectable at some stations during some monitoring events, but consistently made up a small proportion of the TR zinc present. It was clear from the 2011 and 2010 monitoring data that most zinc is present in the upper Clark Fork in a sediment-associated state.

Overall, TR and dissolved zinc concentrations were comparable in each of 2011 and 2010, but peak concentrations in June 2011 at the near Garrison and Deer Lodge monitoring sites were slightly higher than those measured in June 2010.

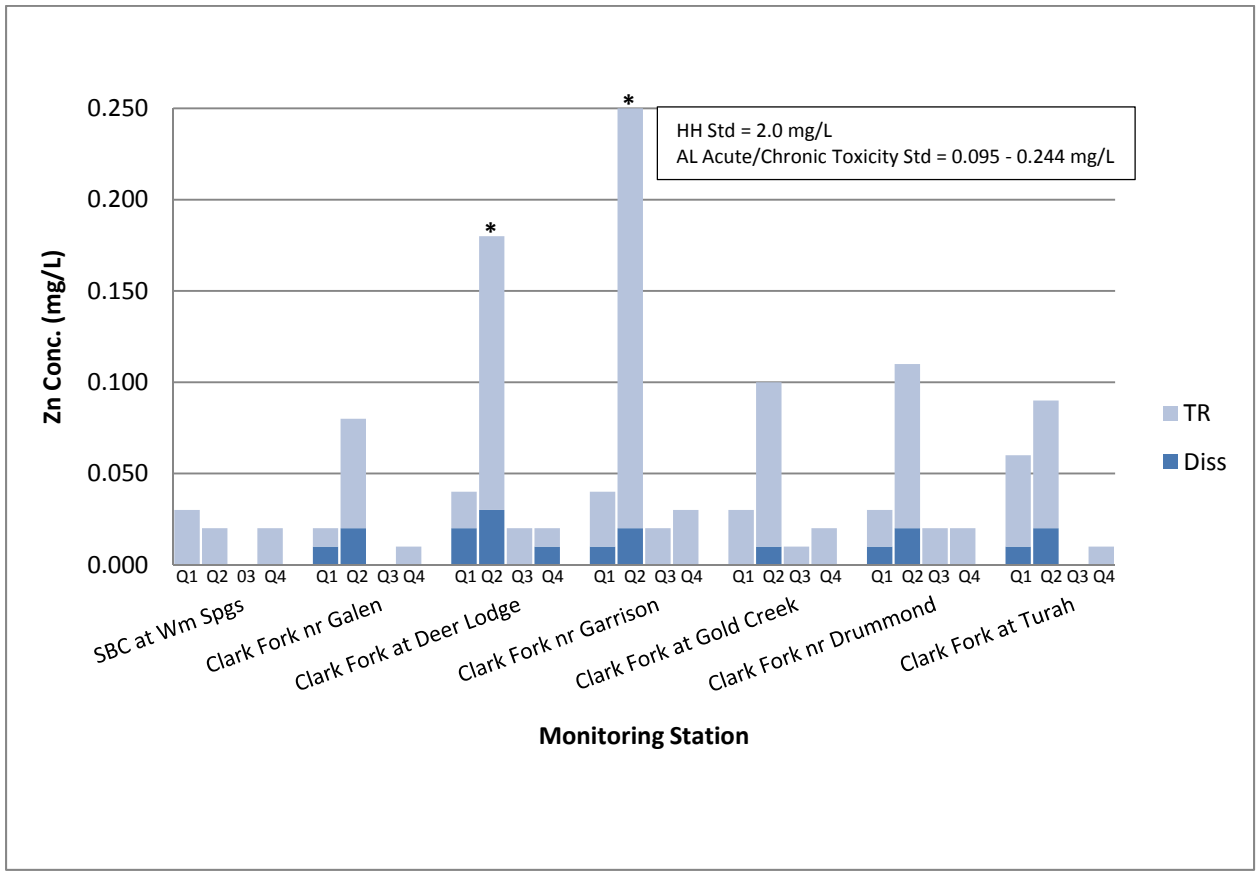

Figure 1-37. TR and dissolved zinc concentrations in the Upper Clark Fork River during 2011. **(no bars indicate values less than the analytical detection limit). Human health (HH) and aquatic life water quality standards for TR zinc are shown for reference. Asterisks indicate values exceeding one or more of the standards (see Table 1-15 for details).**

Total recoverable zinc concentrations measured during 2011 exceeded the hardness-based aquatic life acute and chronic toxicity standard at two of the seven CFROU monitoring stations (two of 28 site measurements) during the June spring snowmelt runoff event (Table 1-15). Excursions ranged from 115 percent to 161 percent of the standard and were noted at the Deer Lodge and near Garrison sites, respectively. No other 2011 TR zinc values exceeded the aquatic life thresholds, and none of the measured concentrations exceeded the HH/DW standards at the time of sampling. Total recoverable zinc excursions during 2010 were

comparably infrequent, with two of 24 site measurements exceeding the aquatic life toxicity standard in June. The monitoring sites near Garrison and near Drummond showed the excursions in 2010.

Table 1-15. Results of 2011 monitoring for zinc compared to remediation performance standards for the CFROU.

Parameter: TR Zinc (mg/L)	SBC at Warm Spgs	CFR nr Galen	CFR at Deer Lodge	CFR nr Garrison	CFR at Gold Creek	CFR nr Drummond	CFR at Turah
Q1 (April)	0.03	0.02	0.04	0.04	0.03	0.03	0.06
Q2 (June)	0.02	0.08	0.18	0.25	0.10	0.11	0.09
Q3 (Aug–Sept)	ND	ND	0.02	0.02	0.01	0.02	ND
Q4 (December)	0.02	0.01	0.02	0.03	0.02	0.02	0.01

Remedy performance standard attained *ND = Not detected at parameter reporting limit*

aquatic life acute toxicity performance standard exceeded

Load estimates for TR and dissolved zinc are presented in Figure 1-38. Similar to other metals, the data suggested that most of the TR zinc load was transported during spring snowmelt runoff conditions, in association with elevated suspended sediment transport at that time of the year. Total recoverable zinc loading in the Clark Fork during June 2011 showed more or less consecutive downstream increases from the headwaters at the SBC at Warm Springs monitoring station to the Clark Fork at Turah monitoring station. Largest increases in TR zinc load during the June 2011 monitoring event occurred between the near Drummond and Turah monitoring stations (2,250 lbs/day), between the near Galen and Deer Lodge stations (953 lbs/day), Deer Lodge to Garrison (420 lbs/day), and Gold Creek to near Drummond (419 lbs/day). Spatial patterns in TR zinc loading during the first, third, and fourth quarter 2011 monitoring events were similar to the second quarter (though much smaller), with peak loads measured at the near Drummond or Turah monitoring sites. Missing streamflow data for the near Garrison station during the fourth quarter 2011 monitoring date prevented a complete assessment of fourth quarter zinc loads. Zinc loading during 2011 was comparable to loading estimates for the 2010 quarterly monitoring events with the exception of the Turah station, which showed much higher zinc loads in June 2011 compared to June 2010.

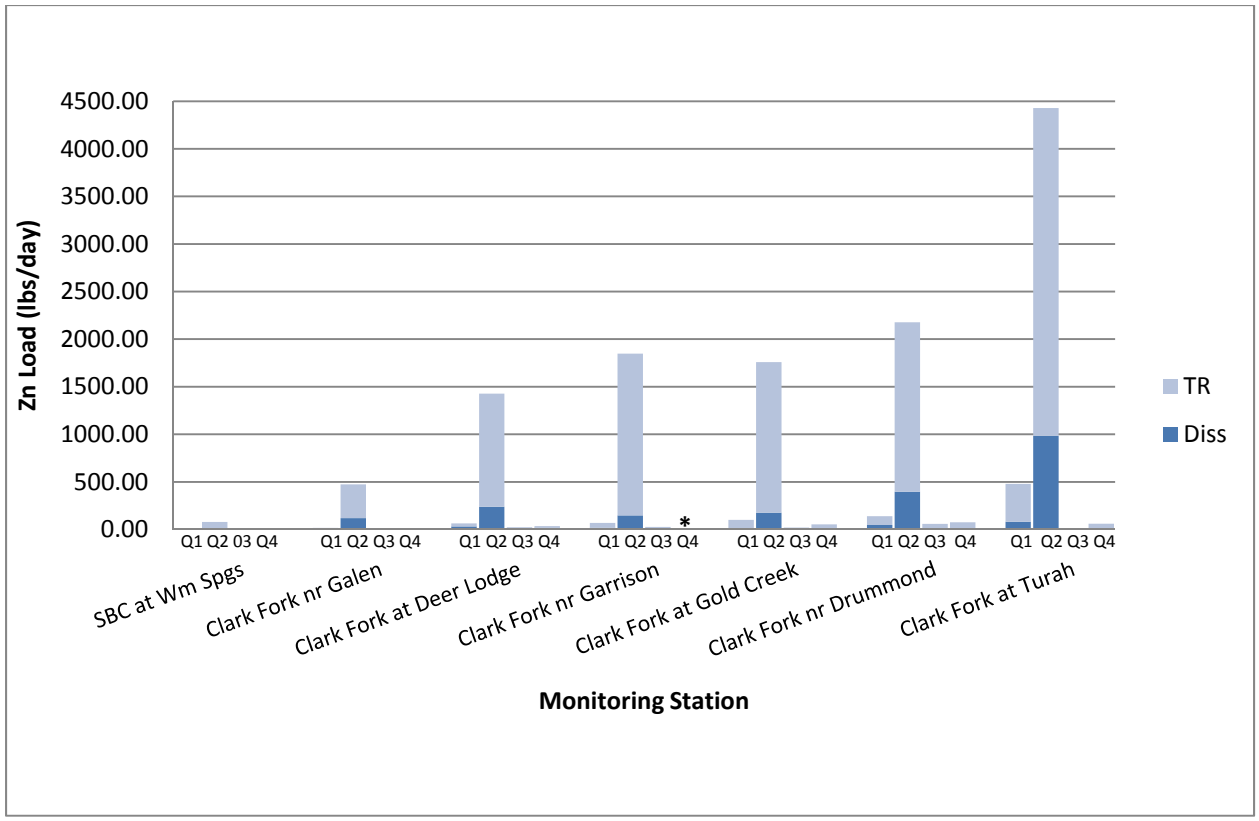

Figure 1-38. TR and dissolved zinc loads in the Upper Clark Fork River during 2011.
(* = no load data available due to ice at streamflow gauging station).

The regression analysis performed on paired TR zinc and TSS concentration data from all six monitoring stations and for all quarterly 2010–2011 monitoring events showed a reasonably strong positive correlation with an R-squared value of approximately 0.86. The regression analysis for the 2010 data pairs only showed a stronger correlation, with an R-squared value of 0.96. In both cases, the results suggested a reasonably predictable relationship between TR zinc and suspended sediment concentrations in the upper Clark Fork River based on the 2010–2011 datasets (Figure 1-39). Regressions were also run on the individual motoring station data for 2010–2011 (eight data pairs for each of six stations) (Table 1-16). The results were more conclusive than for the pooled data. Several of the monitoring stations, notably the Clark Fork stations near Drummond, near Garrison, and at Deer Lodge, showed very strong correlations between TSS and TR zinc concentrations (R-squared values of 0.99, 0.94, and 0.94, respectively). The weakest correlation among individual stations' datasets was the Clark Fork at Turah, with an R-squared value of 0.77.

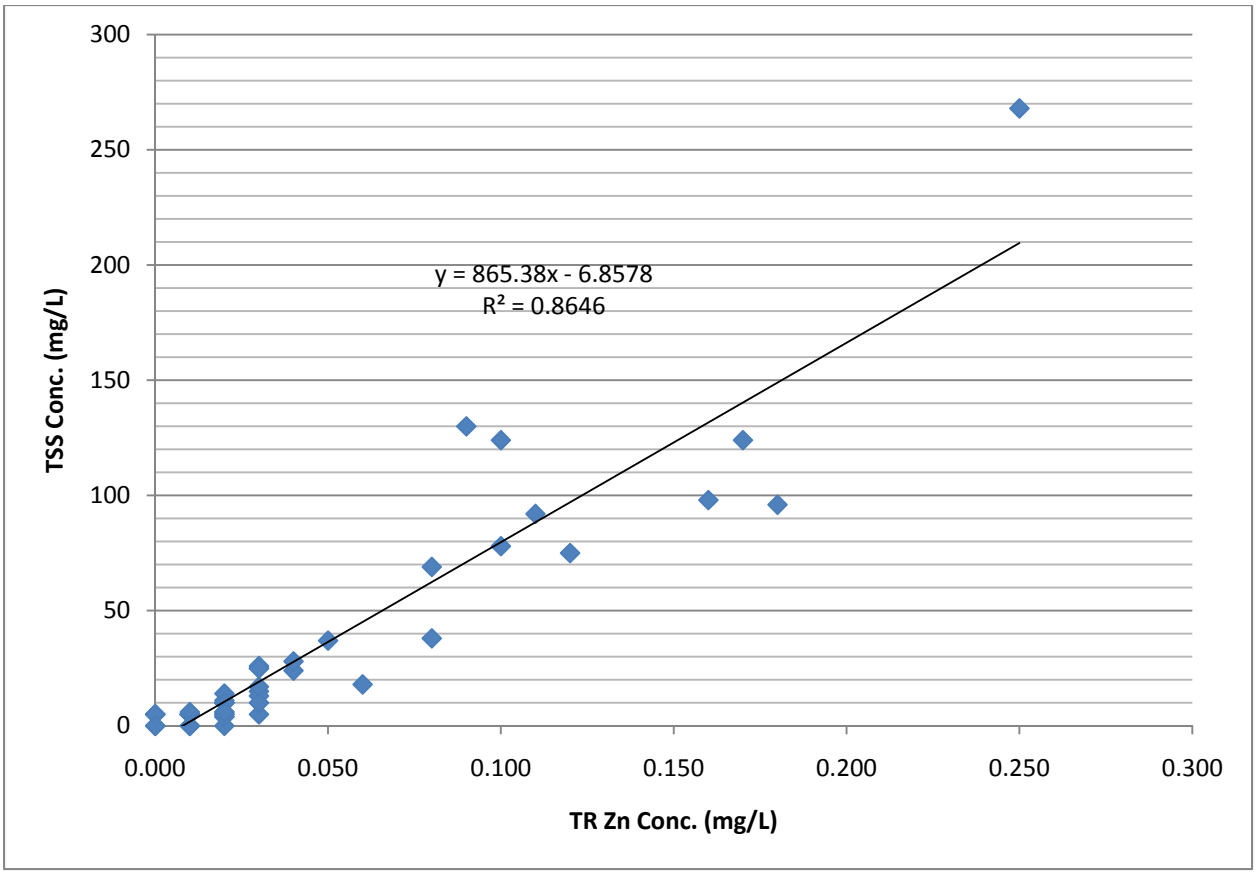

Figure 1-39. Regression analysis of TR zinc concentration versus TSS concentration at upper Clark Fork monitoring stations during 2010-2011.
(all quarterly data pooled).

Table 1-16. Regression analysis results (R-squared values) for TR zinc concentrations versus TSS concentrations at individual monitoring stations.*

Clark Fork near Galen	Clark Fork at Deer Lodge	Clark Fork near Garrison
0.8786	0.9382	0.9426
Clark Fork at Gold Creek	**Clark Fork near Drummond**	**Clark Fork at Turah**
0.8965	0.9873	0.7673

**four quarterly monitoring events per year during calendar years 2010-2011.*

1.3 Conclusions

The CFROU remedy is intended to remove threats to human health and the environment posed by mining-related contaminants within the floodplain of the upper Clark Fork. To date, remedial measures have not been implemented within the operable unit. Thus, this second year monitoring report represents an assessment of pre-remediation conditions present during the 2011 calendar year. Comparisons are also made to the initial 2010 monitoring year.

1.3.1 Data Validation

All data derived from laboratory analysis of surface water collected during 2011 at upper Clark Fork River locations were validated through field quality control samples, as well as laboratory control samples. Field duplicate sample analysis results were within acceptable limits for all

chemical parameters and suspended sediment during all quarters of 2011, with the exception of one sediment total lead result. Dissolved zinc was detected in filtered field blank samples during the first and second quarters at levels twice the reporting limit, and TSS was measured at four times the limit in the field blank collected during the second quarter; associated data was flagged. Data quality objectives (representativeness, comparability and completeness) were met, and data quality indicators (sensitivity, precision, bias and accuracy) were acceptable during all quarters of 2011, as established in the CFROU Long-Term Monitoring Plan (Appendix A).

1.3.2 Streamflow Conditions/Representativeness

Concentrations of sediment, metals and other pollutants in the Clark Fork are strongly tied to streamflows. Streamflows for each of the seven permanent Clark Fork monitoring stations were determined from USGS streamflow gauging station records for co-located sites.

First quarter surface water quality monitoring was conducted at each of seven permanent upper Clark Fork River monitoring locations on April 12 and 13, 2011. Monitoring occurred during early spring streamflow conditions that were slightly above average compared to long-term median daily flows for those dates. Second quarter monitoring was performed on June 7 and 8, 2011 during high spring runoff conditions, a rising hydrograph, and near seasonal peak flows. The June 2011 monitoring event represented well above average streamflows for that period. Third quarter monitoring was completed over four days from August 30 through September 2 with streamflows again above normal levels for the period. Lastly, the fourth quarter monitoring event was conducted on December 1 and 2, 2011 during normal to above normal flow conditions, depending on the individual monitoring station. Overall, 2011 was a much wetter-than-normal year, with predominantly higher streamflows than during the 2010 monitoring year. Very high flows in June, and a protracted snowmelt runoff period that continued well into July, strongly influenced (increased) pollutant concentrations and loading rates in 2011, especially during the second quarterly monitoring event.

1.3.3 Field Parameters

Field measurement parameters, including water temperature, pH, specific conductance, and DO, showed seasonally appropriate conditions reflecting generally cold, well oxygenated, neutral pH, and moderately mineralized waters that would not be expected to preclude any designated beneficial water uses, including cold water fisheries. Field parameter measurements were generally similar in both 2011 and 2010. One 2011 pH measurement at the newly added monitoring site on SBC at Warm Springs was outside (above) the range of measurement values observed in 2010 with a pH of 9.25. Lime additions to the Warm Springs Ponds system was the suspected cause of the single high value. Conductivity values in 2011 were slightly lower overall than in 2010 due to predominantly higher streamflows and more dilution of dissolved solids.

Turbidity measurements made during the third and fourth quarters of 2011 and 2010 were comparable and generally quite low. First quarter 2011 turbidity measurements (turbidity was not measured in the first quarter of 2010) were somewhat elevated at many CFROU stations, suggesting the influence of ice effects on streambanks and streambeds during a colder than normal winter. Second quarter, June 2011 turbidity readings were very high, and surpassed measurements taken during the June spring snowmelt runoff period in 2010. Localized cleansing effects of some tributary inflows on turbidity levels in the Clark Fork, notably the Little Blackfoot River and Rock Creek, were evident in both June 2011 and 2010. Highest turbidity values were recorded at the near Garrison monitoring station in both years.

1.3.4 Suspended Sediment

Total suspended sediment was highly correlated with concentrations of TR cadmium, copper, lead and zinc in the upper Clark Fork during each of the 2011 and 2010 monitoring years. The relationship was particularly strong for CFROU monitoring stations near Drummond, near Garrison, and at Deer Lodge. TSS concentrations followed the same temporal pattern as for turbidity, with somewhat elevated levels during the early spring monitoring event, very high levels during spring snowmelt runoff in June, and generally very low concentrations during the late summer and winter monitoring events. TSS concentrations were an order of magnitude higher during the early June second quarter 2011 monitoring event than at any other time of the year. Spatial trends in TSS concentrations showed the most significant inter-station increases in the reach from Deer Lodge to near Garrison, followed by dilution influences downstream from the Little Blackfoot River and Rock Creek inflows during many, but not all, of the monitoring events. TSS concentrations at CFROU monitoring stations during the first, third and fourth quarters of 2011 were very comparable to values recorded for those quarters in 2010, but second quarter 2011 TSS concentrations were much higher than second quarter 2010 values.

Load estimates for TSS suggested that much of the annual suspended sediment load was transported during the spring snowmelt runoff hydrograph. TSS loading in early June far surpassed loading during any of the other three quarterly events, and generally increased from the headwaters at Warm Springs downstream to the Turah monitoring station. Largest increases in TSS loading between monitoring stations during June 2011 were in the reach between the Deer Lodge and near Garrison stations, and from near Drummond to Turah. June 2011 TSS concentrations were frequently two to four times higher than during the same period in 2010.

1.3.5 Common Ions

Analysis of common cations and anions in the upper Clark Fork during 2011 showed a predominantly calcium bicarbonate water type, with appreciable but declining concentrations of sulfate anion from the headwaters to Turah. Water hardness contributed by calcium and magnesium ions was classified as hard to very hard, except during snowmelt runoff. Lower water hardness during the second quarter monitoring event contributed to a greater frequency and magnitude of metals excursions. Alkalinity tended to increase with distance from the headwaters area at Warm Springs, coupled with localized reductions below the Little Blackfoot River and Rock Creek inflows. Concentrations of calcium, magnesium, alkalinity and sulfate during 2011 were slightly lower overall than during the 2010 monitoring year due to the presence of higher streamflows and associated dilution.

1.3.6 Algal Nutrients

Monitoring for algal nutrients was added to the CFROU monitoring program beginning in the first calendar quarter of 2011. Primary nutrient variables of concern in the upper Clark Fork included ammonia, nitrate plus nitrite nitrogen, TN, and TP. The assessment of 2011 nutrient monitoring results included: 1) comparisons of TN, nitrate plus nitrite nitrogen, and TP concentrations to criteria designed to prevent nutrient enrichment/nuisance algae problems in surface waters; 2) examination of spatial patterns for nitrogen and phosphorus loads in SBC and the upper Clark Fork as indicators of nutrient sources; and 3) evaluation of ammonia concentrations in relation to pH and water temperature-dependent ammonia toxicity water quality standards for the protection of aquatic life.

Compared to the Clark Fork water quality standards, which apply only to the summertime period, concentrations of TN exceeded the TN standard only at the SBC at Warm Springs and Clark Fork near Galen monitoring stations. Technically, the standards do not apply to SBC.

Concentrations of nitrate plus nitrite nitrogen did not exceed MDEQ's recommended threshold value of 0.10 mg/L during the summer 2011 period. Summertime exceedances of the Clark Fork TP water quality standard were observed at four of the seven monitoring stations, including SBC at Warm Springs and at the Clark Fork near Galen, Gold Creek, and near Drummond monitoring stations. Ammonia nitrogen concentrations were consistently below the analytical reporting level at all CFROU monitoring stations during all of the four quarterly 2011 monitoring events and did not exceed either of the aquatic life chronic or acute toxicity thresholds.

Total nitrogen concentrations during lower flow periods tended to be highest in SBC and in the segment of the Clark Fork from Deer Lodge to Gold Creek. Lowest TN concentrations were observed at Turah below the Rock Creek confluence. Very high TN concentrations were noted in the Clark Fork near Galen during peak spring runoff conditions in June, which was most likely attributable to agricultural nonpoint source runoff. Total phosphorus concentrations during lower flow periods were highest in SBC, and tended to be similar throughout much of the Clark Fork within the CFROU. Lowest TP concentrations were observed at Turah below the Rock Creek confluence. Highest TP concentrations were noted in the Clark Fork near Garrison during peak spring runoff conditions in June, which also corresponded to the highest measured TSS concentration.

The highest rates of TN and TP transport (loads) occurred during spring runoff conditions in June, likely as a result of cumulative nonpoint source inputs throughout the upper Clark Fork watershed. The general spatial trend for TN and TP loading during all four quarterly monitoring events was an incremental downstream increase. A very large increase in TN load was noted within the segment of the Clark Fork from Deer Lodge to Gold Creek during the fourth quarter (December) monitoring event. Largest non-runoff season increases in TP load were noted within the segment of the Clark Fork from near Garrison to Gold Creek, and from Gold Creek to near Drummond. Possible sources of TN and TP loading within the CFROU include, but are not limited to, agricultural nonpoint sources, groundwater inputs, natural geologic sources, and municipal wastewater discharges from the communities of Butte (via SBC), Warm Springs, Deer Lodge, and Drummond.

1.3.7 Contaminants of Concern

Primary COCs in the upper Clark Fork included TR and dissolved arsenic, cadmium, copper, lead and zinc. The 2011 quarterly monitoring data for each of these contaminants were assessed for spatial and temporal trends in in-stream concentrations; apparent relationships between dissolved and TR concentrations; the timing and locations of aquatic life and human health performance standards excursions; spatial and temporal patterns for estimated in-stream loads; and relationships of TR metals to suspended sediment through regression analysis.

Spatial trends for TR and dissolved arsenic, cadmium, copper, lead and zinc generally showed the highest concentrations at the near Garrison and Deer Lodge monitoring stations, especially during the spring snowmelt runoff monitoring event. Highest concentrations of dissolved arsenic tended to be found in the headwaters area at the SBC at Warm Springs and Clark Fork near Galen stations. Metals sources responsible for increasing concentrations were primarily apparent in the reaches of river between Galen and Garrison. Metals concentrations generally decreased in the reaches from above to below the confluences of the Little Blackfoot River (at Gold Creek) and Rock Creek (at Turah), presumably due to a dilution effect. Lowest concentrations of metals were observed in SBC at Warm Springs (copper and zinc) or in the Clark Fork at Turah (arsenic, cadmium and lead).

The highest concentrations of TR metals were measured during the second quarter (June) high streamflow monitoring event. Metals concentrations in the Clark Fork during the June 2011

monitoring event were an order of magnitude higher than during the other three quarters. Highest concentrations of TR arsenic, cadmium, copper, lead and zinc during the June 2011 event were measured near Garrison. Second highest concentrations of TR metals during June were observed at Deer Lodge.

A majority of the measureable cadmium, copper, lead and zinc in the upper Clark Fork was present in the sediment-associated form during all four of the 2011 quarterly monitoring events. Arsenic was present in a predominantly dissolved form at all of the seven monitoring stations, except during the June runoff monitoring event when more than half of the arsenic at some stations was present as sediment-associated, non-dissolved forms. Arsenic at the upper-most monitoring station, SBC at Warm Springs, and to a slightly lesser extent in the Clark Fork near Galen, was consistently present in a largely dissolved phase. Concentrations of dissolved cadmium were commonly below detection during 2011 monitoring events, thus most cadmium was present in a sediment-associated state.

First quarter (April) 2011 monitoring results showed excursions of aquatic life performance standards for copper (five of seven stations) and of human health performance standards for arsenic (five of seven stations). Other metals were not problematic during the first quarter monitoring event.

Second quarter (June) 2011 high water monitoring showed a high frequency of excursions of aquatic life performance standards, including copper (seven of seven stations), cadmium and lead (six of seven stations each), and zinc (two of seven stations). Frequent occurrences of HH/DW standards excursions were noted for arsenic (seven of seven stations) and lead (two of seven stations). The greater frequency and magnitude of aquatic toxicity excursions during the June 2011 monitoring event was attributable to increased metals pollutant loading associated with spring snowmelt runoff and rain coupled with reduced water hardness (and hence lower toxicity thresholds) due to runoff-induced dilution. A comparison of the dissolved to TR metals concentrations indicated that most metals during the June 2011 event were present in the particulate, sediment-associated state. Total suspended sediment concentrations at some stations were 10-fold higher in June 2011 than during the initial April 2011 monitoring event.

Third quarter (August–September) 2011 monitoring showed a low frequency of excursions of aquatic life performance standards for copper only (two of seven stations). Frequent occurrences of HH/DW standards excursions were again noted for arsenic (six of seven stations). The lower frequency and magnitude of aquatic toxicity excursions during the August–September monitoring event was attributable to reduced metals pollutant loading associated with lower seasonal streamflows (but higher than normal for August–September) coupled with elevated water hardness and associated higher toxicity thresholds. A comparison of the dissolved to TR metals concentrations indicated that a much higher percentage of most metals during the August–September 2011 event were present in the dissolved state when compared to the June runoff event. TSS concentrations in the third quarter 2011 were consistently low.

Fourth quarter (December) 2011 monitoring showed excursions of aquatic life chronic toxicity performance standards for copper (two of six stations) and of HH/DW standards for arsenic (four of six stations). The frequency and magnitude of arsenic HH/DW standards excursions was lower than during each of the three previous 2011 quarterly monitoring events. The frequency and magnitude of copper aquatic toxicity excursions during the December monitoring event was lower than during the first quarter (April) and second quarter (June) 2011 monitoring events, but the magnitude was slightly higher than during the third quarter (August–September) monitoring event.

Of the seven CFROU monitoring stations, the stations near Garrison and at Deer Lodge showed the highest frequency of metals excursions (11 and 10 individual excursions, respectively); the

Clark Fork near Galen and Gold Creek stations ranked second (seven excursions each), and the Clark Fork near Drummond and at Turah ranked third (six excursions each). The monitoring station on SBC at Warm Springs showed the fewest excursions of metals performance standards in 2011, with five individual metals exceedances.

Overall, TR and dissolved metals concentrations at CFROU monitoring stations during the first, third and fourth quarters of 2011 were comparable to those measured during 2010, but peak concentrations measured in June 2011 were generally higher than those measured in June 2010.

Spatial and temporal patterns in in-stream metals loads suggested that much of the TR and dissolved arsenic, cadmium, copper, lead and zinc was transported during runoff conditions in June, most likely in association with suspended sediment. Loading for most of these metals in the upper Clark Fork during June showed downstream increases from the headwaters area at Warm Springs to near Garrison (arsenic, copper, lead, zinc) or Gold Creek (cadmium), and again from Gold Creek to Turah (all subject metals). Spatial patterns in metals loading were less distinct at other times of the year, although peak loads tended to be seen at Turah or near Drummond.

Largest increases in TR arsenic, cadmium, lead and zinc loads during the second quarter (June) monitoring event occurred between the near Galen and Deer Lodge stations (arsenic and copper) or from near Drummond to Turah (cadmium, lead, and zinc). Second largest increases in arsenic and lead loading were noted in the reach from Deer Lodge to near Garrison. As mentioned earlier in this report, between-station differences in metals loading should be interpreted with caution due to potentially rapidly changing in-river conditions and timing of actual monitoring relative to river travel times.

Regression analysis of TR metals concentrations versus TSS concentrations showed positive relationships for zinc (R-squared value of 0.86), lead (R^2 value of 0.86), cadmium (R^2 value of 0.84), copper (R^2 value of 0.79), and a weaker relationship for arsenic (R^2 value of 0.64). When individual station metals and TSS data pairs were examined, regression results were much stronger with R-squared values for all metals attaining values of 0.95 to 0.99 at some monitoring stations. Total suspended sediment versus metals correlations were particularly strong at the Clark Fork near Drummond, near Garrison, and Deer Lodge monitoring stations.

2.0 IN-STREAM SEDIMENT MONITORING

No specific remediation performance standards have been established for metals concentrations found in in-stream sediments in the Clark Fork River. However, it is recognized that the mobilization and transport of contaminated sediments originating from streambank erosion, overland flow, and re-suspension of deposited in-channel sediment are pathways for contamination of surface water, and aquatic and riparian resources. Extensive data collected in Clark Fork River bed sediments show that concentrations of contaminants vary considerably in space and time due to streambed and streambank erosion and deposition of streambed material that occurs naturally. Generally, metal and arsenic concentrations are three to five times higher in the fine grained fractions of the sediment than in the bulk fractions. Sediments from riffle areas have also been investigated and concentrations of metals were found to be 30 to 40 percent lower in these areas than in depositional areas. Additionally, copper concentrations in streambed sediments decrease as grain size increases (Montana DOJ, 2007).

Remediation goals have been established for in-stream sediments in SBC upstream of the CFROU. It is anticipated that attainment of remediation goals for SBC, coupled with planned remedial actions within the CFROU to remove tailings deposits, curtail streambank erosion, and enhance overall riparian integrity, will contribute to significant reductions in metals concentrations in in-stream sediments in the Clark Fork River. As such, monitoring of in-stream sediments has been included as a component of the Clark Fork monitoring strategy. Numeric standards have not been developed for metals contamination associated with streambed sediments. Currently, the SBC remediation goals for in-stream sediments match the consensus-based sediment quality guidelines that were developed by freshwater ecologists (MacDonald et al., 2000).

The sediment quality guidelines include TECs and PECs. Both of these reference the effects of metals on sediment-dwelling organisms, and thus provide a basis for predicting the effects of metals concentration on aquatic life. Threshold of effect concentrations are concentrations below which no effect on sediment-dwelling organisms are expected, whereas PECs are the concentrations at which negative effects on sediment-dwelling organisms are judged more likely to occur than not.

The TEC and PEC goals developed for SBC have been adopted as guidelines for interpreting in-stream sediment concentration data within the CFROU. Table 2-1 summarizes the TEC and PEC thresholds by COC.

From a management standpoint, stream sediments are unlike surface water in that they typically have a longer residence time. Water moves into and out of the remediation reach of the Clark Fork River fairly rapidly. This can cause wide variations in water quality over short time periods. Sediment moves much more slowly, and contamination in sediment can have lasting effects on water quality and aquatic life.

In-stream sediment samples are collected and analyzed with the goal of preventing exposure of humans and aquatic species to sediments having concentrations of contaminants in excess of the published risk-based reference concentrations. Trends towards attainment of the guidelines shown in Table 2-1 are expected to improve the quality of fine-grained in-stream sediments in the Clark Fork River system with eventual full attainment of coldwater fishery and associated aquatic life use-support goals.

While there are no mandated contaminant concentration goals for in-stream sediments in the Clark Fork River, the remediation and restoration goal will be considered fully attained when all analytes monitored at a site are below the guidelines shown in Table 2-1, or are at background concentrations for at least three consecutive years.

Table 2-1. In-stream sediment contaminant goals for the CFROU.

Parameter	Primary Contaminant	TEC1	PEC2
Arsenic	X	9.79	33.0
Cadmium	X	0.99	4.98
Copper	X	31.6	149
Lead	X	35.8	128
Zinc	X	121	459

1. TEC per MacDonald et al. 2000.
2. PEC per MacDonald et al. 2000.

2.1 Methods

In-stream sediment was collected from seven monitoring stations in SBC and the upper Clark Fork on one occasion during the third quarter (September) 2011 surface water monitoring event. The sediment sampling locations are the same seven stations monitored for surface water quality described in Section 0and shown in Figure 1-1.

Sample collection was obtained by compositing subsamples from at least five wadeable deposition zones at each monitoring location. Sediment was scooped from the streambed with a non-metallic spoon and/or turkey baster following MDEQ's standard operating procedure, SOP WQPBWQM-020 (Revision 2, 2005). Each composite sample was wet sieved in the laboratory shortly after collection into three sediment particle size fractions: silts and clays (less than 0.065 mm), fine sands (0.065–1 mm) and coarse sands (1–2 mm). Samples for the three size fractions were analyzed for total concentrations of arsenic, cadmium, copper, lead and zinc, and the relative proportion by weight of each of these three fractions (i.e., the sediment gradation) was reported for each stream sediment sample collected in 2011. Sediment samples were analyzed by Energy Laboratories, Inc. in Helena, Montana following methods shown in Table 2-2.

Table 2-2. Stream sediment analytes and methods, 2011.

Parameter	Category	Method
Total Arsenic (mg/kg)	Contaminants of Concern	SW6010B
Total Cadmium (mg/kg)		SW6010B
Total Copper (mg/kg)		SW6010B
Total Lead (mg/kg)		SW6010B
Total Zinc (mg/kg)		SW6010B

Sediment metals concentrations are reported for each of the three size classes of sediment less than 2 mm, and as a weighted mean concentration for the three size classes together. Comparisons to the TEC and PEC goals are made primarily on the basis of the weighted mean concentrations, which is consistent with the reporting methodology adopted for the SBC monitoring program. Weighted mean concentrations are determined by a) calculating the weighted concentration for each sediment size class, b) summing them, and c) dividing the total by the total percentage of the sample that was contributed by the three size classes of sediment less than 2 mm. Weighted concentrations for each size class are calculated by multiplying the reported sediment metals concentration values by the reported fraction, by weight, for that particular size class.

The relationship of the percent of sediment which is less than 2 mm as compared to the whole sample in 2011 samples is included in Table 2-3. Samples which contain a higher percentage of sediments less than or equal to 2 mm may be more susceptible to metals contamination due to the affinity of metals to smaller particle sizes. Table 2-3 illustrates a general pattern of downstream increases in percent fines (less than or equal to 2 mm size classes) observed at the network of CFROU monitoring stations in 2011, especially from the headwaters to the Garrison area. Percent fines at stations from near Garrison to Turah did not vary by a large margin.

Table 2-3. Percent of total sediment sample less than or equal to 2 mm in 2011.

Station	Percent
SS-25, SBC at Warm Springs	23.3
CFR-03A, Clark Fork near Galen	67.8
CFR-27H, Clark Fork at Deer Lodge	81.9
CFR-42G, Clark Fork near Garrison	99.4
CFR-53C, Clark Fork at Gold Creek	95.6
CFR-84F, Clark Fork near Drummond	97.1
CFR-116A, Clark Fork at Turah	100.0

Intra-site variability in sediment concentrations was analyzed by the collection of one duplicate sample per sampling event. The relative percent differences (RPDs) between duplicate samples for each metal and sediment size class ranged from 0 to 54 percent, with an overall average difference for all metals and all sediment size classes of 18 percent. This level of sampling precision for sediment samples was lower than in the first year of sampling in 2010, when the range was from 0 to 15 percent and the average was 6 percent. The higher RPDs between duplicate sediment samples in 2011 was strongly influenced by larger differences in analytical results for metals in the largest sediment size class, particularly lead (54.1 RPD) and copper (39.7 RPD). Differences in results for the smallest sediment size classes (less than 0.065 mm) ranged from 2.1 to 20.9 percent and averaged 9.9 percent. Duplicate sample results for the intermediate sediment size class (0.065–1 mm) ranged from 0 to 26.9 percent and averaged 12.5 percent. The largest sediment size class showed an RPD range of 11.9 to 54.1 percent and averaged 32.5 percent. Increasing variability with increasing sediment particle size is not unexpected.

Variability in sediment metals concentrations at any given monitoring site can be attributed to the influences of complex channel morphology and depositional processes, which can influence the distribution of the sample across the respective size fractions. Table 2-34 illustrates the distribution of the 2011 sediment samples among the three sediment particle size classes that were analyzed for metals.

As shown, sediment sample fractionation can vary widely from sample to sample. This is most noticeable from monitoring site to site, but is also true of samples collected from the same site at different times, and in duplicate samples collected at the same site during the same monitoring event. As mentioned above, this high variability has an effect on reported sediment metals concentrations because COC concentrations are not consistent across sediment size fractions. The smaller size fractions have larger surface area to volume ratios and larger ion exchange capacity, and are capable of adsorbing larger concentrations of COC metals. It is not unusual for the smallest sediment size fraction tested (less than 0.065 mm) to yield metals concentration values that are an order of magnitude or more higher than the largest (1–2 mm)

sediment size fraction. These effects combine to increase the variability of COC concentration in stream sediment.

Table 2-4. Distribution of 2011 CFROU sediment samples among three size classes of fine sediment.*

Station	Q3		
	< 0.065 mm	0.065–1 mm	1–2 mm
SS-25, SBC at Warm Springs	0.6	14.8	7.9
CFR-03A, Clark Fork near Galen	5.4	47.0	15.4
CFR-27H, Clark Fork at Deer Lodge	2.0	48.7	31.2
CFR-42G, Clark Fork near Garrison	9.8	88.3	1.3
CFR-53C, Clark Fork at Gold Creek	16.4	74.0	5.2
CFR-84F, Clark Fork near Drummond	6.0	76.6	14.5
CFR-116A, Clark Fork at Turah	4.6	94.8	0.6

**percent of size class, by weight, of sediment ≤ 2 mm.*

2.2 Results and Discussion

Concentrations of total arsenic, cadmium, copper, lead, and zinc in three size classes of stream bottom sediments (less than 0.065 mm, 0.065–1 mm, 1–2 mm), together with weighted mean concentration values, for each of the seven Clark Fork monitoring stations during 2011 are shown in Figure 2-1 through Figure 2-5. The graphs also include the relevant TEC and PEC from the monitoring plan. Weighted mean sediment metals concentrations at each monitoring station in relation to the TEC and PEC threshold values are summarized in Table 2-5 through Table 2-9. Spatial and temporal patterns in sediment metals concentrations, and comparison of results to reference values, are discussed in the following sections. It should be noted that the previously mentioned high natural variability in sediment metals concentrations at CFROU stations is likely to be a significant factor influencing the apparent spatial and temporal trends, and monitoring results should be interpreted with caution.

2.2.1 Arsenic

Sediment arsenic concentrations were highest in the smallest sediment size fraction (less than 0.065 mm) and lowest in the largest size class (1–2 mm) at four of seven monitoring stations (Figure 2-1). The distribution of arsenic among the three sediment size classes was less predictable at the remaining three stations. Arsenic was highest in the largest (1–2 mm) sediment size class at the near Galen and near Garrison stations, with the 2011 values being several-fold higher than values recorded in September 2010. With the exception of the high arsenic values in the 1–2 mm sediment size class near Galen and near Garrison, the overall spatial trend for sediment arsenic concentrations was a downstream decrease in concentration in most sediment size classes from the headwaters near Galen downstream to Turah (Figure 2-1). Arsenic concentrations in the smallest sediment fraction at the near Drummond station showed a slight increase from the upstream station at Gold Creek. Excluding the high arsenic values in the 1–2 mm sediment size class near Galen and near Garrison, the 2011 sediment arsenic values were generally within the range of values seen in 2010.

Weighted mean concentrations of total arsenic exceeded the arsenic TEC threshold at all stations, but only marginally so at Turah (Figure 2-1 and Table 2-5). Total arsenic concentrations in the smallest size fraction of sediment exceeded the TEC value at all monitoring stations during 2011 by several fold. Total arsenic concentrations in the smallest size fraction of sediment exceeded the PEC threshold at all stations from SBC to near Garrison,

and again at the near Drummond station. Weighted mean sediment arsenic concentrations exceeded the PEC value only at the near Galen monitoring site.

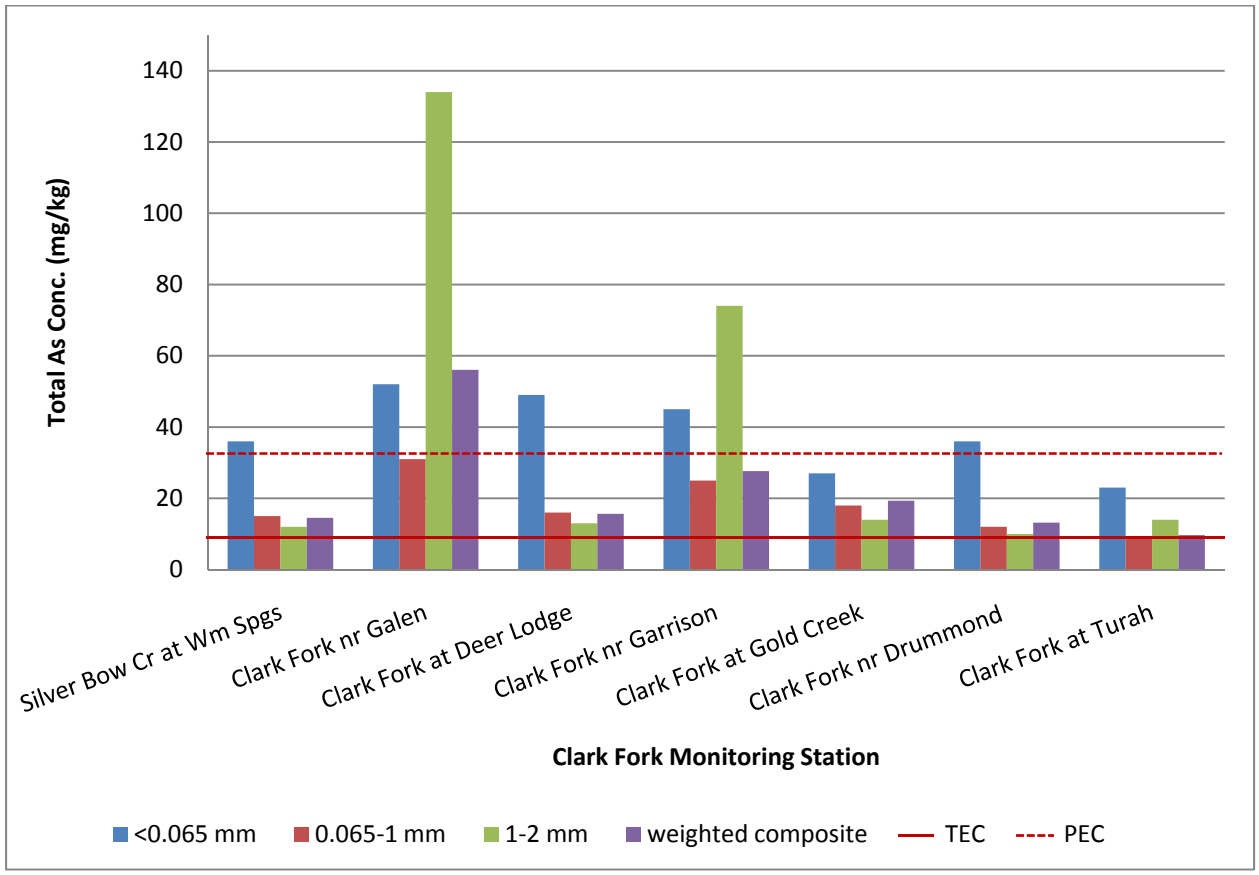

Figure 2-1. Arsenic concentrations in upper Clark Fork stream sediments during Sept. 2011.

Table 2-5. Results of 2011 monitoring for total arsenic in streambed sediment* compared to remediation goals for the CFROU.

Parameter: Total Arsenic (mg/kg)	SBC at Warm Spgs	CFR nr Galen	CFR at Deer Lodge	CFR nr Garrison	CFR at Gold Creek	CFR nr Drummond	CFR at Turah
Q3 (September)	15	56	16	28	19	13	10

TEC goal exceeded (9.79 mg/kg)
PEC goal exceeded (33.0 mg/kg)

**weighted mean concentrations.*

2.2.2 Cadmium

Cadmium was detectable at all monitoring stations and in most sediment size classes during the September 2011 monitoring event (Figure 2-2). Sediment cadmium concentrations were consistently highest in the less than 0.065 mm size fraction, and lowest in either the largest (1–2 mm) sediment size class (four of seven stations) or the intermediate (0.065–1 mm) size class (three of seven stations). There was no distinct spatial trend for cadmium in sediment at CFROU monitoring stations during 2011, with peak values for the less than 0.065 mm size fraction ranging from 1.2 to 3.0 mg/kg at all monitoring stations. The highest value was observed at the near Drummond monitoring station and the second highest value was found in

SBC at Warm Springs. Sediment cadmium concentrations during 2011 were somewhat higher overall than those observed in 2010.

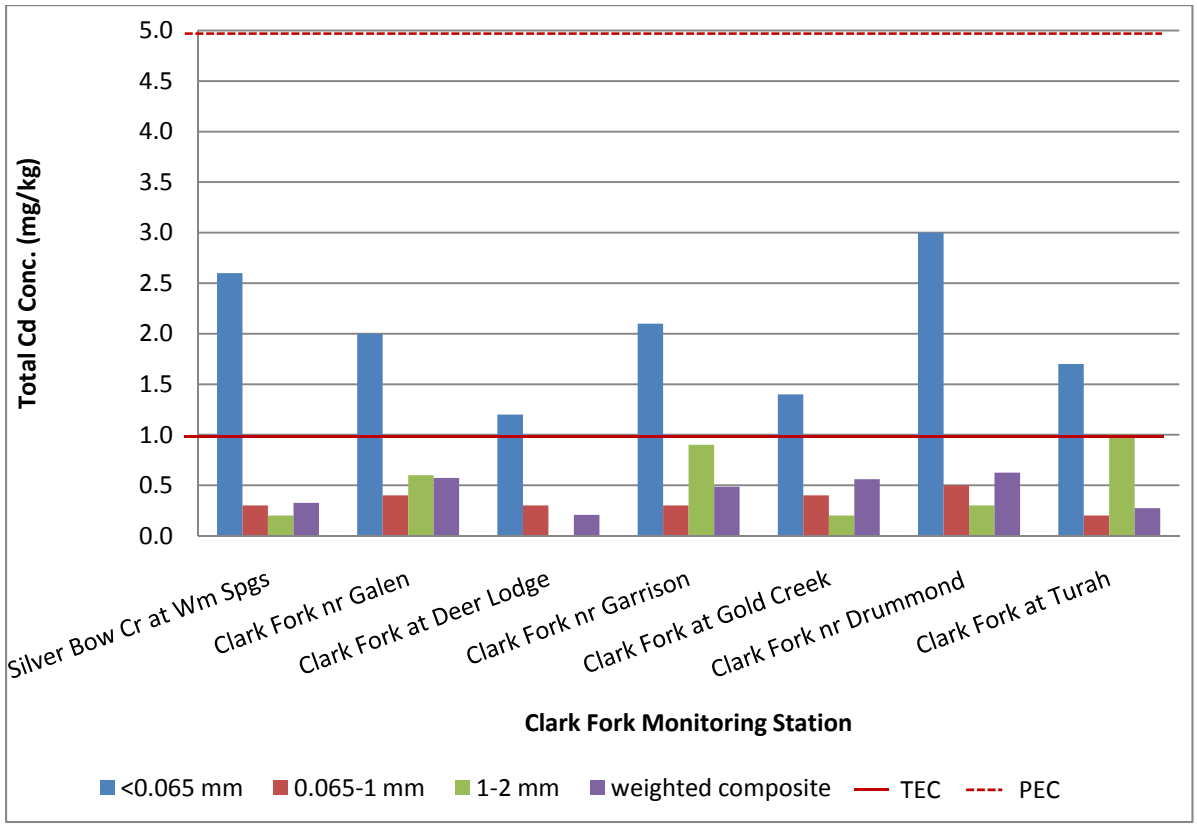

Figure 2-2. Cadmium concentrations in upper Clark Fork stream sediments during Sept. 2011.

Weighted mean concentrations of total cadmium did not exceed the TEC or PEC threshold values at any of the seven monitoring stations during 2011 (Figure 2-2 and Table 2-6). However, total cadmium concentrations in the smallest size fraction of sediment exceeded the TEC value at all monitoring stations, including Turah. No exceedences of the PEC threshold were observed at any of the stations.

Table 2-6. Results of 2011 monitoring for total cadmium in streambed sediment* compared to remediation goals for the CFROU.

Parameter: Total Cadmium (mg/kg)	SBC at Warm Spgs	CFR nr Galen	CFR at Deer Lodge	CFR nr Garrison	CFR at Gold Creek	CFR nr Drummond	CFR at Turah
Q3 (September)	0.3	0.6	0.2	0.5	0.6	0.6	0.3

Remedy goal attained

**weighted mean concentrations.*

2.2.3 Copper

Sediment total copper concentrations were consistently highest in the smallest sediment size fraction (less than 0.065 mm) at all seven stations, and lowest in the largest (1–2 mm) size class (three of seven stations) or the intermediate (0.065–1 mm) sediment size class (four of seven stations) (Figure 2-3). The spatial trend for sediment copper concentrations was a modest

decline from the headwaters near Galen downstream to Gold Creek. A spatially short-lived and relatively small increase in total copper was noted in the less than 0.065 mm size class of sediment at the near Drummond site. Lowest sediment copper concentrations were observed in SBC at Warm Springs and in the Clark Fork at Turah. Weighted mean sediment copper concentrations during 2011 were generally within the range of values observed during 2010.

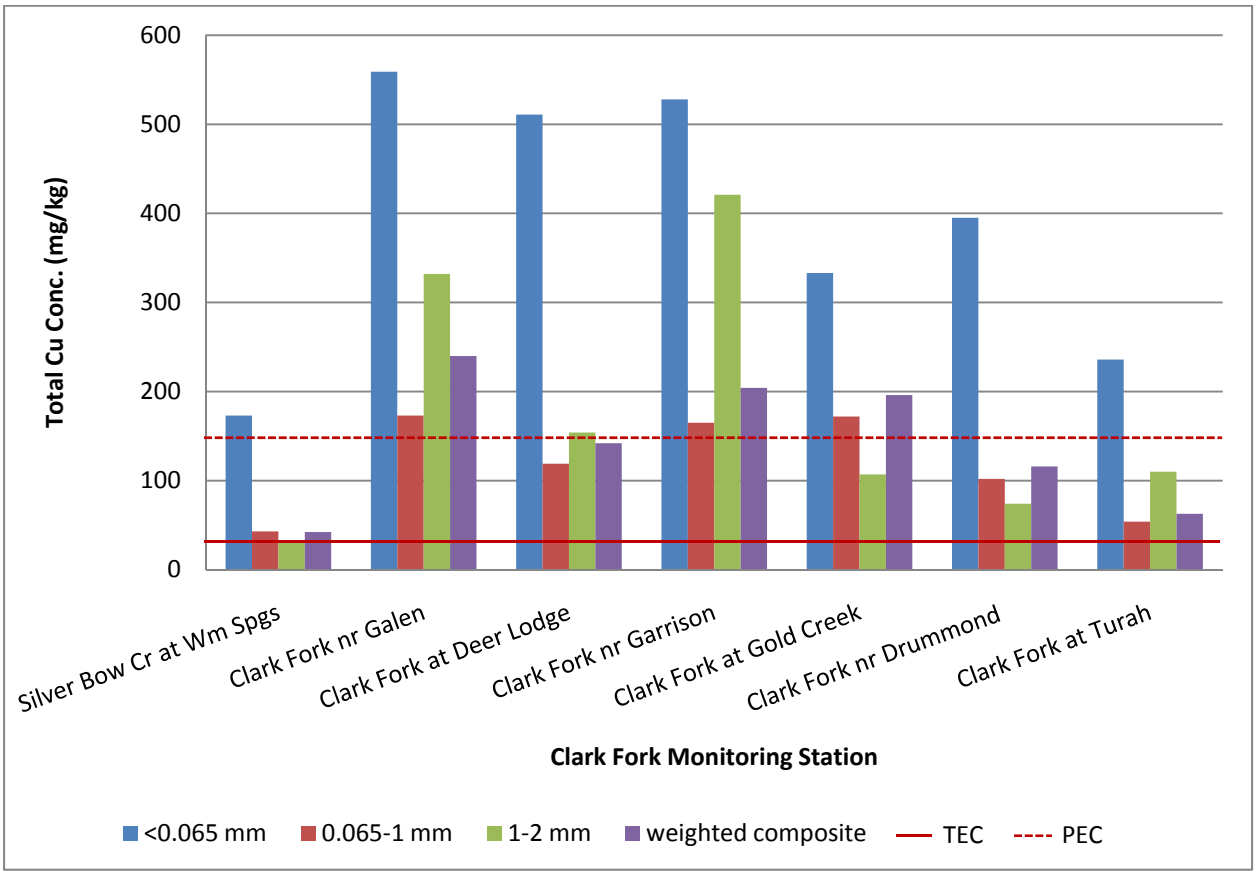

Figure 2-3. Copper concentrations in upper Clark Fork stream sediments during Sept. 2011.

Copper concentrations in all three sediment size fractions, and weighted mean concentrations, exceeded the copper TEC threshold at all seven CFROU monitoring stations during 2011 and 2010 (Figure 2-3 and Table 2-7). Total copper concentrations in one or more of the sediment size fractions exceeded the PEC value at all monitoring stations during 2011 and 2010. The 2011 weighted mean concentrations for total copper exceeded the PEC threshold value of 149 mg/kg at the near Galen (240 mg/kg), near Garrison (204 mg/kg), and Gold Creek (196 mg/kg) stations, and approached the PEC value at the Deer Lodge station (142 mg/kg).

Table 2-7. Results of 2011 monitoring for total copper in streambed sediment* compared to remediation goals for the CFROU.

Parameter: Total Copper (mg/kg)	SBC at Warm Spgs	CFR nr Galen	CFR at Deer Lodge	CFR nr Garrison	CFR at Gold Creek	CFR nr Drummond	CFR at Turah
Q3 (September)	42	240	142	204	196	116	63

TEC goal exceeded (31.6 mg/kg)
PEC goal exceeded (149 mg/kg)

**weighted mean concentrations.*

2.2.4 Lead

Sediment total lead concentrations were highest in the smallest sediment size fraction (less than 0.065 mm) at all seven stations, and lowest in either the largest (1–2 mm) (four of seven stations) or intermediate (0.065–1 mm) size classes (three of seven stations). The spatial trend for sediment lead concentrations in 2011 was less distinct in 2011 than in 2010, when a general pattern of downstream decreases in concentration was noted for most sediment size classes from near Garrison to Turah.

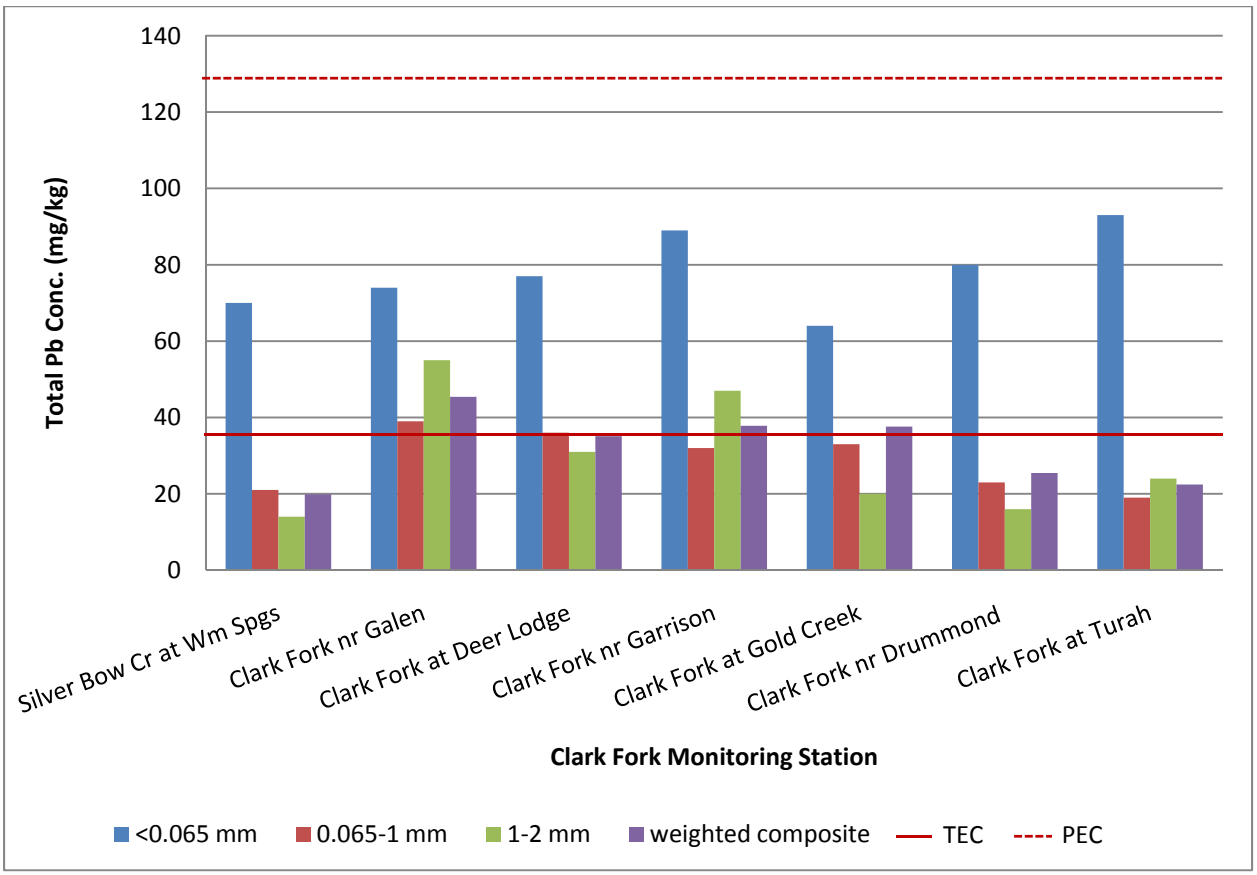

Figure 2-4. Lead concentrations in upper Clark Fork stream sediments during Sept. 2011.

Weighted mean sediment lead concentrations were lowest in SBC at Warm Springs and in the Clark Fork at Turah and near Drummond, highest in the Clark Fork near Galen, and intermediate from Deer Lodge to Gold Creek (Figure 2-4). Sediment lead concentrations during 2011 were generally comparable to those observed in 2010, with highest values in the 90 mg/kg range.

Weighted mean concentrations of total lead exceeded the lead TEC threshold at the near Galen, near Garrison, and Gold Creek stations during 2011, and closely approached the TEC value at the Deer Lodge station (Figure 2-4 and Table 2-8). Three stations exceeded or approached the lead TEC threshold in 2010, including near Galen, Deer Lodge, and near Garrison. Total lead concentrations in the smallest size fraction of sediment exceeded the TEC value at all monitoring stations during each of 2011 and 2010. The PEC concentration threshold was not exceeded for any sediment size fraction or weighted composite concentration at any of the monitoring stations in either 2011 or 2010.

Table 2-8. Results of 2011 monitoring for total lead in streambed sediment* compared to remediation goals for the CFROU.

Parameter: Total Lead (mg/kg)	SBC at Warm Spgs	CFR nr Galen	CFR at Deer Lodge	CFR nr Garrison	CFR at Gold Creek	CFR nr Drummond	CFR at Turah
Q3 (September)	20	45	35	38	38	25	22

Remedy goal attained
TEC goal exceeded (35.8 mg/kg)
**weighted mean concentrations.*

2.2.5 Zinc

Sediment total zinc concentrations were highest in the smallest sediment size fraction (less than 0.065 mm) at all stations except Clark Fork near Galen in September 2011. The largest sediment size class (1–2 mm) showed the highest zinc concentrations at the near Galen monitoring station (Figure 2-5). Sediment total zinc concentrations were lowest in either the largest (1–2 mm) (three of seven stations) or intermediate (0.065–1 mm) size classes (four of seven stations). The spatial trend for sediment zinc concentrations in 2011 was not distinct, unlike the pattern noted in 2010. The September 2011 dataset shows lowest concentrations in the Clark Fork at Turah and in SBC at Warm Springs. Highest weighted mean sediment zinc concentrations were observed at the near Galen and near Drummond stations. Intermediate concentrations were found at the Deer Lodge, near Garrison and Gold Creek monitoring sites. Weighted mean sediment zinc concentrations were comparable in 2011 to those measured in 2010 for most monitoring sites, except for the near Galen and near Drummond sites which showed higher concentrations in 2011 than in 2010 (389 mg/kg and 304 mg/kg in 2011, respectively, as compared to 255 mg/kg and 242 mg/kg in 2010).

Zinc concentrations in all three sediment size fractions, and the weighted mean concentrations, exceeded the zinc TEC threshold at all seven CFROU monitoring stations during 2011 and, with one exception, in 2010 (Figure 2-5 and Table 2-9). Total zinc concentrations in the 1–2 mm sediment size fraction at the near Galen monitoring station, and in the less than 0.065 mm size fraction at the near Garrison and near Drummond stations, exceeded the PEC value during 2011. None of the 2011 weighted mean concentrations for total zinc exceeded the PEC threshold value. In comparison, no stations exceeded the PEC threshold for zinc in 2010 in any of the sediment size fractions or in the weighted mean concentrations.

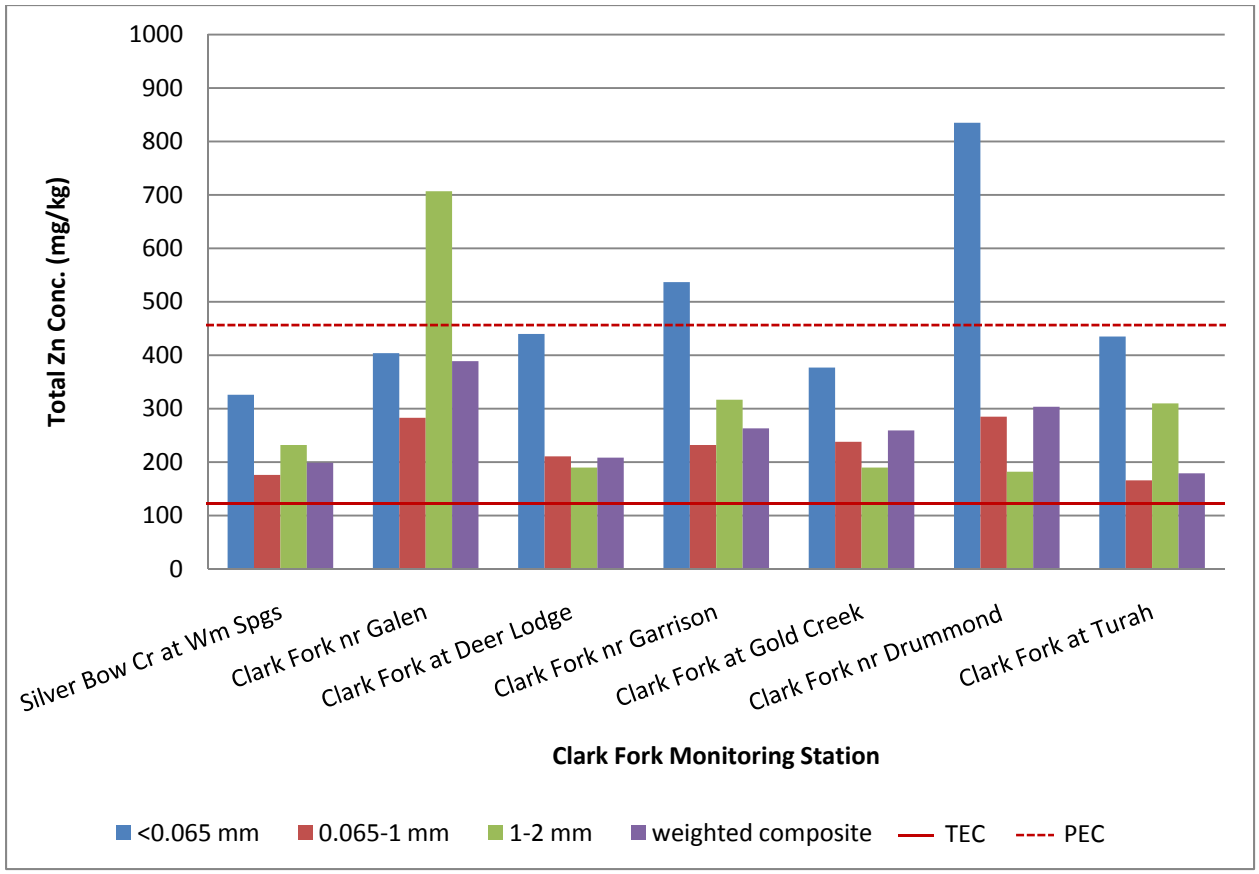

Figure 2-5. Zinc concentrations in upper Clark Fork stream sediments during Sept. 2011.

Table 2-9. Results of 2011 monitoring for total zinc in streambed sediment* compared to remediation goals for the CFROU.

Parameter: Total Zinc (mg/kg)	SBC at Warm Spgs	CFR nr Galen	CFR at Deer Lodge	CFR nr Garrison	CFR at Gold Creek	CFR nr Drummond	CFR at Turah
Q3 (September)	199	389	209	263	259	304	179

TEC goal exceeded (121 mg/kg)

**weighted mean concentrations.*

2.3 Conclusions

For most of the metals and monitoring sites, there was a strong inverse correlation between the sediment particle size and the respective total metal concentration. This relationship was not as strong as the pattern that was observed in 2010, which may have been partially due to greater overall variability between samples in 2011 as demonstrated in duplicate sample analysis results. Spatially, highest sediment metals concentrations tended to be found at the upper river monitoring locations, particularly at the near Galen, near Garrison, Gold Creek and Deer Lodge monitoring sites, in decreasing order of concentrations. Lowest concentrations were observed in the Clark Fork at Turah and in SBC at Warm Springs. Sediment metals concentrations in September 2011 were generally within the same range as concentrations measured in September 2010, with some exceptions.

Weighted mean concentrations of total arsenic, copper, lead and zinc exceeded the TEC and/or PEC concentration thresholds at several to many of the Clark Fork monitoring stations during

the September 1–2, 2011 monitoring event. Copper showed the greatest frequency of excursions. Total cadmium in the smallest size fraction of sediment showed excursions of the TEC threshold at all seven of the monitoring stations, but the weighted mean concentrations showed no excursions.

Analysis of a field duplicate sediment metals sample collected at site CFR-27H at Deer Lodge showed higher variability for most of the metals and sediment size classes in 2011 than was seen in duplicate samples collected during 2010 sampling. Relative percent differences between the original sample and the duplicate sample ranged from 0 to 54 percent for all metals and sediment size fractions, with an average RPD of 18 percent. Relative percent differences were greater for the larger sediment size fractions than for the smaller fractions.

3.0 MACROINVERTEBRATES AND PERIPHYTON[1]

3.1 Introduction

This chapter describes the analysis of benthic macroinvertebrate and periphyton samples collected from sites within the CFROU in September 2011. The work is part of an adaptive, comprehensive long-term monitoring plan for evaluating the success of restoration and remediation activities, which are yet to be undertaken at these sites. The benthic invertebrate fauna was analyzed using several bioassessment tools, including a group of indices developed by D. McGuire and applied over a long course of sampling in the Clark Fork River dating to 1998, including the Multi Metrics Index (MMI), and a predictive model River Invertebrate Prediction and Classification System (RIVPACS) which are currently used as standard operating procedure for aquatic monitoring by the MDEQ, and two historic indices (MVFP and Bukantis 1998) developed for use in foothill and valley regions of Western Montana. The scores and impairment classifications obtained with these tools are examined and compared.

Periphyton samples were added to the analysis in 2011. Diatom and non-diatom algae were analyzed, and a stressor-specific tool was used for determining the probability of sediment impairment, which was developed for the Middle Rockies Ecoregion for MDEQ (Teply 2005, 2010).

Information about probable stressors to water quality and habitat integrity, implied by the taxonomic and functional composition of the benthic flora and fauna, is described in a series of site-specific narratives.

3.2 Methods

3.2.1 Sampling

Benthic macroinvertebrates and periphyton were sampled at six sites on the Clark Fork River and one site on SBC in September 2011. Atkins collected periphyton samples on September 1 and 2 and macroinvertebrate samples on September 19. Four macroinvertebrate sample replicates and one periphyton sample were collected at each of the seven sites. Sites are described in Table 3-1. Macroinvertebrates were sampled using a Hess sampling device and periphyton was collected by a rock-scraping technique. Samples were delivered to Rhithron Associates, Inc. for processing and identification.

Table 3-1. Sampling sites; Clark Fork River basin, September 2011.

Site description	Site No.	USGS Site No.	Lat.	Long.
SBC at Warm Springs	SS-25	12323750	46º10’46.19”	-112º46’50.02”
Clark Fork near Galen	CFR-03A	12323800	46º12’30”	-112º45’59”
Clark Fork at Deer Lodge	CFR-27H	12324200	46º23’52”	-112º44’31”
Clark Fork bv Little Blackfoot River nr Garrison	CFR-42G	12324400	46º30’40”	-112º47’20”
Clark Fork at Gold Creek	CFR-53C	12324680	46º35’26”	-112º55’40”
Clark Fork near Drummond	CFR-84F	12331800	46º42’44”	-113º19’48”
Clark Fork at Turah	CFR-116A	12334550	46º49’34”	-113º48’48”

[1] Section 3.0 was prepared by Rhithron Associates Inc., with minor edits and formatting completed by Atkins.

3.2.2 Laboratory Analysis

3.2.2.1 Macroinvertebrates

Samples were completely picked of organisms, following procedures consistent with previous Clark Fork River Biomonitoring projects (McGuire, 2010; Bollman, 2010). Similar to the most recent study (Bollman, 2010), densities of abundant taxa were not estimated, but actual counts were obtained for all organisms. Caton trays were used to distribute the samples for sorting (Caton, 1991). Each individual sample was thoroughly mixed in its jar(s), poured out and evenly spread into the Caton tray. Grids were systematically selected, and grid contents were examined under stereoscopic microscopes using 10x–30x magnification. All invertebrates were sorted from the substrate and placed in 95 percent ethanol for subsequent identification.

Organisms were individually examined by certified taxonomists using 10x–80x stereoscopic dissecting scopes (Leica S8E and S6E). Identification of organisms were made to the lowest practical level consistent with previous Clark Fork River Biomonitoring projects, using appropriate published taxonomic references and keys (McGuire, 2010).

Identification, counts, life stages, and information about the condition of specimens were recorded. Organisms that could not be identified to the taxonomic targets because of immaturity, poor condition, or lack of complete current regionally-applicable published keys were left at appropriate taxonomic levels that were coarser than target levels. To obtain accuracy in richness measures, these organisms were designated as “not unique” if other specimens from the same group could be taken to target levels. Organisms designated as “unique” were those that could be definitively distinguished from other organisms in the sample. Identified organisms were preserved in 95 percent ethanol in labeled vials and archived at the Rhithron laboratory.

Midges and worms were carefully morphotyped using 10x–80x stereoscopic dissecting microscopes (Leica S8E and S6E) and representative specimens were slide-mounted and examined at 200x–1000x magnification using an Olympus BX 51 compound microscope equipped with Hoffman Contrast. Slide-mounted organisms were archived at the Rhithron laboratory.

3.2.2.2 Periphyton

Samples were thoroughly mixed by shaking. Permanent diatom slides were prepared; subsamples were taken and treated with concentrated H2SO4 and 30 percent H2O2. Samples were neutralized by rinses with distilled water, and subsample volumes were adjusted to obtain adequate densities. Small amounts of each sample were dried onto 22-mm square coverslips. Coverslips were mounted on slides using Naphrax diatom mount. To ensure a high quality mount for identification and to make replicates available for archives, three slide mounts were made from each sample. One of the replicates was selected from each sample batch for identification. A diamond scribe mark was made to define a transect line on the cover slip, and a minimum of 600 diatom valves were identified along the transect mark. A Leica DM 2500 compound microscope, Nomarski contrast, and 1000x magnification were used for identifications. Diatoms were identified to the lowest possible taxonomic level, generally species, following standard taxonomic references.

For soft-bodied (non-diatom) algae samples, the raw periphyton sample was manually homogenized and emptied into a porcelain evaporating dish. A small, random sub-sample of algal material was pipetted onto a standard glass microscope slide using a disposable dropper or soda straw. Visible (macroscopic) algae were also sub-sampled, in proportion to their estimated importance relative to the total volume of algal material in the sample, and added to the liquid fraction on the slide. The wet mount was then covered with a 22 x 30 mm cover slip.

Soft-bodied (non-diatom) algae were identified to genus using an Olympus BHT compound microscope under 200x and 400x magnification. The relative abundance of each algal genus (and of all diatom genera collectively) was estimated for comparative purposes, according to the following system:

- rare (r): represented by a single occurrence in the sub-sample,
- occasional (o): multiple occurrences, but infrequently seen,
- common (c): multiple occurrences, regularly seen,
- frequent (f): present in nearly every field of view,
- abundant (a): multiple occurrences in every field of view, but well within limits of enumeration,
- dominant (d): multiple occurrences in every field of view, but generally beyond practical limits of enumeration.

Soft-bodied genera (and the diatom component) were also ranked according to their estimated contribution to the total algal biovolume present in the sample.

3.2.3 Quality Assurance Systems

3.2.3.1 Macroinvertebrates

Quality control procedures for macroinvertebrate sample processing involved checking sorting efficiency. These checks were conducted on 100 percent of the samples by independent observers who microscopically re-examined at least 20 percent of sorted substrate from each sample. Sorting efficiency was evaluated by applying the following calculation:

$$SE = \frac{n_1}{n_1 + n_2} \times 100$$

where:
SE = the sorting efficiency, expressed as a percentage
n_1 = the total number of specimens in the first sort
n_2 = the total number of specimens expected in the second sort based on the results of the re-sorted 20 percent.

Quality control procedures for taxonomic determinations of invertebrates involved checking accuracy, precision and enumeration. Three samples were randomly selected and all organisms re-identified and counted by an independent taxonomist. Taxa lists and enumerations were compared by calculating a Bray-Curtis similarity statistic for each selected sample (Bray & Curtis, 1957).

Quality control/quality assurance results are reported in Appendix A.

3.2.3.2 Periphyton

Quality control procedures for periphyton taxonomy involved the re-identification of diatoms from one randomly selected sample by an independent taxonomist. Re-identifications of diatoms were made internally at Rhithron. Bray-Curtis similarity statistics were generated by comparing the original identifications with the re-identifications, and adjustments to taxonomy were made where appropriate. Discrepancies in identifications were discussed, and rectifications were made to the data.

Quality control/quality assurance results are reported in Appendix A.

3.2.4 Data Analysis

3.2.4.1 Macroinvertebrates

Taxa lists and counts for each sample were constructed (Appendix E). Standard metric calculations were made using customized database software. Five bioassessment indices, and two additional indices based on subsets of McGuire's metrics, were calculated and scored.

3.2.4.2 Periphyton

Taxa lists and counts for each sample were constructed. Standard metric calculations were made using customized database software. Sediment impairment probabilities were calculated based on discriminant functions developed for MDEQ (Teply, 2010a; Teply, 2010b).

3.2.4.3 Macroinvertebrate bioassessment indices

McGuire's Clark Fork River indices (McGuire, 2010): McGuire's indices were the only ones employed in this study that were "specifically designed to evaluate water quality in the Clark Fork River Basin" (McGuire, 2010). McGuire's indices are composed of 11 metrics. Two subsets of three metrics each are scored and summed separately to obtain values for organic/nutrient impairment and for metals impairment. Individual metrics and the expected response of each to environmental stress are described in the interim monitoring plan document (Atkins, 2010).

MMI (Jessup et al., 2006): The MMI index currently used by the MDEQ was designed for statewide sites that could be classified as occurring in "Low Valleys" as contrasted with montane or plains sites. The MMI for Low Valley sites uses five metrics which were determined to discriminate between reference and degraded sites, and which could be explained in terms of their mechanisms of response. Low Valley sites must conform to criteria including specific ranges for site elevation, annual mean of daily maximum air temperature, and the annual precipitation. All sites in this study conformed to these criteria. Table 3-2 lists the metrics for Low Valley sites, and gives the expected response of each metric to increasing stress. Impairment classifications were assigned to sites using the criteria given in Table 3-3.

Table 3-2. MMI metrics, and the expected response to environmental stress.

Metric	Expected response to environmental stress
% Ephemeroptera/Plecoptera/Trichoptera (EPT) excluding Hydropsychidae and Baetidae	decrease
% Chironomidae	decrease
% Crustacea and Mollusca	increase
Shredder taxa	increase
% Predator	decrease

Source: (Jessup et al. 2006)

RIVPACS (Hawkins, 2005; Jessup et al., 2006): Similar to the MMI, the RIVPACS model used in this study was developed by MDEQ for statewide sites that conformed to certain classification criteria, including ranges for latitude, longitude, annual mean of daily maximum temperature, and watershed area. All sites in this study conformed to the established criteria. The model is based on analysis of the taxonomic composition of samples which is evaluated by comparing the observed number of taxa (O) with the expected number of taxa (E). The proportion of O/E is interpreted as the degree to which a site is attaining its potential in biological diversity. Impairment classifications were assigned to sites using the criteria given in Table 3-3.

Table 3-3. MMI and RIVPACS scoring criteria for impairment classifications.

Impairment Classification	MMI score	RIVPACS score
not impaired	≥ 48	≥ 0.8
moderate impairment	47–38	0.79–0.44
severe impairment	36–28	< 0.44

Source: MDEQ 2006.

MVFP index (Bollman, 1998): The MVFP index is based on the performance of six metrics which were evaluated for their ability to distinguish between unimpaired and impaired conditions, defined by physical, chemical and habitat variables, in the Montana Valley and Foothill Prairie Ecoregion (Woods et al., 2002). The applicability of this index to sites on the Clark Fork River may be limited, however, since the dataset from which the index was developed was largely limited to streams of approximately third order. Three of the six component metrics probably do not adequately assess conditions in the higher order Clark Fork River. Sensitive taxa richness would be expected to be much lower, and the percent of filterers and tolerant taxa would be expected to be higher in the Clark Fork River than in the streams targeted by the MVFP index. Individual metrics and the expected response of each to environmental stress are described in the interim monitoring plan document (Atkins, 2010).

Bukantis, 1998: This index is composed of eight metrics, and was likely intended for use only in small-to-mid-order streams in the intermountain valleys and foothills. The ability of the index and its component metrics to distinguish between impaired and unimpaired sites is not known. Individual metrics and the expected response of each to environmental stress are described in the interim monitoring plan document (Atkins, 2010).

3.2.4.4 Periphyton Bioassessment Tool

Sample diatom taxa counts were evaluated to determine the probability of sediment impairment using the Sediment Increaser Taxa List for coldwater streams in the Middle Rockies Ecoregion, described in Teply (2010a and 2010b) and earlier documents (Teply & Bahls, 2005). Taxa on the Sediment Increaser Taxa List have autecological affinities that make them suitable indicators of sediment impairment. The current criteria used by MDEQ to determine impairment by sediment is a probability threshold of 51 percent. Sites demonstrating a percent relative abundance of Sediment Increaser Taxa greater than 15.34 percent would exceed this probability threshold and would be classified as sediment-impaired.

3.2.4.5 Ecological Interpretations

Narrative interpretations of the taxonomic and functional composition of invertebrate and periphyton assemblages are based on demonstrated associations between assemblage components and habitat and water quality variables. Information was gleaned from the published literature, the writer's own research (especially Bollman, 1998) and professional judgment, and those of other expert sources (especially Wisseman, 1996). These interpretations are not intended to replace canonical procedures for stressor identification, since such procedures require substantial surveys of habitat, and historical and current data related to water quality, land use, point and nonpoint source influences, soils, hydrology, geology, and other resources that were not readily available for this study. Instead, attributes of invertebrate taxa that are well-substantiated in diverse literature, published and unpublished research, and that are generally accepted by regional aquatic ecologists, are combined into descriptions of probable water quality and instream and reach-scale habitat conditions. Replicate samples were electronically combined into composited samples for the analysis.

The approach to this analysis uses some assemblage attributes that are interpreted as evidence of water quality and other attributes that are interpreted as evidence of habitat integrity. To

arrive at impairment classifications, attributes are considered individually, so information is maximized by not relying on a single cumulative score, which may mask stress on the biota. Such an approach also minimizes the possibility of using inappropriate assessment strategies when the biota at a site is atypical of "characteristic" sites in a region.

Water quality variables are estimated by examining mayfly taxa richness and the Hilsenhoff Biotic Index (HBI) value. Other indications of water quality include the richness and abundance of hemoglobin-bearing taxa and the richness of sensitive taxa. Mayfly taxa richness has been demonstrated to be significantly correlated with chemical measures of DO, pH, and conductivity (e.g., Bollman, 1998; Fore et al., 1996; Wisseman, 1996). The HBI (Hilsenhoff, 1987) has a long history of use and validation (Cairns and Pratt 1993). In Montana foothills, the HBI was demonstrated to be significantly associated with conductivity, pH, water temperature, sediment deposition, and the presence of filamentous algae (Bollman, 1998).

The presence of filamentous algae is also suspected when macroinvertebrates associated or dependent on it (e.g., LeSage & Harrison, 1980; Anderson, 1976) are abundant. Nutrient enrichment in Montana streams often results in large crops of filamentous algae (Watson, 1988). Sensitive taxa exhibit intolerance to a wide range of stressors (e.g., Wisseman, 1996; Hellawell, 1986; Friedrich, 1990; Barbour et al., 1999), including nutrient enrichment, acidification, thermal stress, sediment deposition, habitat disruption, and others. These taxa are expected to be present in predictable numbers in functioning montane and foothills streams (e.g., Bollman, 1998). Although the abundance of invertebrates in Hess samples can be highly variable, reflecting the patchy and dynamic areal distribution of the benthos in stony-bottomed streams, McGuire's thresholds for environmental perturbation are cited as evidence of enrichment or impairment (McGuire, 2010).

Among the diatoms, tolerance to nutrients has been established for many taxa (e.g., Van Dam et al., 1994; Fairchild et al., 1985; Carrick et al., 1988; Teply & Bahls, 2005). Diatom taxa with specific tolerances to saprobity (e.g., Van Dam et al., 1994), organic pollution (e.g., Lange-Bertalot, 1979), salinity (e.g., Van Dam et al., 1994), conductivity and ionic composition (Potapova & Charles, 2003), and adaptations to sediment (e.g., Lowe, 1974; Lowe, 2003) and general habitat disturbance (e.g., Lange-Bertalot, 1996) have been identified.

Thermal characteristics of the sampled site are predicted by the richness and abundance of cold stenotherm taxa (Clark, 1997), and by calculation of the temperature preference of the macroinvertebrate assemblage (Brandt, 2001). Hemoglobin-bearing taxa are also indicators of warm water temperatures (Walshe, 1947), since DO is directly associated with water temperature; oxygen concentrations can also vary with the degree of nutrient enrichment. Increased temperatures and high nutrient concentrations can, alone or in concert, create conditions favorable to hypoxic sediments, habitats preferred by hemoglobin-bearers.

Thermal preference among diatoms has been described for many taxa (e.g., Kociolek & Spaulding, 2003) although many taxa appear to have broad temperature tolerances. In this approach, only a few taxa were used to estimate thermal conditions. These estimates were limited to foothills and montane regions.

Metals sensitivity for some groups, especially the heptageniid mayflies, is well-known (e.g., Kiffney & Clements, 1994; Clements, 1999; Clements, 2004). In the present approach, the absence of these groups in environs where they are typically expected to occur is considered a signal of possible metals contamination, but only when combined with a measure of overall assemblage tolerance of metals. The Metals Tolerance Index (Bukantis, 1998) ranks taxa according to their sensitivity to metals. Weighting taxa by their abundance in a sample, assemblage tolerance is estimated by averaging the tolerance of all sampled individuals.

Indications of metal contamination can also be discerned in diatom assemblages. Species that increase in abundance with contamination are listed in Teply and Bahls (2005) (see also Stoermer & Smol, 1999).

The condition of instream and streamside habitats is also estimated by characteristics of the macroinvertebrate assemblages. Stress from sediment is evaluated by caddisfly richness and by "clinger" richness (Kleindl, 1995; Bollman, 1998; Karr & Chu, 1999). A newer tool, the Fine Sediment Biotic Index (FSBI) (Relyea et al., 2011) shows promise when applied to the montane and foothills regions, but its use is limited in plains regions, where taxa characteristic of these sites have not been studied for sediment tolerance.

Sediment tolerance among the diatoms has been established (Lowe, 1974) and is demonstrated for motile varieties, which can alter their position in response to alteration of substrates by sediment deposition. Groups of diatoms known to increase with sediment serve as indicators of probable stress (Teply, 2010a; Teply, 2010b).

The functional characteristics of macroinvertebrate assemblages are based on the morphology and behaviors associated with feeding, and are interpreted in terms of the River Continuum Concept in the narratives (Vannote et al., 1980). Alterations from predicted patterns in montane and foothills streams may be interpreted as evidence of water quality or habitat disruption. For example, shredders and the microbes they depend on are sensitive to modifications of the riparian zone (Plafkin et al., 1989).

3.3 Results

3.3.1 Bioassessment Indices

Mean bioassessment scores over all replicates and their associated impairment classifications, using seven indices, are given in Table 3-4, Table 3-5 and Table 3-6. Raw scores for each macroinvertebrate replicate sample are given in the Appendix E.

3.3.1.1 McGuire's Clark Fork River indices (McGuire, 2010)

Mean scores for McGuire's indices (Table 3-4) indicate unimpaired overall biological integrity at the Clark Fork River site at Deer Lodge. The Galen, Garrison, Gold Creek, Drummond, and Turah sites yielded scores indicating slight impairment. SBC at Warm Springs was moderately impaired. There was little variation in overall biological integrity scores among sample replicates. The mean coefficient of variation (CV) among replicates for this index was 6.06. Mean, maximum and minimum scores with 95 percent confidence intervals are graphed in Figure 3-1. Scores for the organic/nutrient subset indicate slight impairment at the SBC site, but no impairment due to organic pollution was indicated at any Clark Fork River site. McGuire's criterion determines that a specific type of pollution is indicated when the score of one subset is substantially lower than the other. Using this criterion, metals pollution is indicated at Gold Creek, Drummond, and Turah sites. The mean CV among replicates for the organic/nutrient subset was 7.53, indicating little variation in these scores. Mean, maximum and minimum scores with 95 percent confidence intervals are graphed in the Figure 3-2. Variation in metals pollution subset scores among sample replicates was also low; the mean CV for these scores was 8.03. Mean, maximum and minimum scores with 95 percent confidence intervals are graphed in Figure 3-3.

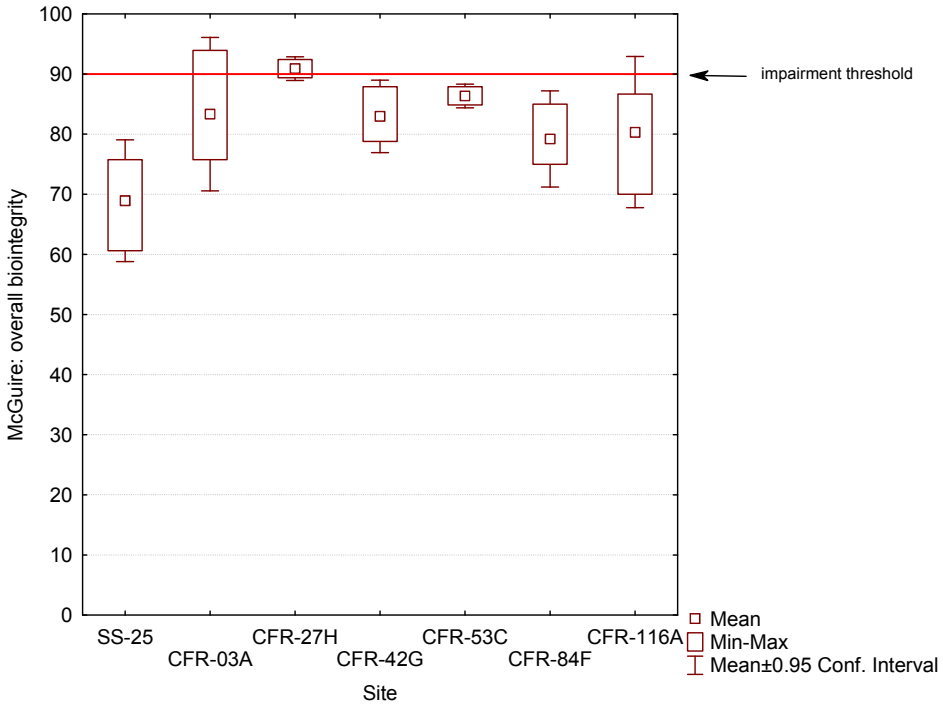

Figure 3-1. Variability among replicates: mean scores, maximum and minimum scores, and 95% confidence intervals for McGuire's overall biointegrity metrics.
Clark Fork River basin, September 2011.

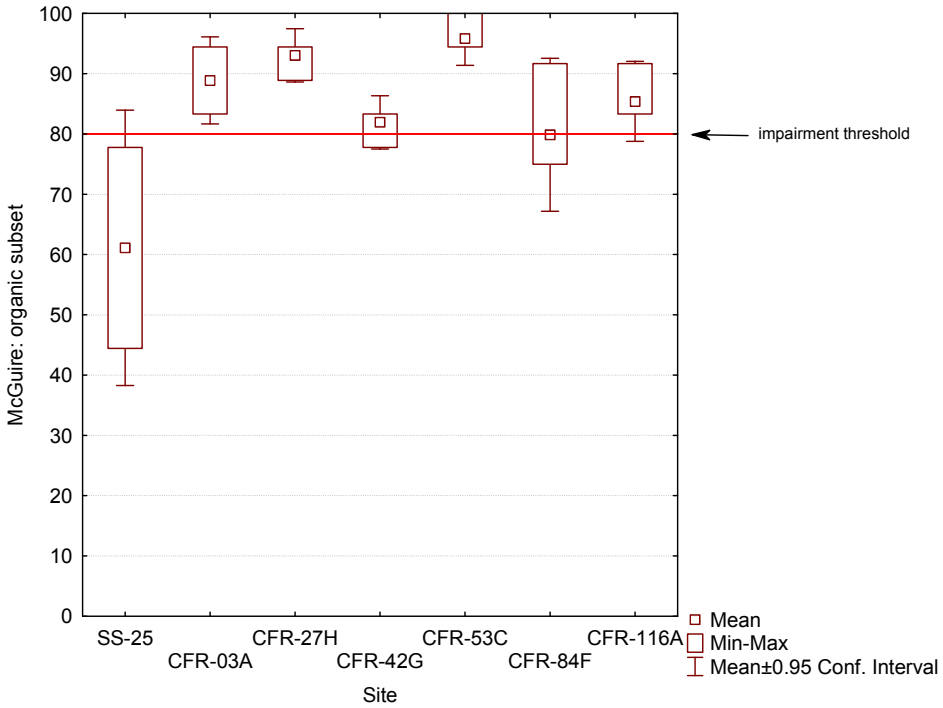

Figure 3-2. Variability among replicates: mean scores, maximum and minimum scores, and 95% confidence intervals for McGuire's nutrient/organic pollution metric subset.
Clark Fork River basin, September 2011.

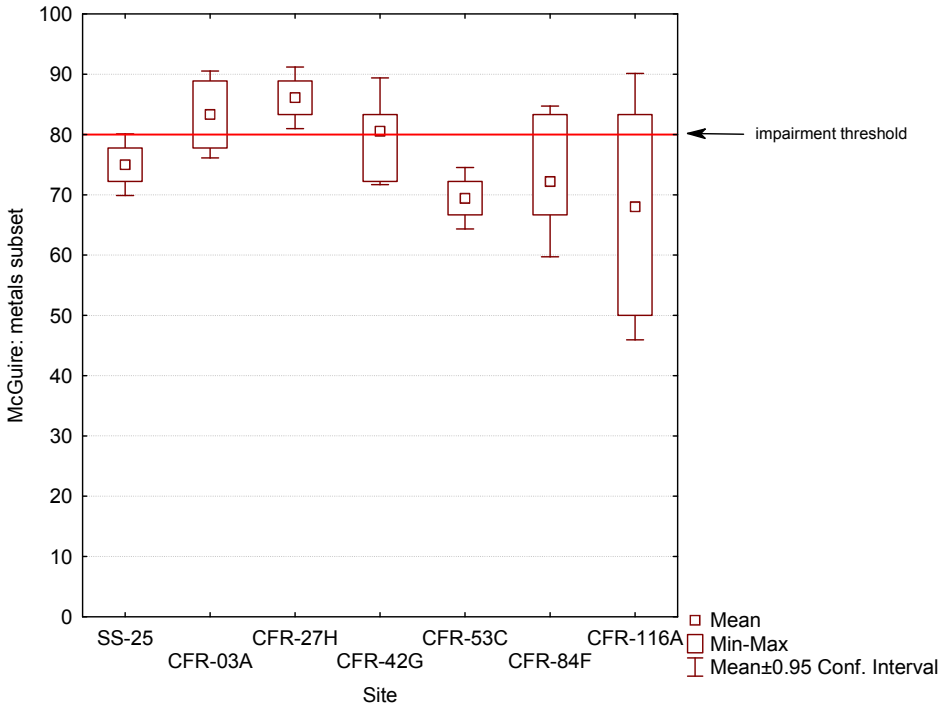

Figure 3-3. Variability among replicates: mean scores, maximum and minimum scores, and 95% confidence intervals for McGuire's metals pollution metric subset.
Clark Fork River basin, September 2011.

Table 3-4. Mean macroinvertebrate bioassessment scores and impairment classifications. McGuire's indices for general biointegrity, nutrient/organic impairment, and metals impairment.*

Clark Fork River Site Description	McGuire Biointegrity Metrics (McGuire, 2010)		McGuire Nutrient-Sensitive Subset (McGuire, 2010)		McGuire Metals-sensitive Subset (McGuire, 2010)	
	score	impairment class	score	impairment class	score	impairment class
SBC at Warm Springs	68.94	Moderate impairment	61.11	Slight impairment	75.00	Slight impairment
Clark Fork River near Galen	83.33	Slight	88.89	Not impaired	83.33	Not impaired
Clark Fork River at Deer Lodge	90.91	Not impaired	93.06	Not impaired	86.11	Not impaired
Clark Fork River near Garrison	82.95	Slight	81.94	Not impaired	80.56	Not impaired
Clark Fork River at Gold Creek	86.36	Slight	95.83	Not impaired	69.44	Slight impairment
Clark Fork River at Drummond	80.68	Slight	84.72	Not impaired	72.22	Slight impairment
Clark Fork River at Turah	81.82	Slight	88.89	Not impaired	68.06	Slight impairment

**Scores are mean values over four replicate samples, and are expressed as the percent of maximum score.*
Clark Fork basin, September 2011.

Moderate impairment of overall integrity at the SBC site was reflected in lower taxa richness and Ephemeroptera/Plecoptera/Trichoptera (EPT) richness than expected. In addition, tolerant

hydropsychids and baetids dominated the caddisfly and mayfly fauna, respectively. Slight impairment of overall biological integrity in the Clark Fork River at Galen was reflected in depressed taxa richness and domination of the mayfly fauna by tolerant baetids. Low taxa richness and a relatively high value for the HBI characterized the benthic assemblage at the Garrison site. Low taxa richness and low sample densities influenced scores at the Gold Creek Site. Low sample densities also were recorded for some replicate samples collected at Drummond. Slight impairment was also reflected in high proportions of tolerant baetids among the mayfly fauna. The HBI indicated a more tolerant benthic assemblage than expected at the Turah site.

3.3.1.2 MMI (Jessup et al., 2006)

Mean scores for the MMI indicated unimpaired conditions at all sampled sites; scores indicated subtly improving conditions on the Clark Fork between the Galen site and the Deer Lodge site; scores at the Deer Lodge, Garrison, and Gold Creek sites were similar. Variability in MMI scores among replicates was low; the mean CV among samples was 8.38. Mean, maximum and minimum scores with 95 percent confidence intervals are graphed in the Figure 3-4.

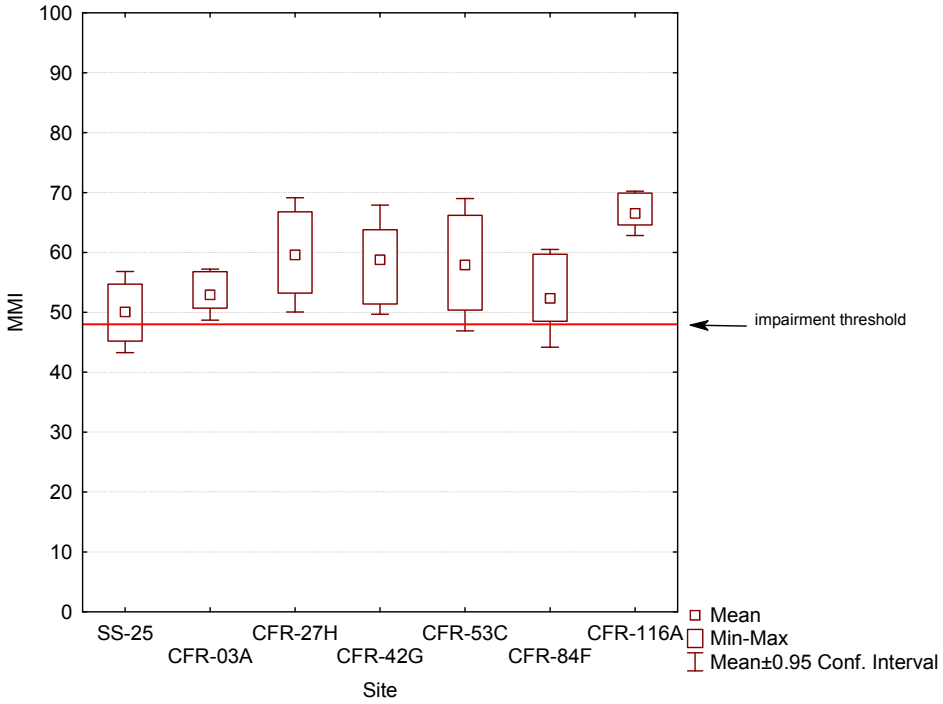

Figure 3-4. Variability among replicates: mean scores, maximum and minimum scores, and 95% confidence intervals for MDEQ's MMI.
Clark Fork River basin, September 2011.

3.3.1.3 RIVPACS (Hawkins, 2005; Jessup et al., 2006)

The RIVPACS model produced variable scores among replicate samples; the mean CV for these scores was 11.6. Mean, maximum and minimum scores with 95 percent confidence intervals are graphed in the Figure 3-5. The model indicated severe impairment at the SBC site and at the Clark Fork site at Galen. Scores indicated moderate impairment at the Deer Lodge, Garrison, Gold Creek and Turah sites, while the Drummond site was not impaired. The RIVPACS scores suggest increasing biologic integrity between Garrison and Drummond, with the Drummond site achieving the highest mean score. Influences on model performance are

difficult to evaluate, since expected taxa in the model design are not directly indicated in the results.

When MMI and RIVPACS impairment classifications do not agree, MDEQ procedures require evaluation of scores to determine which score falls furthest from its respective impairment threshold. In the case of the SBC and Galen sites, the RIVPACS scores are more extreme than the MMI scores, and MDEQ protocols would classify both sites as severely impaired. Similarly, the Turah site exhibits moderate impairment by these criteria. Comparison of MMI and RIVPACS scores at the Deer Lodge, Garrison, and Gold Creek sites, however, would result in non-impaired classifications, since the MMI score is farther from the MMI impairment threshold. MMI and RIVPACS scores gave the same impairment classification for only one site—the Clark Fork River site at Drummond was rated as unimpaired by both bioassessment methods.

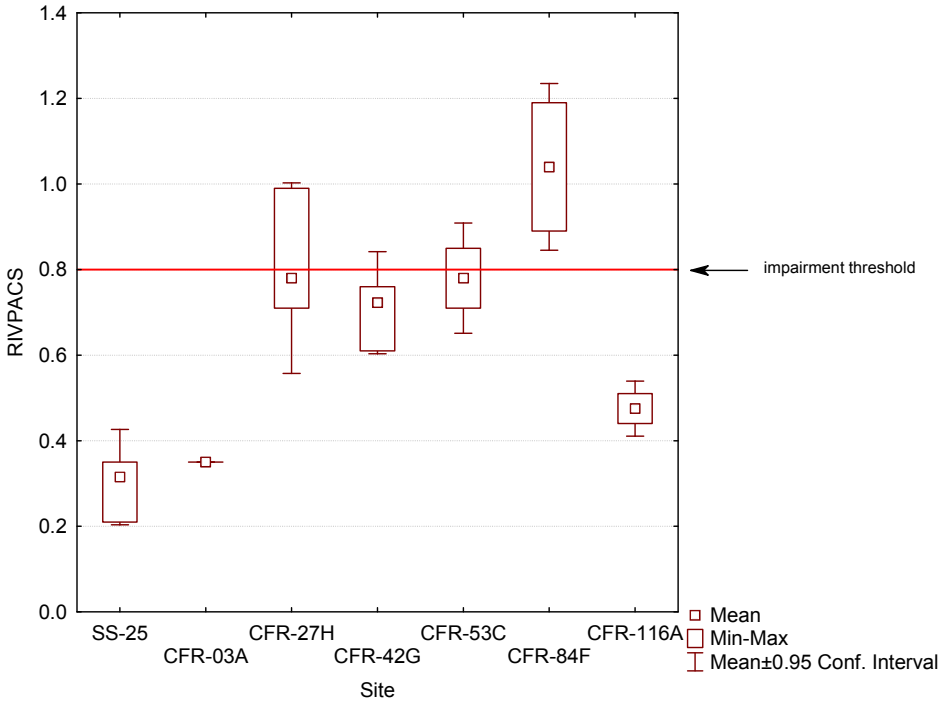

Figure 3-5. Variability among replicates: mean scores, maximum and minimum scores, and 95% confidence intervals for MDEQ's RIVPACS model.
Clark Fork River basin, September 2011.

3.3.1.4 MVFP Index

The MVFP index scores indicated moderate impairment at the SBC site, and at the Clark Fork River sites near Galen, Deer Lodge, Garrison, and Drummond. Slight impairment was indicated by MVFP scores at Gold Creek and Turah. Scores exhibited a relatively high amount of variability; the mean CV among samples was 14.41. Mean, maximum and minimum scores with 95 percent confidence intervals are graphed in the Figure 3-6. Low MVFP scores were attributable to high percentages of filter-feeders and tolerant taxa, and low richness among sensitive taxa, but these findings are not unexpected for a high-order riverine environment, and likely do not accurately reflect the degree of impairment in the Clark Fork River.

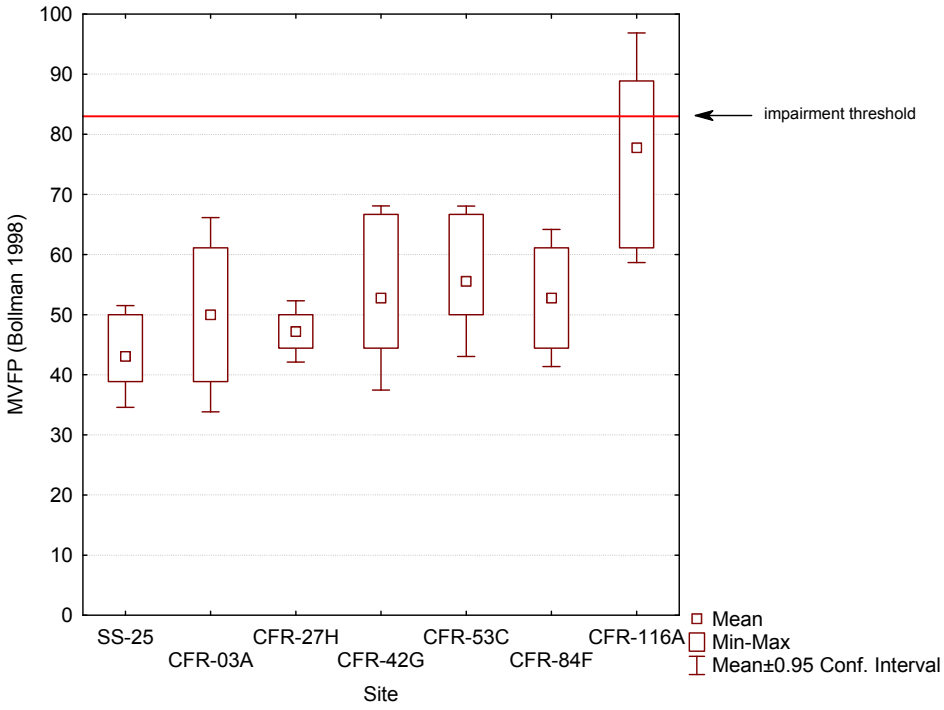

Figure 3-6. Variability among replicates: mean scores, maximum and minimum scores, and 95% confidence intervals for the MVFP index.
Clark Fork River basin, September 2011.

3.3.1.5 Bukantis 1998

Using this historic MDEQ index, SBC and all of the Clark Fork River sites were classified as moderately impaired. The low scores for this index were generally attributable to the performance of the scraper-plus-shredder percent metric, as well as to low EPT richness and high values for the HBI. Variability of scores among replicates was the highest among indices used in this study; the mean CV was 20.63. Mean, maximum and minimum scores with 95 percent confidence intervals are graphed in the Figure 3-7.

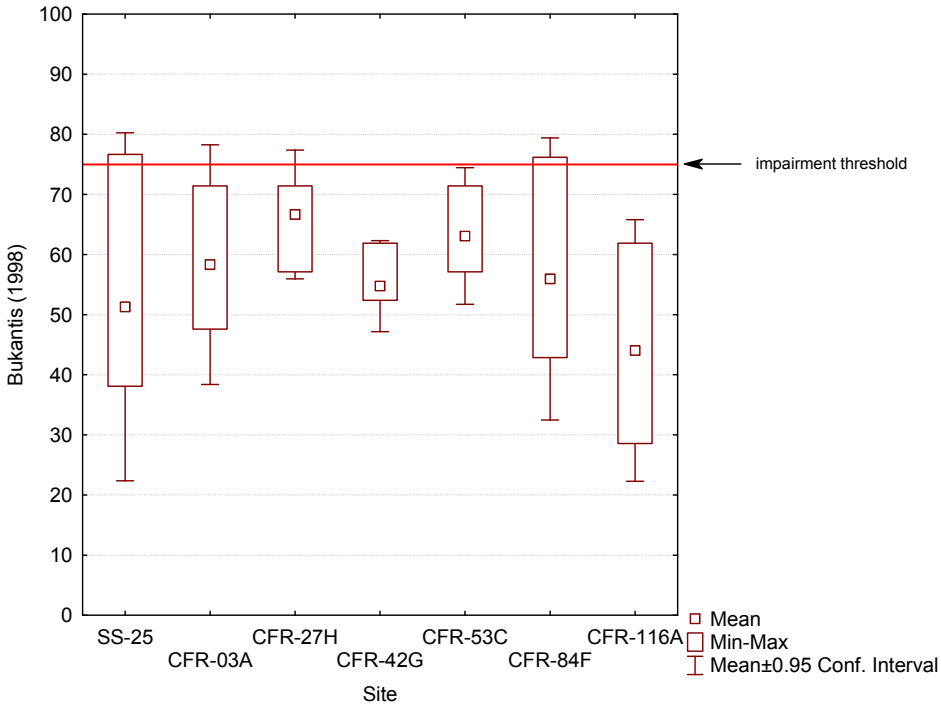

Figure 3-7. Variability among replicates: mean scores, maximum and minimum scores, and 95% confidence intervals for the Bukantis (1998) index.
Clark Fork River basin, September 2011.

Table 3-5. Mean macroinvertebrate bioassessment scores and impairment classifications: MDEQ MMI, MDEQ RIVPACS, MVFP, and Historic MDEQ indices.

Clark Fork River Site Description	MMI (Jessup et al., 2006)		RIVPACS (Hawkins, 2005)		MVFP (Bollman, 1998)		Historic MDEQ (Bukantis, 1998)	
	score	Impairment class	score	impairment class	score	impairment class	score	impairment class
SBC at Warm Springs	50.05	Not impaired	31.26	Severe impairment	43.06	Moderate impairment	51.31	Moderate impairment
Clark Fork River near Galen	52.95	Not impaired	34.86	Severe impairment	50.00	Moderate impairment	58.34	Moderate impairment
Clark Fork River at Deer Lodge	59.60	Not impaired	78.04	Moderate impairment	47.22	Moderate impairment	66.67	Moderate impairment
Clark Fork River near Garrison	58.80	Not impaired	72.45	Moderate impairment	52.78	Moderate impairment	54.76	Moderate impairment
Clark Fork River at Gold Creek	57.95	Not impaired	78.02	Moderate impairment	55.56	Slight impairment	63.10	Moderate impairment
Clark Fork River at Drummond	52.35	Not impaired	103.71	Not impaired	52.78	Moderate impairment	55.95	Moderate impairment
Clark Fork River at Turah	66.53	Not impaired	47.67	Moderate impairment	77.78	Slight impairment	44.05	Moderate impairment

Note: Classifications highlighted in red are rectified MDEQ classifications for cases where MMI and RIVPACS results do not agree. Scores are mean values over four replicate samples and are expressed as the proportion of observed to expected taxa for the RIVPACS tool, and as percent of maximum score for the other indices. Clark Fork basin, September 2011.

3.3.1.6 Diatom Increaser Taxa (Teply, 2010a; Teply, 2010b)

Among diatom samples collected for this study, between four and seven diatom taxa on the Sediment Increaser Taxa list were counted, representing total percent relative abundances ranging from 3.50 percent to 18.50 percent of Sediment Increaser Taxa. This indicates that the percent probabilities of being impaired due to sediment under 303(d) guidelines ranged between 15 percent and 55 percent. This probability is based on past evidence of taxa associated with sediment-impaired streams in coldwater streams of the Middle Rockies Ecoregion. Sediment Increaser Taxa do not discriminate other causes of impairment and this result does not indicate whether the stream may or may not be impaired due to other causes.

Table 3-6. Sediment impairment probabilities based on relative abundance of diatom Sediment Increaser taxa at sites in the Clark Fork basin, September 2011.

Clark Fork River Site Description	Sample Location	Number of Sediment Increaser Taxa Counted	Percent Relative Abundance of Sediment Increaser Taxa	Probability of Sediment Impairment
SBC at Warm Springs	SS-25	6	3.50%	15%
Clark Fork River near Galen	CFR-03A	7	12.33%	40%
Clark Fork River at Deer Lodge	CFR-27H	6	6.50%	20%
Clark Fork River near Garrison	CFR-42G	5	5.67%	20%
Clark Fork River at Gold Creek	CFR-53C	7	9.17%	30%
Clark Fork River at Drummond	CFR-84F	4	18.50%	55%
Clark Fork River at Turah	CFR-116A	5	9.83%	30%

Source: Teply 2010a and Teply 2010b.

Based on the current criteria developed by MDEQ for the interpretation of impairment probabilities, the Clark Fork River site at Drummond (CFR-84F), with a 55 percent probability of impairment, is classified as sediment-impaired.

3.3.2 Ecological interpretation of benthic assemblages

3.3.2.1 SS-25: SBC at Warm Springs

Replicate samples collected at this site yielded four unique mayfly taxa, somewhat fewer than expected for a mid-order stream in the Clark Fork basin. This finding, along with a moderately elevated value (4.71) for the biotic index, suggests that slight nutrient and/or organic enrichment may have influenced the composition of the invertebrate fauna at this site. Filter-feeding caddisflies in the family Hydropsychidae (*Hydropsyche occidentalis, Ceratopsyche cockerelli, Cheumatopsyche* spp. and others) dominated the fauna, accounting for 60 percent of the sampled assemblage. High proportions of filter-feeders are characteristic of sites below impoundments. Suspended organic material was apparently an important energy source in the reach. The metals tolerance index value (5.93) was higher than the biotic index value (BIV). Metals contamination cannot be ruled out at this site. The very low abundance of heptageniid mayflies and the absence of tanytarsine midges support a hypothesis of metals contamination. The thermal preference of the benthic assemblage was calculated at 15.3°C. No cold stenotherm taxa were present in the sample.

Twenty-two “clinger” taxa and 13 caddisfly taxa were counted, suggesting that fine sediment deposition did not appreciably limit colonization at this site. The FSBI value (3.25) indicated a

moderately sediment-tolerant assemblage. Overall taxa richness (50) was high, suggesting diverse instream habitats. Four stonefly taxa were collected, including the salmonflies *Pteronarcys californica* and *Pteronarcella* sp. High richness among stoneflies may be related to intact riparian vegetation, stable streambanks, and natural channel morphology. The site supported at least eight semivoltine taxa. It seems unlikely that dewatering or thermal extremes were influential here. The fauna was dominated by filterers and gatherers, a pattern that is sometimes interpreted as inferring nutrient or organic pollution. Shredders were abundant, but most of these were midges in the genus *Cricotopus* spp. This taxon is frequently associated with filamentous algae. Large crops of filamentous algae may indicate nutrient enrichment.

The diatom flora at the SBC site was dominated by *Synedra ulna*, and *Fragilaria vaucheriae* was common. These taxa are tolerant of mild organic pollution. Among the non-diatom component of the algal assemblage, the green alga *Stigeoclonium* sp., which is sometimes associated with nutrient enrichment, was abundant. Metals-tolerant taxa were also among the dominant diatoms, these included *Nitzschia fonticola* and *Synedra acus*. Using criteria proposed by Teply and Bahls (2005), the site had a 33.7 percent probability of impairment by metals contamination.

3.3.2.2 CFR-03A: Clark Fork River near Galen

Six unique mayfly taxa were counted in composite samples collected at the Clark Fork River site near Galen; this number is fewer than expected for a high-order stream in the Middle Rockies Ecoregion. The BIV (4.50) is slightly higher than expected. These findings are consistent with slight nutrient and/or organic enrichment. Among the dominant taxa was *Cricotopus nostococladius*, a midge associated with the blue-green alga *Nostoc* sp. This animal accounted for 13 percent of the organisms collected at the site, which suggests that *Nostoc* sp. was a dominant component of the benthic substrate here. *Nostoc* sp. prefers clean water, and its abundance suggests nitrogen-limiting conditions. Metals contamination cannot be ruled out. The metals tolerance index value (4.73) was higher than the BIV, and heptageniid mayflies, considered bellwethers of metals pollution, were represented by only two individuals (*Nixe* sp.). A few comparatively metals-sensitive invertebrates, such as the caddisfly *Lepidostoma* sp. and the mayfly *Drunella grandis*, were collected, but none were abundant. The thermal preference for the benthic assemblage was calculated at 14.7ºC, which is somewhat colder than expected for a high-order system; in addition, three cold stenotherm taxa were collected.

The site supported at least 25 “clinger” taxa and 14 unique caddisfly taxa. It seems likely that sediment deposition did not appreciably limit colonization of stony substrate habitats. The FSBI value (4.33) indicated moderate sensitivity to sediment deposition compared to expectations for higher order streams in the Middle Rockies Ecoregion. Overall taxa richness (47) was somewhat lower than expected, suggesting some limitation of instream habitats and perhaps reflecting masses of *Nostoc* sp. Eight semivoltine taxa were counted; it seems unlikely that scouring sediment pulses, dewatering or thermal extremes influenced the benthic assemblages in this reach. All expected functional components were present, but the samples were dominated by shredders and filterers. *Cricotopus nostococladius* was the dominant shredder, and its abundance is related to its mutualistic alga and not to riparian inputs of large organic material. *Hydropsychid* caddisflies (especially *Hydropsyche occidentalis*, *Ceratopsyche cockerelli*, and *Ceratopsyche slossonae*) dominated the filter feeders. A high proportion of filterers is not unexpected in a riverine environment.

Among the dominant diatoms at the Clark Fork River site near Galen was the pennate *Achnanthidium minutissimum* (*A. minutissimum*). The abundance of this diatom at this site, along with the high diversity of the community, suggests that mild nutrient enrichment may have influenced the flora in the reach. *A. minutissimum* has been described as a "phosphorus

specialist" (L. Bahls, personal communication). Among the non-diatom algal flora, cyanophytes such as *Nostoc* sp., *Oscillatoria* sp., and *Komvophoron* sp. were also present in the algae sample collected here. These findings further suggest nitrogen-limiting conditions. Cool water temperatures are suggested by the dominance of *Ulothrix* sp. among the non-diatom flora, and by the abundance of *A. minutissimum* among the diatoms.

Metals-tolerant diatoms were also collected here and ten such taxa were counted. However, members of this group accounted for 11.8 percent of diatoms in the sample. Using criteria proposed by Teply and Bahls (2005), the site had a 13.8 percent probability of impairment by metals contamination.

3.3.2.3 CFR-27H: Clark Fork River at Deer Lodge

Metric indicators of general water quality suggest mild impairment at this site—mayfly taxa richness (6) was lower than expected, and the BIV (4.16) indicated a somewhat tolerant benthic assemblage, compared to expectations for a high-order stream in the Middle Rockies Ecoregion. The metals tolerance index value (4.33) was higher than the BIV; although the metals-sensitive caddisfly *Lepidostoma* sp. was present, heptageniid mayflies were represented by only six specimens. Metals contamination cannot be ruled out here. The calculated thermal preference for the sampled assemblage was 15.8ºC. No cold stenotherm taxa were present in the samples.

Sediment deposition probably did not influence colonization at this site, since at least 13 unique caddisfly taxa and 23 “clinger” taxa were counted. The FSBI value (3.66) indicated a moderately sediment-tolerant assemblage. Overall taxa richness (43) was lower than expectations for a high-order stream in the ecoregion, suggesting monotonous substrates or other limitations to instream habitat complexity. Midges commonly associated with filamentous algae (*Orthocladius* spp., *Cricotopus* spp., *Tvetenia* spp., *Eukiefferiella* spp.) were abundant. Seven semivoltine taxa were present in the replicate composite; given the long life cycles of these organisms, it is unlikely that scouring flows, toxic inputs, or thermal extremes influenced the benthic assemblages in this reach. Filterers dominated the functional composition of the invertebrate community, but all other expected feeding groups were well-represented. The dominant filterers were hydropsychid caddisflies, especially *Hydropsyche occidentalis* and *Ceratopsyche cockerelli*.

The diatom flora at the Clark Fork River site at Deer Lodge was dominated by the relatively tolerant diatom *Nitzschia dissipata*. Although there were at least eight metals-tolerant taxa in the sample collected here, they accounted for only 7 percent of the sample, indicating a low probability of metals pollution. The green algae *Stigeoclonium* sp. and *Cladophora* sp. were most abundant among the non-diatom algal component, suggesting nutrient enriched conditions.

3.3.2.4 CFR-42G: Clark Fork River above the Little Blackfoot River, near Garrison

Low mayfly taxa richness (6) and a moderately tolerant benthic assemblage (BIV of 4.91) characterized the metric indicators of general water quality calculated for this site. Nutrient enrichment may be indicated. The presence of filamentous algae is suggested by the abundance of *Cricotopus* spp., *Eukiefferiella* spp. and *Orthocladius* spp. among the midges. Metals contamination cannot be ruled out; the metals tolerance index value (5.97) was much higher than the BIV, and heptageniid mayflies were limited to a single specimen of *Rhithrogena* sp. However, metals-sensitive taxa (e.g. *Drunella grandis*, *Lepidostoma* sp.) were represented in the samples. The thermal preference calculated for this assemblage was 15.2ºC; no cold stenotherms were counted. Warmer water temperatures were further indicated by the presence of *Helicopsyche borealis* and *Oecetis* sp.

Fifteen unique caddisfly taxa and 22 "clinger" taxa were present, suggesting that sediment deposition did not limit colonization of stony substrate habitats. The FSBI value (4.66) indicated a moderately sediment-sensitive community. Overall taxa richness (43) was lower than expected for high-order streams in the Middle Rockies Ecoregion, and may indicate limited instream habitat complexity. Seven semivoltine taxa were counted, implying stable instream conditions and the absence of catastrophic scour, thermal extremes, or dewatering. All expected functional components were present; the assemblage was dominated by filterers. *Hydropsychid* caddisflies (especially *Hydropsyche occidentalis*, *Ceratopsyche cockerelli*, and immature larvae) accounted for most of the filter-feeders.

Nitzschia dissipata was the most abundant diatom in the periphyton sample collected at the Clark Fork River site near Garrison. This is a relatively tolerant taxon. Seven metals-tolerant diatoms were collected, but these accounted for only 6.5 percent of the assemblage, and suggested a metals-impairment probability of only 7.35 percent. The green algae *Cladophora* sp. and *Stigeoclonium* sp. were most abundant among the non-diatom algal component, suggesting nutrient enriched conditions.

3.3.2.5 CFR-53C: Clark Fork River at Gold Creek

Mayfly taxa richness (6) was similar to the upstream sites in this study. The BIV (3.92) suggested a moderately sensitive benthic assemblage. General water quality may have been better in this reach; however, the metals tolerance index value (4.27) was higher than the BIV, and heptageniid mayflies were rare in samples. On the other hand, the metals-sensitive caddisfly *Lepidostoma* sp. was common, suggesting less metals contamination here than at the upstream sites. Midges associated with filamentous algae were collected, but were not as abundant as at upstream sites. The thermal preference of the benthic assemblage was calculated at 14.9ºC.

Both "clingers" (24 taxa) and caddisflies (11 taxa) were well-represented, suggesting that stony substrates were not excessively obscured by deposited sediment. The FSBI value (4.33), indicates a moderately sediment-sensitive assemblage. Overall taxa richness (42) was lower than expected for a high-order stream in the Middle Rockies Ecoregion, suggesting that instream habitats were somewhat limited. At least 10 semivoltine taxa were supported at the site; it seems unlikely that thermal extremes, dewatering, or scouring sediment pulses were influential. Functional components were balanced among the expected groups. Abundant shredders (especially *Lepidostoma* sp.) suggest ample inputs of large organic material from riparian sources.

Relatively tolerant diatoms, including *Nitzschia dissipata* and *Cocconeis placentula*, dominated the diatom flora, suggesting nutrient enrichment. At least 10 metals-tolerant taxa were supported at the site, accounting for 9.7 percent of counted diatoms. Using the criteria proposed by Teply and Bahls (2005), these findings indicate a metals-impairment probability of 10.8 percent. Although the green alga *Cladophora* sp. was the most abundant non-diatom alga in the sample, nitrogen-fixing taxa were also common. These included *Phormidium* sp., *Homeothrix* sp., and *Heteroleibleinia* sp. These taxa suggest nitrogen-limiting conditions.

3.3.2.6 CFR-84F: Clark Fork River near Drummond

Seven mayfly taxa were present in samples collected at this site, and the BIV (4.33) indicated a moderately sensitive invertebrate assemblage. Similar to the other sites in this study, the metals tolerance index value (5.76) exceeded the BIV. *Heptageniid* mayflies were rare, as was the metals-sensitive caddisfly *Lepidostoma* sp. Metals contamination cannot be ruled out here. Evidence for the presence of filamentous algae includes moderately large numbers of the midges *Cricotopus* spp., *Eukiefferiella* spp., *Orthocladius* spp. and *Tvetenia* spp. The calculated

thermal preference for the sampled assemblage was 15.9ºC. Warmer water temperatures are indicated by the presence of the dragonfly *Ophiogomphus* sp. and the caddisflies *Helicopsyche borealis* and *Oecetis* sp.

Twelve unique caddisfly taxa and 21 "clinger" taxa were present in the samples, suggesting that sediment deposition did not appreciably limit colonization of stony substrate habitats. The FSBI value (4.91) indicates a moderately sediment-sensitive assemblage. Overall taxa richness (49) suggested some limitation of instream habitat diversity. Semivoltine taxa were well-represented: nine such taxa were counted. This finding indicates stability of instream habitats, since long life cycles would be aborted by catastrophes such as scouring flows, thermal extremes, or dewatering. The functional components were well-balanced among all of the expected feeding groups. Gatherers and filterers dominated the assemblage, which is a common pattern for a high-order stream in the Middle Rockies region.

Sediment-tolerant diatoms, such as *Cocconeis pediculus* and *Reimeria sinuata* accounted for 18.5 percent of the diatom flora at the Clark Fork River site near Drummond. Using the current MDEQ criteria, the site is classified as sediment-impaired, based on the composition of the diatom assemblage. Nutrient enrichment is suggested by the abundance of *Nitzschia inconspicua*, a facultative nitrogen heterotroph that prefers eutrophic conditions. Seven metals-tolerant diatom taxa were counted, comprising 17.2 percent of the sample. The probability of metals-impairment is 23.3 percent. Abundant *Stigeoclonium* sp. and *Cladophora* sp. among the non-diatom algal component also suggests enrichment.

3.3.2.7 CFR-116A: Clark Fork River at Turah

Mayfly taxa richness (14) was within expectations for an unpolluted high-order stream in the Middle Rockies Ecoregion. However, the BIV (4.85) indicated a moderately tolerant assemblage. The dominant taxa were the midges *Orthocladius* spp. and *Cricotopus* spp., which are typically associated with filamentous algae. Mild nutrient enrichment is suggested by these findings. The metals tolerance index value (5.13) was higher than the BIV; however, several heptageniid mayflies (*Rhithrogena* sp., *Cinygmula* sp., *Nixe* sp), and immature larvae were present. Metals contamination probably does not influence the invertebrate assemblages in this reach. The thermal preference of the benthic community was calculated at 15.2ºC.

Both caddisflies (nine unique taxa) and "clingers" (23 taxa) were well-represented. These findings suggest that stony substrate habitats were not extensively compromised by sediment deposition. Overall taxa richness (57) was high, suggesting diverse instream habitats. Similar to the other sites in this study, semivoltine taxa (six taxa) were well-represented, indicating stable instream environments without recent scouring or thermal extremes. Gatherers dominated the functional composition of the assemblage, but all other expected feeding groups were also present.

Metals-tolerant taxa were among the most abundant diatoms at the Turah site on the Clark Fork River. These taxa included *Cymbella excisa* and *Epithemia sorex*. Altogether, metals-tolerant diatoms in nine taxa accounted for 39.5 percent of the sampled assemblage, and suggested an impairment probability of 77.6 percent, using the criteria proposed by Teply and Bahls (2005). *Cladophora* sp. and *Stigeoclonium* sp. dominated the non-diatom algal component, suggesting nutrient enrichment.

3.4 Conclusions

- Based on the analysis of benthic macroinvertebrate and periphyton samples collected from sites within the CFROU in September 2011, the following can be concluded:

- Four sites did not meet the remedial actions goal stated in the Clark Fork River Monitoring Plan (i.e., a score above 80 percent for the metals pollution subset). These sites were: SBC at Warm Springs (SS-25) with a mean score of 75 percent; Clark Fork River at Gold Creek (CFR-53C) (score 69.4 percent); Clark Fork River at Drummond (CFR-84F) (score 72.2 percent); and Clark Fork River at Turah (CFR-116A) (score 68.1 percent). Sites with mean scores that meet the remedial actions goal were the Clark Fork River at Galen, Clark Fork River at Deer Lodge, and Clark Fork River at Garrison.

- On the basis of the taxonomic composition of the macroinvertebrate faunae and the performance of the metals tolerance index, the influence of metals contamination could not be ruled out at the SBC site, nor at the Clark Fork River sites at Galen, Deer Lodge, Garrison, Gold Creek, and Drummond, but appeared to be less likely at the Turah site.

- The various indices employed in this study gave highly variable results in terms of classifying the degree of impairment at Clark Fork River sites. Some indices (e.g., the MVFP and Bukantis indices) may not be appropriate for a high-order riverine system.

- The Clark Fork River site at Turah had the lowest mean score among sites for the metals subset of the McGuire index, and diatom metals-increasing taxa were most abundant there. Probability for metals impairment was estimated at 77.6 percent at this site by the criteria proposed by Teply and Bahls (2005). Diatoms are not currently used by MDEQ as a tool for assessing metals contamination.

- Based on the mean of the coefficient of variation for scores among replicates at each site, McGuire's index for overall biointegrity gave the most consistent results. The Bukantis (1998) index results were the most variable.

- Narrative ecological interpretations of the macroinvertebrate faunae demonstrated probable habitat and water quality conditions that were not readily apparent from index scores alone. These included evidence of metals contamination at Galen, Deer Lodge, and Garrison; and evidence of filamentous algae and nutrient enrichment at Deer Lodge, Garrison, Drummond, and Turah.

4.0 UPPER CLARK FORK RIVER CAGED FISH STUDY: THE DISTRIBUTION AND TIMING OF TROUT MORTALITY[2]

4.1 Introduction

Trout diversity, health, and survival in the Upper Clark Fork River have been well studied (Phillips & Lipton, 1995; Louma et al., 2008). Hillman et al. (1995) documented reduced densities and species of trout in the Clark Fork River as a result of mining. Farag et al. (1995) investigated the bioaccumulation of metals in brown trout, and found copper levels in tissues of trout from two Clark Fork River sites to be higher than those in control sites. Levels of copper were also found to be higher at the contamination source and to decrease downstream. Higher copper concentrations were detrimental to growth and reproduction.

Study cages (treatment, replicate and replacement) located on the Clark Fork River near Turah, Montana in July 2011.

Metals pollution has resulted in low trout species diversity and brown trout dominance throughout most of the Upper Clark Fork River. Comparisons between rainbow trout and brown trout consistently show brown trout to be more tolerant of metals pollution. Rainbow trout were less likely to survive pulse events mimicking thunderstorms (Marr et al., 1995a; Marr et al., 1995b). Brown trout were shown to have increased metallothionein (metals binding proteins that protect against metals toxicity) in water with elevated metals, whereas rainbow trout did not. Farag et al. (1995) found brown trout from the Clark Fork River possess elevated metallothionein as well. Both rainbow trout and brown trout avoided water with elevated metals, but rainbow trout consistently selected clean water despite acclimation to the elevated metals concentrations (Woodward et al., 1995a; Louma et al., 2008).

Diet is a significant avenue for the bioaccumulation of metals (Louma et al., 2008). In laboratory trials, young trout were fed invertebrates collected from the contaminated Clark Fork River. The laboratory specimens exhibited similar lipid peroxidation (i.e., cell damage) to wild trout in the Clark Fork River (Farag et al., 1994; Woodward et al., 1995b). Thus, it is likely fish in the Clark Fork are also exposed to metals through their diet. Laboratory specimens also exhibited reduced growth and survival due to metals exposure, and the same effect is suggested on trout in the Clark Fork River.

Water borne exposure to metals has acute and chronic effects on trout. Laboratory experiments have simulated the effects of pulse and chronic exposure to metals in the water column (Marr et al., 1995a; Marr et al., 1995b). Young trout exhibited significantly reduced survival when exposed to metal concentrations similar to those documented in the Clark Fork River. Sub-lethal metal concentrations can also reduce growth rates (Marr et al., 1995a; Marr et al., 1995b).

[2] Section 4.0 was prepared by Montana Fish, Wildlife, and Parks, with minor edits and formatting completed by Atkins.

Mayfield and McMahon (2010, 2011) documented high mortality rates for adult trout radio-tagged in the Clark Fork River. Greater than 50 percent of the trout tagged in April expired by fall. Much of the mortality occurred during high spring discharges and again when water temperatures rose on the descending limb of the hydrograph (Mayfield & McMahon, 2010; Mayfield & McMahon, 2011). Similar results have been shown recently in fish cages at Turah on the Clark Fork River where trout mortality was higher during the low elevation run-off and on the descending limb of the hydrograph as water temperatures rose (D. Schmetterling, FWP, personal communication).

Recent population surveys on the Clark Fork River have documented declines in trout abundance and fewer young trout than expected in a section below the Warm Springs Ponds (Lindstrom, 2011). Other sections of the Clark Fork and tributaries had stable populations suggesting a localized decline in fish densities below the ponds. The low density of young trout may be indicative of metals pollution as young fish are more susceptible to metals poisoning than larger, older trout (Louma et al., 2008).

Phillips and Spoon (1990) performed caged fish studies in the Clark Fork River during the spring of 1986 through 1989. Mortality was consistently high at Beavertail and consistently low at Clinton, Montana below Rock Creek. However, mortality elsewhere varied in space and time, and was not related to metal concentrations. Mortality rates were not consistently higher than controls in cages at Gold Creek and Warm Springs. These results demonstrate the area of the Clark Fork affected by mine wastes, as well as the spatial and temporal variability within that area.

Although metals concentrations (including copper) continue to exceed acute and chronic aquatic toxicity criteria in the Clark Fork River (PBS&J, 2010b), other conditions have changed. Cleanup work on SBC, and possibly other conditions, may currently affect mortality rates at sites in the Clark Fork River. In addition, assessment of potentially confounding factors that may lessen the response of trout populations to metals cleanup, and maintain high mortality in the mainstem, is warranted. For example, ammonia toxicity and low DO from nutrient loading, effectiveness of the Warm Springs Ponds to manage metals and ammonia contamination, or a synergistic effect of environmental conditions that are made fatal by the addition of metals or ammonia pollution. A more current and complete understanding of mortality rates would aid in planning and monitoring Clark Fork River remediation efforts.

In 2011, FWP received funding from MDEQ to implement in situ toxicity testing (fish cages) to help assess the effects of current levels of metals contamination in the Clark Fork River on the mortality of fishes, and to use this information as pre-impact monitoring data for the assessment of remediation. The monitoring objectives were to:

1. Determine mortality rates of fingerling brown trout in the upper Clark Fork River at seven sites from Warm Springs Ponds to Turah, three control streams and one handling control site.
2. Identify water quality factors affecting the mortality rates of young trout, including non-metal stressors.
3. Collect data on the pre-remediation condition to allow for adequate before-after, control-impact assessment.
4. Examine the spatial distribution of mortality rates to better understand the influence of Warm Springs Ponds and dilution from tributaries on the mortality of young trout.
5. Provide information to remediation project managers that will aid in the planning and implementation of cleanup efforts.

4.2 Methods

4.2.1 Cage Construction

Thirty-six wooden cages were constructed in late winter 2011. The cages resembled those used by FWP on the Middle Clark Fork River, but were 34 percent larger to accommodate the brown trout used in this study (Figure 4-1). The internal volume of the cages was 0.75 ft^3 (actual volume of water available). Knotless nylon seine material (1/16 inch bar mesh) was used for the netting on the sides and bottom of the cages. Cages were also fitted with floats to provide buoyancy.

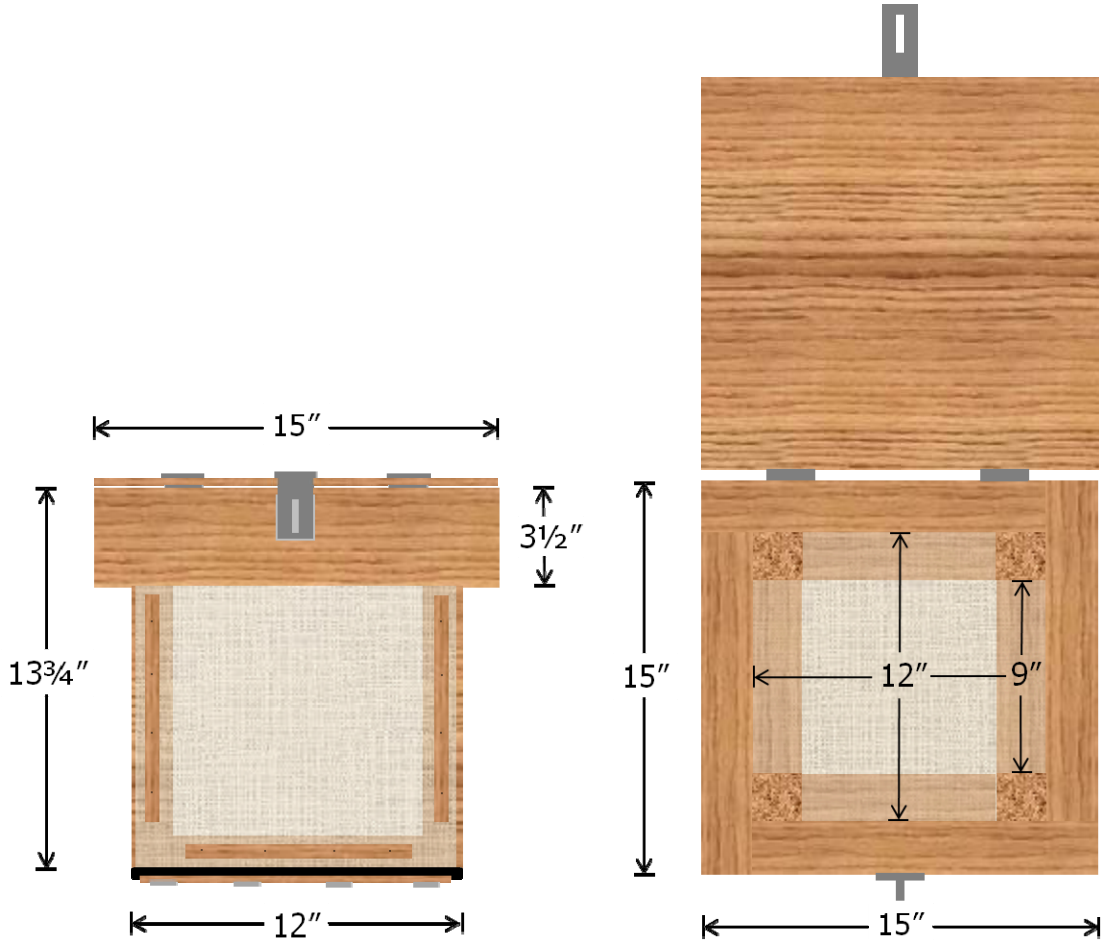

Figure 4-1. Dimensions of the cages constructed for the study.

4.2.2 Study Sites

Cages were deployed at 11 locations in the Upper Clark Fork River Drainage in late March 2011 (Figure 4-2). Seven treatment sites were located on the Clark Fork River:

1. Downstream of the Warm Springs Ponds (upstream of Warm Springs Creek),
2. Galen, Montana,
3. Deer Lodge, Montana,
4. Upstream of the Little Blackfoot River,
5. Downstream of Gold Creek,

6. Bearmouth, Montana,
7. Turah, Montana.

Three control sites were located on tributaries:

1. Lower Little Blackfoot River,
2. Lower Flint Creek,
3. Lower Rock Creek.

One handling control site was located in a spring-fed channel:

1. Clinton, Montana.

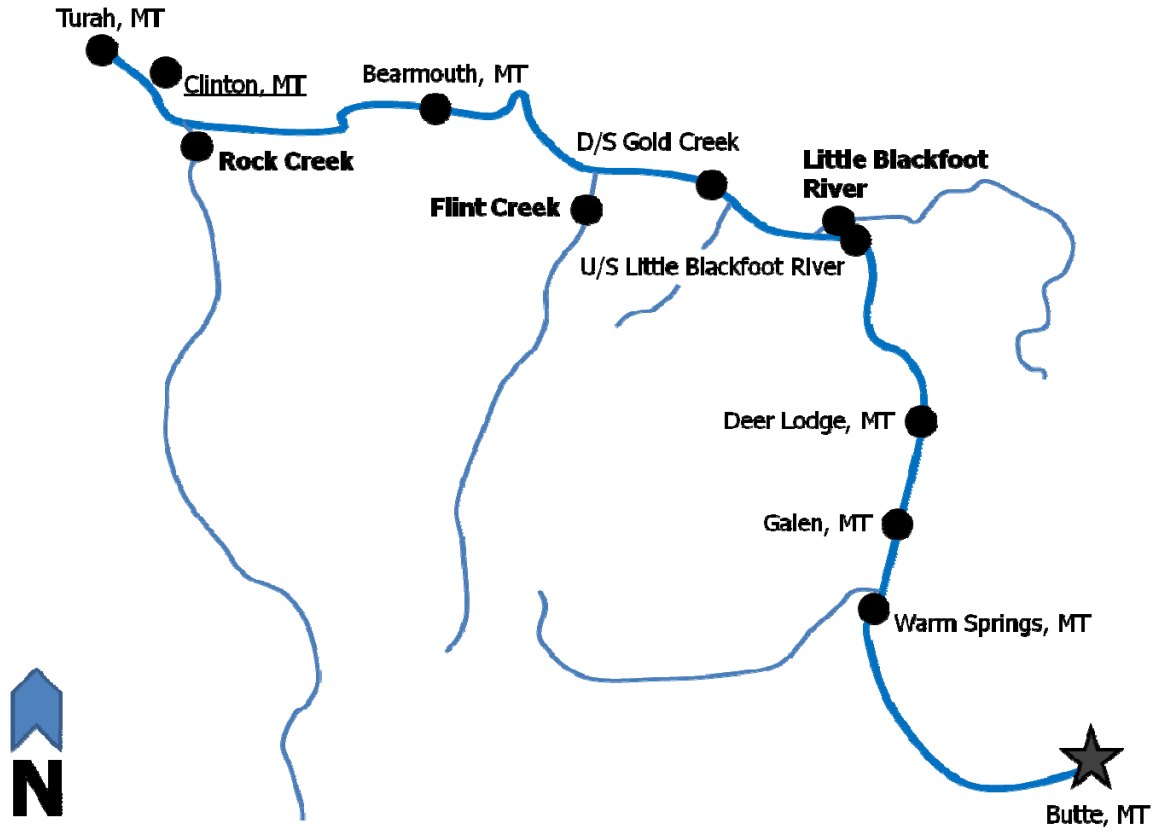

Figure 4-2. Distribution of the 11 study sites in the Upper Clark Fork River Drainage.
Control sites are shown in bold and the handling control is underlined.

All sites except the spring channel near Clinton, Montana (handling control), were located near USGS gauging stations equipped to measure discharge four times per hour. The handling control served as a reference to adjust mortality rates if cage checks (e.g., cleaning and relocating) negatively impacted survival, independent of water quality.

4.2.3 Deployment

Exact locations of the cages were dependent on the availability of low velocity habitats with access to refuge during periods of high runoff. Cages were positioned in velocities less than 0.75 feet per second (ft/s). Three cages were deployed at each site. Two served as treatment cages (i.e., one replicate) and the third held fish for histology specimens and replacement of

individuals in the treatment cages. The study began with 25 brown trout per cage and these densities were maintained in the treatment cages as long as possible by replacing them with individuals from the replacement cage. Cages were secured with sections of reinforcing bar (rebar) driven into the substrate, as well as sash weights and tether lines (Figure 4-3). The sash weights provided additional anchoring during rising water levels, and tether ropes ensured the cages were not completely lost should a flood event occur.

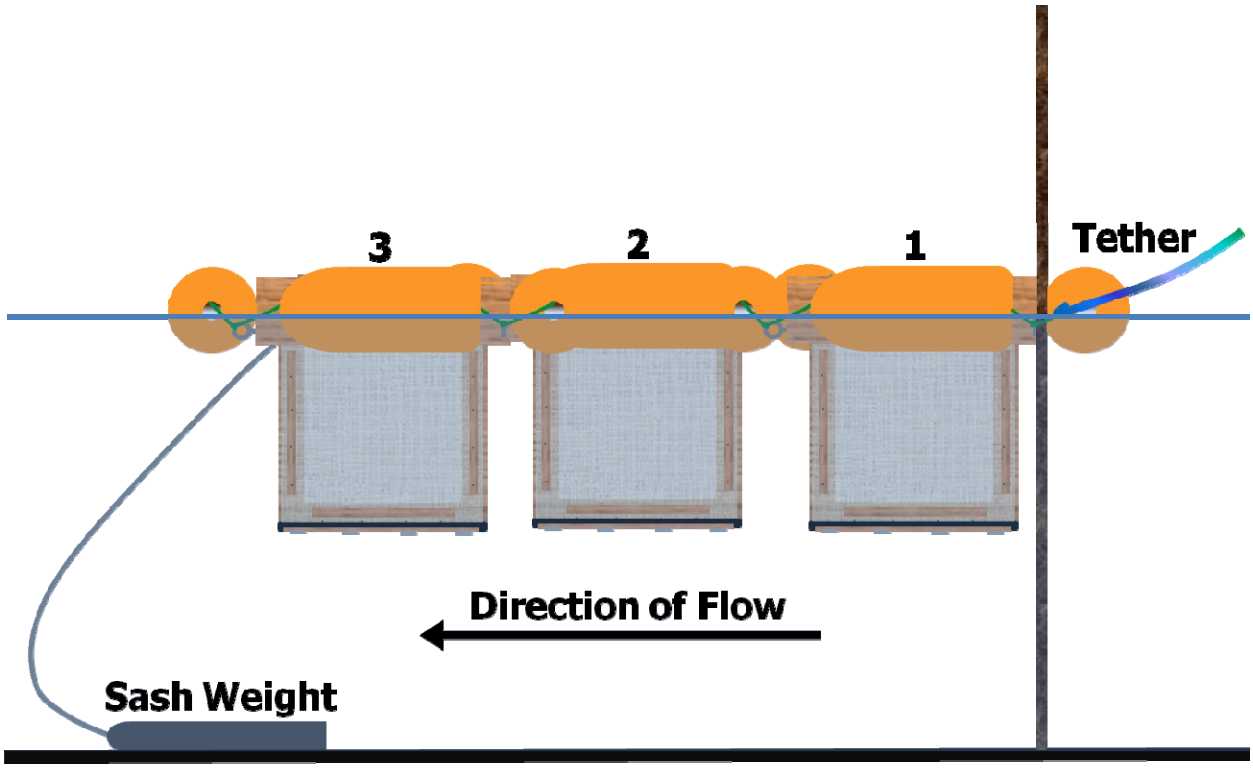

Figure 4-3. Representation of cage deployment.
(arrangement of cages differed by site, and cages often drifted together).

Brown trout were selected for this study given their dominance in the Upper Clark Fork River. Due to low densities of young trout in the upper river, study specimens were obtained from a state hatchery. The fingerlings ranged from 50–85 mm and were feed-trained on pelleted food upon delivery.

On March 30, approximately 900 fingerling brown trout were obtained from Big Springs Hatchery in Lewistown, Montana. The trout were transported from the hatchery to Helena, Montana in a hauling truck and from Helena to the sites in an aerated cooler. At each site trout were anesthetized with clove oil, measured to total length, and divided into one of the three cages. Prior to being anesthetized, fish were acclimated to the site's water temperature with the addition of onsite water. At the first site stocked, the hatchery water was 8.2°C and water temperatures at the sites ranged from 4.8°C–8.6°C. Mean length of trout stocked in cages was 68 mm.

On March 31, a large rain event in the upper Little Blackfoot River drainage caused the Little Blackfoot to rise dramatically, washing the cages up on the bank. The cages were re-stocked with brown trout from Big Springs Fish Hatchery on April 4 (mean length was again 68 mm).

4.2.4 Mortality Monitoring

Beginning the week of April 4, trout mortality was monitored twice per week. At each visit trout were fed one tablespoon of pelleted trout feed. During the first three months trout were fed 1.0 mm sinking feed (Silver Cup Extruded Salmon). The remaining months, trout were fed slightly larger No. 3 sinking feed (Silver Cup Crumbled Salmon/Trout). As discharges varied at the sites, cages were repositioned to seams and eddies with reduced velocities. Velocities around the cages were measured periodically to ensure velocities did not exceed 0.75 ft/s. The exterior of the cages were brushed clean as needed to ensure exchange of water in the cages. Mortalities were replaced with individuals from the replacement cage (Cage 3). Mortalities were measured to total length and frozen. All specimens were labeled and archived in a freezer at the Region 2 FWP headquarters.

4.2.5 Water Quality

Water samples were collected three times at each of the 11 sites. Collections roughly coincided with low-elevation runoff (ascending limb of the hydrograph), peak runoff and the descending limb of the hydrograph (Figure 4-4). Grab samples were collected for the caged fish study on May 10, June 30 and August 1, using the techniques outlined by the MDEQ Field Procedures Manual for Water Quality Assessment Monitoring (MDEQ, 2005). All samples were delivered to Energy Laboratories Inc. in Helena, Montana, within 6 hours of collection. Samples were analyzed for dissolved and TR metals including copper, arsenic, lead, cadmium, and zinc, as well as total ammonia nitrogen (NH3-N). Atkins collected additional water data under a contract for MDEQ during the quarterly monitoring of the CFROU, and this data is available in a comprehensive report published by Atkins (Figure 4-4; Atkins, 2012).

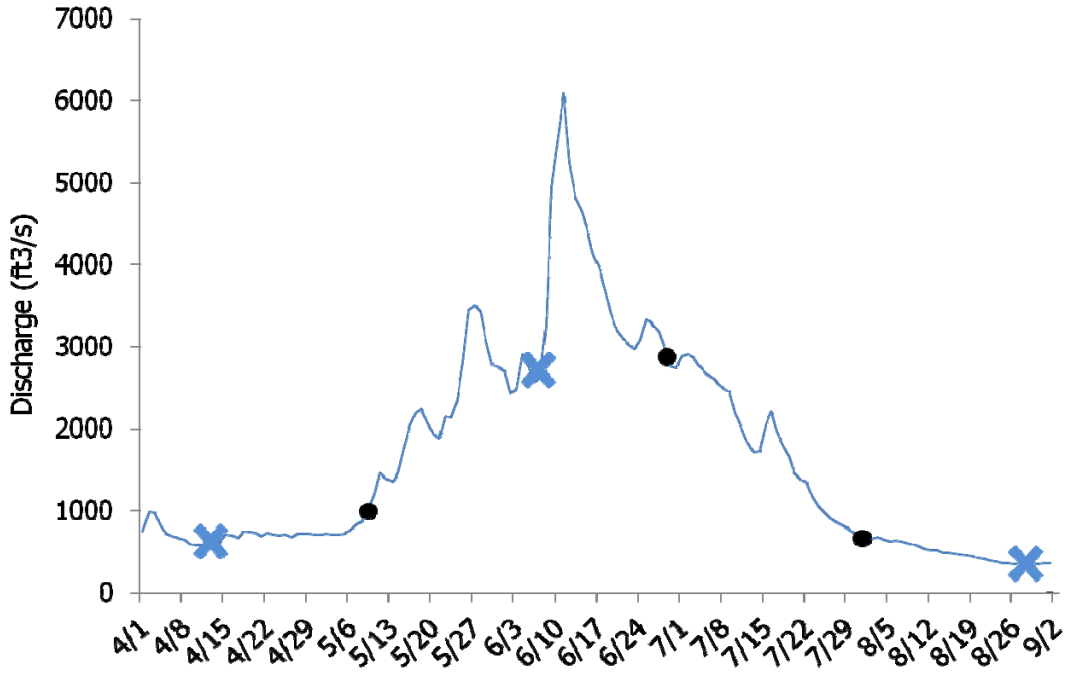

Figure 4-4. Clark Fork River hydrograph at the Gold Creek gauging station.
(roughly the midpoint of the study section). Black dots represent FWP and blue crosses represent Atkins collections.

Freshwater ALS were obtained from the table of standards for Montana waters or calculated using the hardness relationships described by MDEQ (2010). The standards presented in the results are the mean ALS values across sites by date. The Acute ALS values were calculated as:

Acute = exp.{ma[ln(hardness)]+ba}

Where ma and ba = values listed by MDEQ (2010). Similarly, the Chronic ALS values were calculated as:

Chronic = exp.{mc[ln(hardness)]+bc}
Where mc and bc = values listed by MDEQ (2010).

Maximum daily water temperatures were obtained for each site with water temperature data loggers (HOBO ® U22 Pro v2). Loggers were attached to the rebar securing the cages in the channel and the units were most often set 6–12 inches above the substrate. During mid- to late summer, however, rapidly falling water levels left loggers near the surface at a few sites. Thus, higher water temperatures recorded at sites during these instances may not be representative of the temperatures within the cages. Loggers found near the surface were repositioned on the rebar and the cages were often moved to deeper water. Due to logger malfunction at the Rock Creek control site, the first half of the 2011 temperature data was lost. A portion of this data was substituted with data available from the adjacent USGS station.

4.2.6 Discharge

Discharge data presented in this report were obtained from USGS gauge stations, recording measurements four times per hour. Estimates of mean daily discharge were downloaded from the USGS National Water Information System: Web Interface. All estimates presented in this

report were reviewed and approved for publication. Gaps in the Rock Creek dataset during June and July were the result of equipment malfunctions. No station exists at the site near Clinton, Montana.

4.2.7 Histology

Histology specimens were preserved to help link fish condition to observed mortality patterns and metals concentrations. Specimens were collected twice in 2011, once in early August after mortality rates rose in mid- to late July, and once in late August 2011 at the completion of the study season. Live specimens were placed in Davidson's solution, a combination of glacial acetic acid (100 ml), 95 percent ethyl alcohol (300 ml), 10 percent neutral buffered formalin (200 ml), and distilled water (300 ml). A slit was made in the belly of most specimens to ensure all organs were adequately preserved. After 72 hours, specimens were transferred into alcohol. Specimens were submitted to the Bozeman Fish Health Center in January 2012. The samples were examined for cellular changes, physical irritants, bacteria levels and copper accumulations, as well as the general condition of the gills, kidney, liver and skin.

4.2.8 Analysis

Statistical analyses of trout survival consisted of chi-square comparisons between observed and expected survival. Survival was used in place of mortality since three sites experienced zero mortality and chi-square calculations do not accommodate zero values. Survival was expressed as mean counts instead of mean percentages (number dead/25), since input data is standardized during the calculation of the chi-square statistic.

Relative contributions of tributaries were calculated with daily discharge data from 10 USGS gauges. These estimations were used to adjust the predicted survival values used in the analyses. Ratios of contribution were used to adjust expected values and the potential influence on trout survival. The predicted survival at Warm Springs was set at 25 (i.e., 100 percent) because no recent work provides an empirical value.

4.3 Results

4.3.1 Mortality Monitoring

Although cages were in place from April 1 to August 31, losses at the Galen site by June 20 yielded fewer than 25 fish in the replicate cage. Thus, survival was analyzed until mid-June when all replicate cages contained 25 individuals. Mean survival (cumulative until June 20) observed from the Warm Springs site downstream was as follows: 100 percent at Warm Springs, 70 percent at Galen, 98 percent at Deer Lodge, 98 percent upstream of Little Blackfoot River, 90 percent within the Little Blackfoot River, 98 percent downstream Gold Creek, 94 percent at Flint Creek, 100 percent at Bearmouth, 86 percent at Rock Creek, 100 percent at Clinton and 92 percent at Turah (Figure 4-5). No mortality had been observed at the Clinton handling control by June 20, and thus no adjustment was made to the cumulative survival observed at other sites.

Survival until June 20 displayed interesting trends. Survival remained high (100 percent) at the Warm Springs site, but fell to 70 percent at the Galen site only 1.5 miles downstream (Figure 4-5). By the Deer Lodge site, approximately 11.5 miles downstream survival recovered to 98 percent. The relatively high survival at the remaining mainstem sites indicated the need to split sites into groups for analyses. Thus, the sites upstream of the Little Blackfoot River (upper) were analyzed separately from the remaining sites downstream (lower). Relative contributions were quantified by mean discharge and used to adjust expected survival values. Adjustments were made for the three sites below tributaries and included Gold Creek, Bearmouth and Turah.

Chi-square analyses indicated expected survival until June 20 differed significantly from observed survival at the upper sites (P of 0.05), but did not differ significantly at the lower sites (P of 0.99), at alpha levels of 0.05. These results suggest a source of mortality exists at or above the Galen site and is diluted downstream.

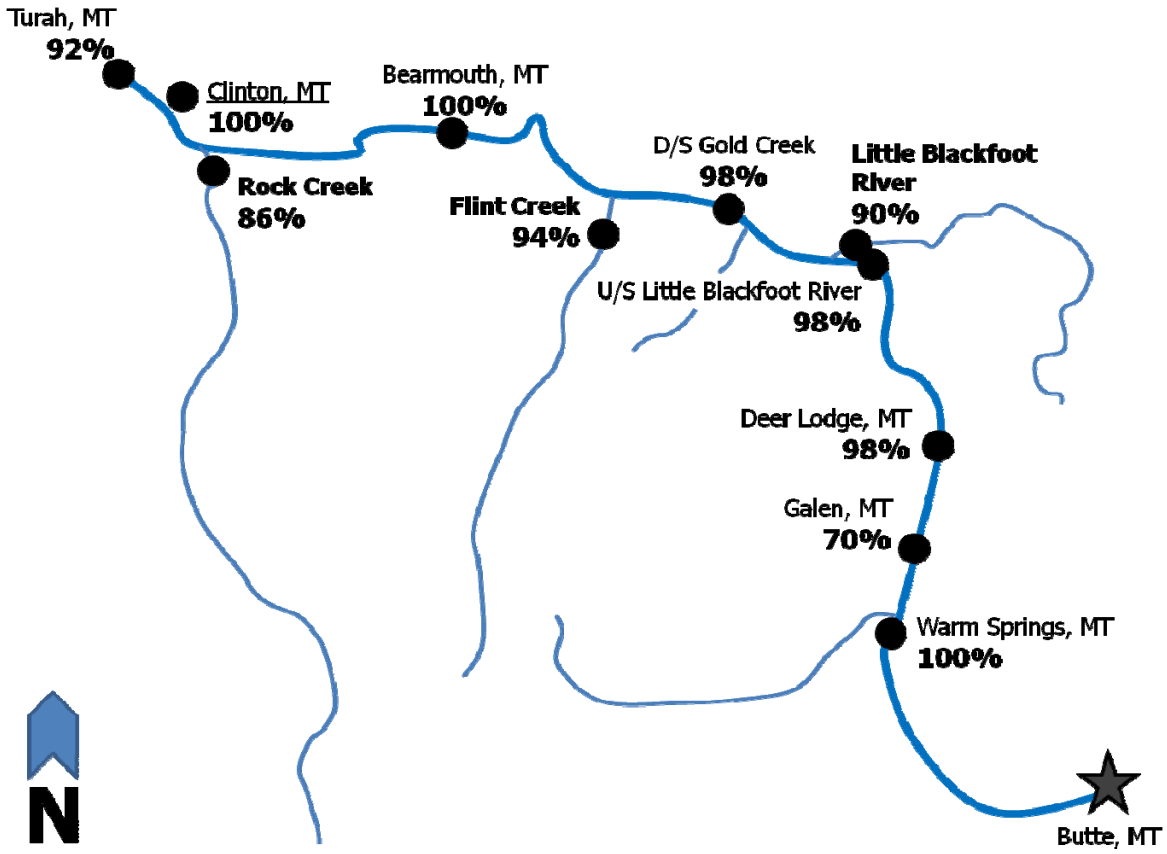

Figure 4-5. Mean survival observed until June 20, 2011.
Control sites are shown in bold and the handling control is underlined.

Figure 4-6 through Figure 4-15 illustrate the mortalities, maximum water temperatures and discharges observed during 2011. The dashed horizontal lines delineate 20°C and highlight instances where water temperatures may have become stressful. The black dots positioned along the hydrographs signify water sample collections and are useful in the water quality section of the report. Although mortalities were analyzed as means, they are plotted by cage (red and black) in the figures.

At the majority of sites, most mortality followed peak runoff as water temperatures rose. Sites deviating from this trend included the Galen, Little Blackfoot River and Flint Creek sites, which exhibited more consistent mortality throughout the study season. Survival at Rock Creek was unexpectedly low during 2011 (Figure 4-14). By June 20, Rock Creek was the second lowest in survival and beginning in mid-August survival fell dramatically. The cages at Rock Creek were located in a side-channel with some spring influence.

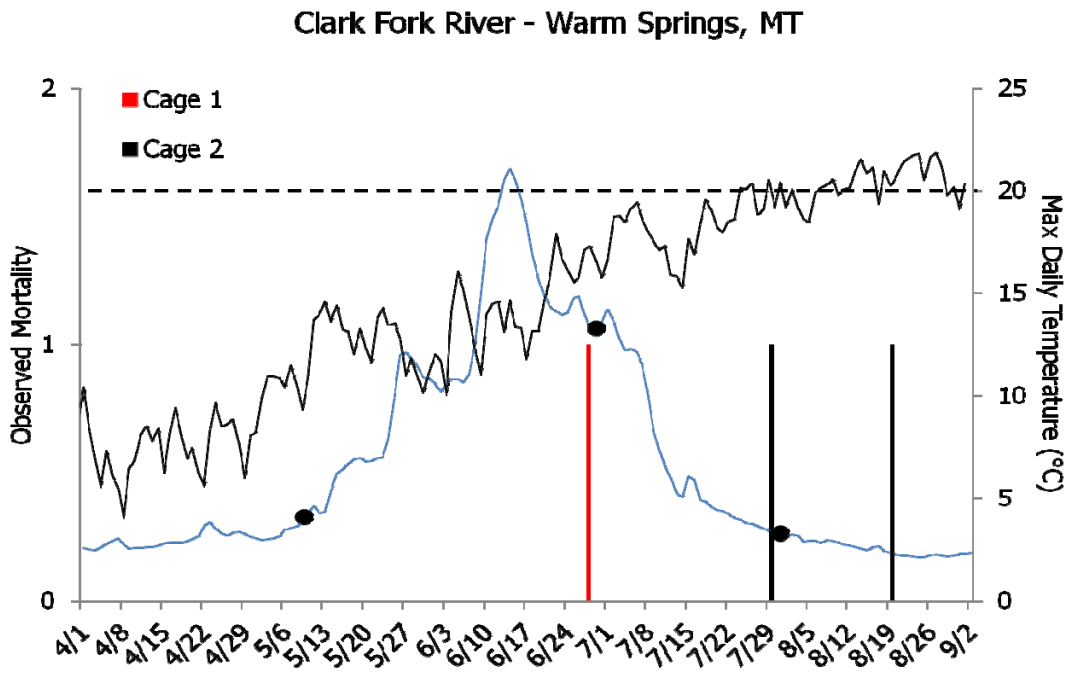

Figure 4-6. Mortalities, water temperatures (black) and discharges (blue) observed at the Warm Springs site located upstream of Warm Springs Creek.

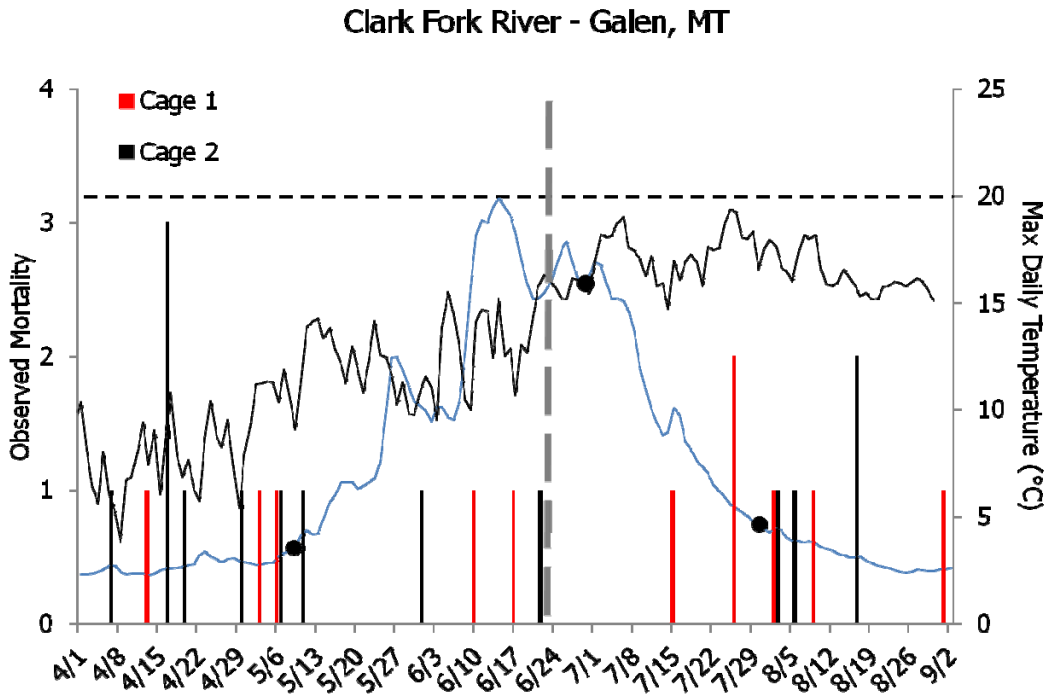

Figure 4-7. Mortalities, water temperatures (black) and discharges (blue) observed at the Galen site near Perkins Lane.
The vertical dashed line on June 23 represents the date when Cage 3 was emptied.

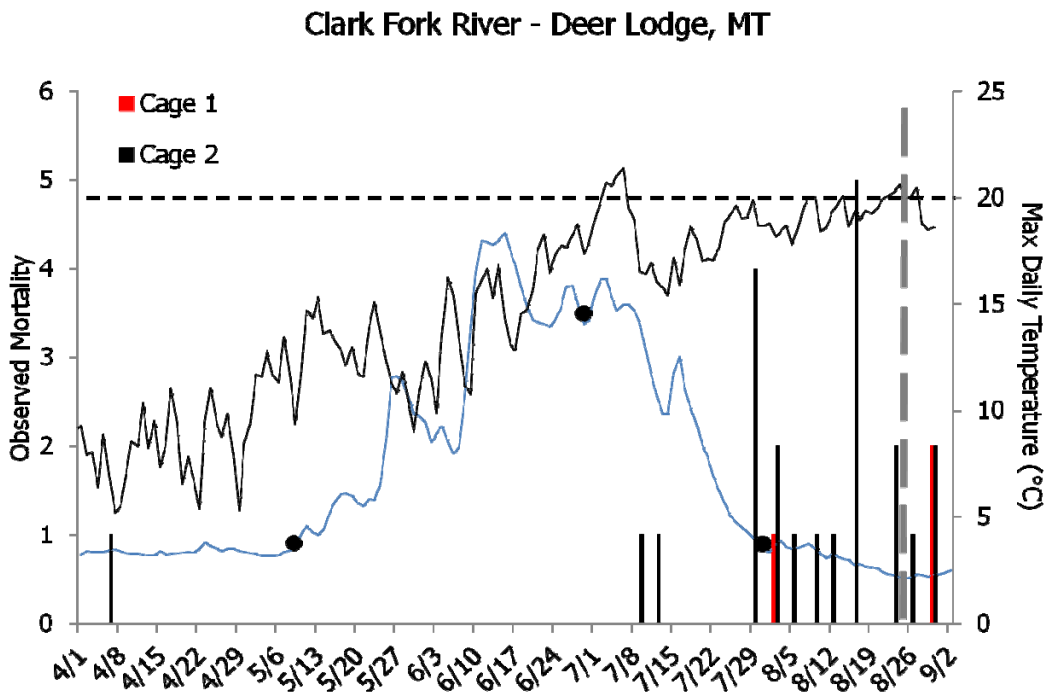

Figure 4-8. Mortalities, water temperatures (black) and discharges (blue) observed at the site upstream of Deer Lodge, MT.
The vertical dashed line on August 25 represents the date when Cage 3 was emptied.

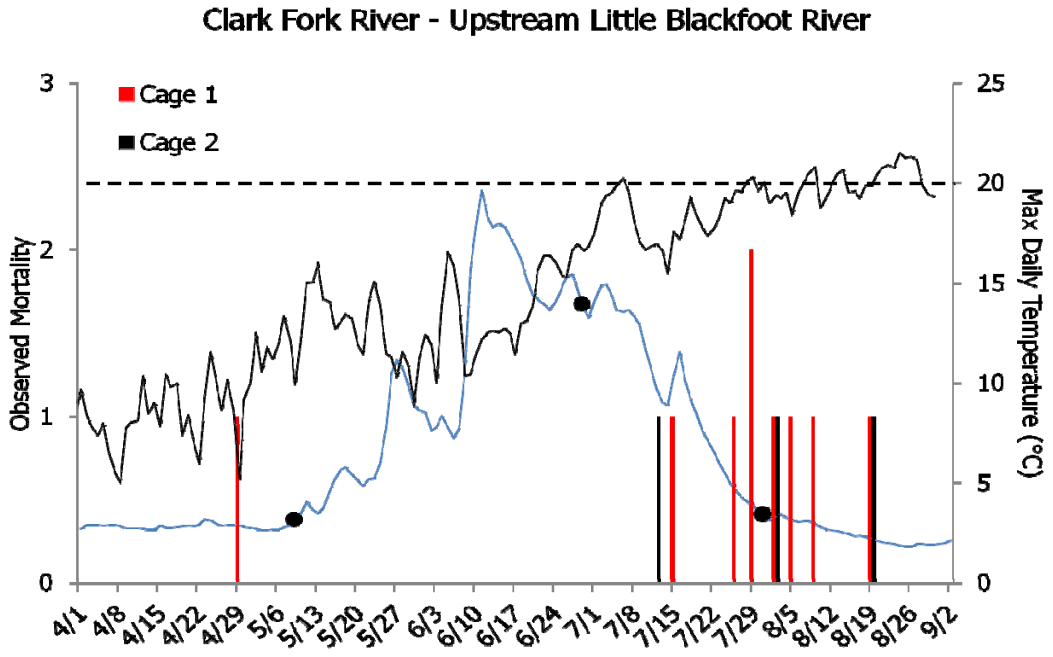

Figure 4-9. Mortalities, water temperatures (black) and discharges (blue) observed at the site upstream of the Little Blackfoot River.

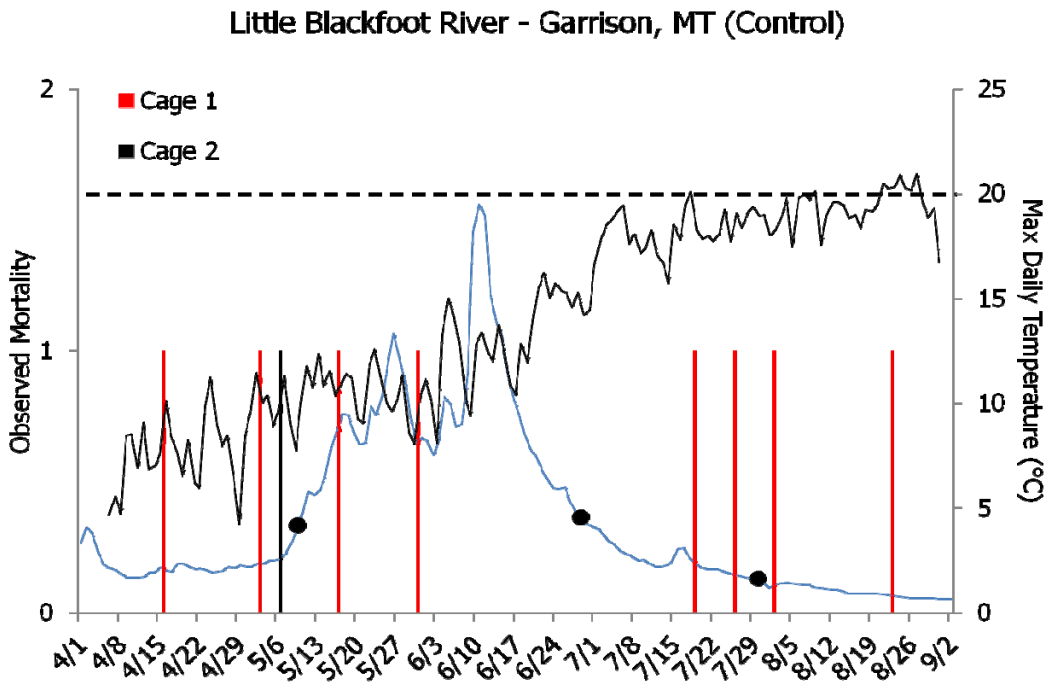

Figure 4-10. Mortalities, water temperatures (black) and discharges (blue) observed in the Little Blackfoot River.

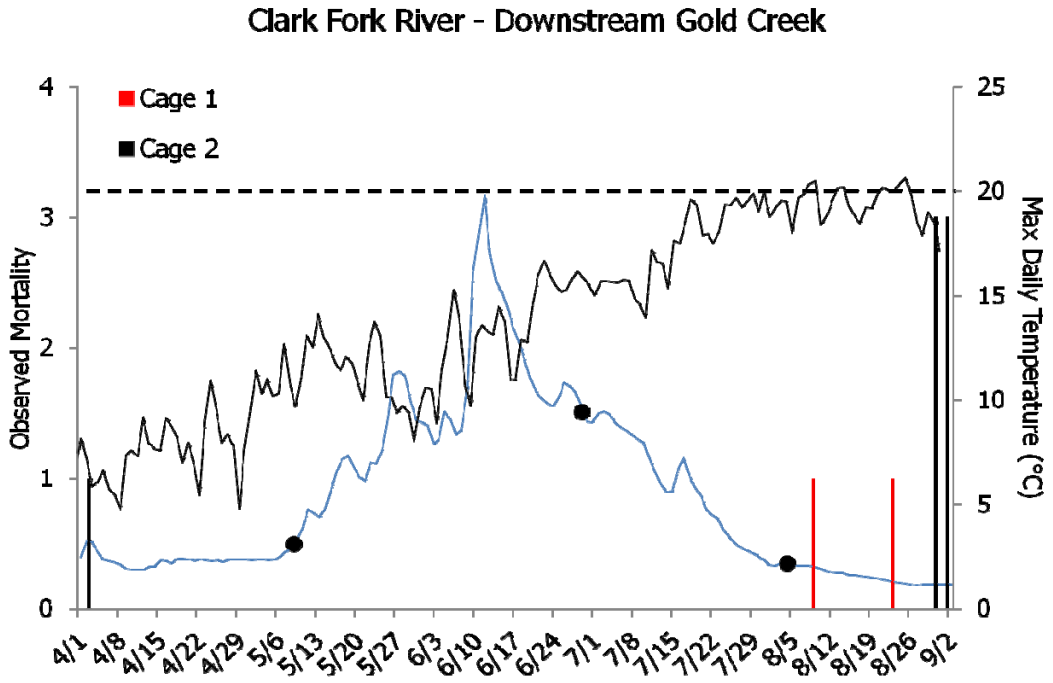

Figure 4-11. Mortalities, water temperatures (black) and discharges (blue) observed in the Clark Fork River downstream of Gold Creek.

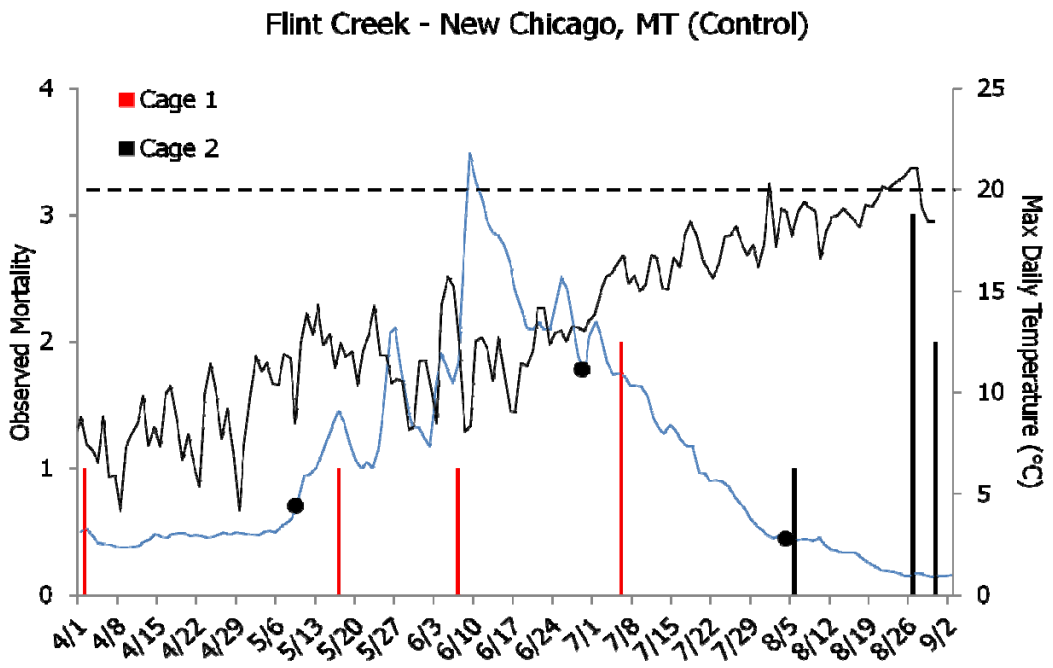

Figure 4-12. Mortalities, water temperatures (black) and discharges (blue) observed in Flint Creek.

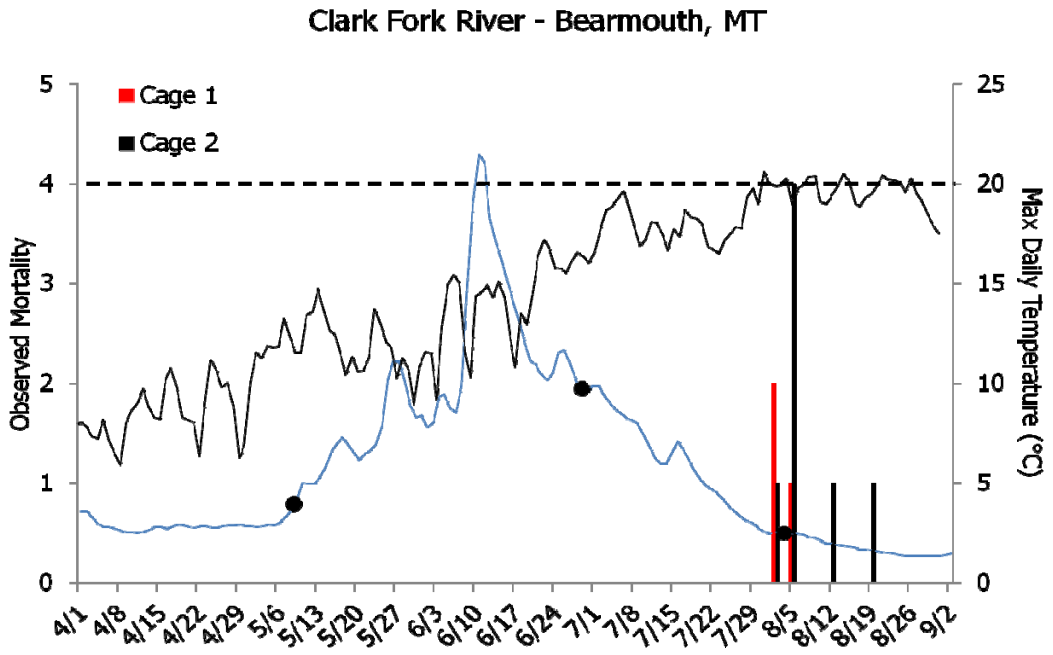

Figure 4-13. Mortalities, water temperatures (black) and discharges (blue) observed in the Clark Fork River near Bearmouth, MT.

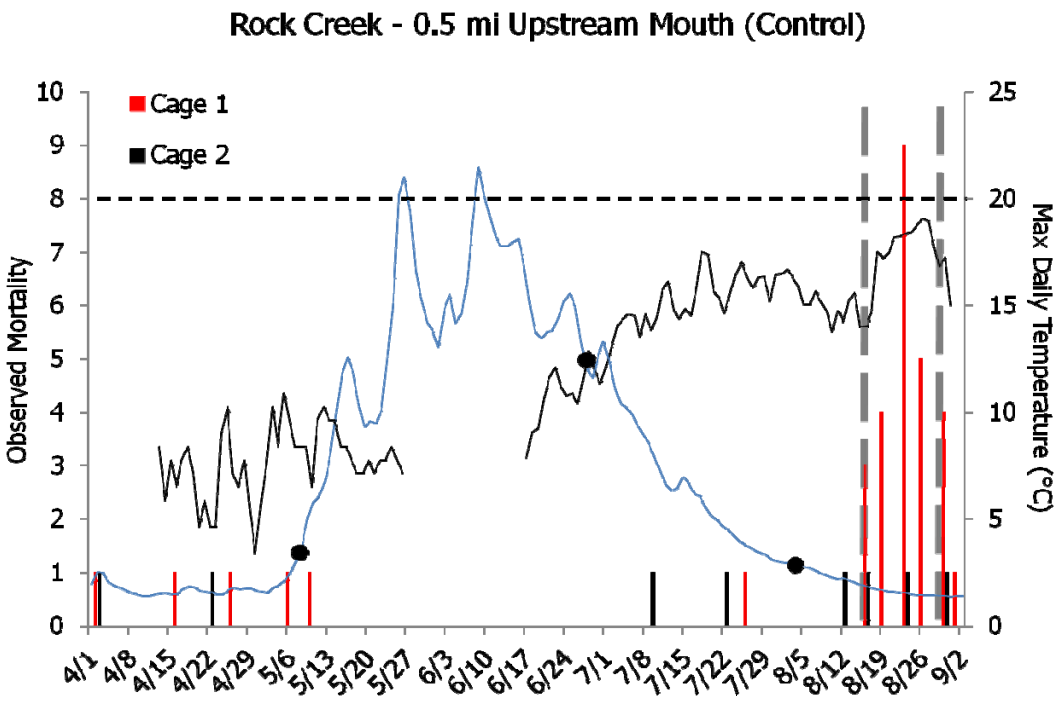

Figure 4-14. Mortalities, water temperatures (black) and discharges (blue) observed in Rock Creek.

The vertical dashed lines on August 15 and 20 represent the dates when Cage 3 and Cage 2 were emptied, respectively. The missing temperature data were the result of equipment malfunctions. Temperature data before June 17 was obtained from the USGS gauging station.

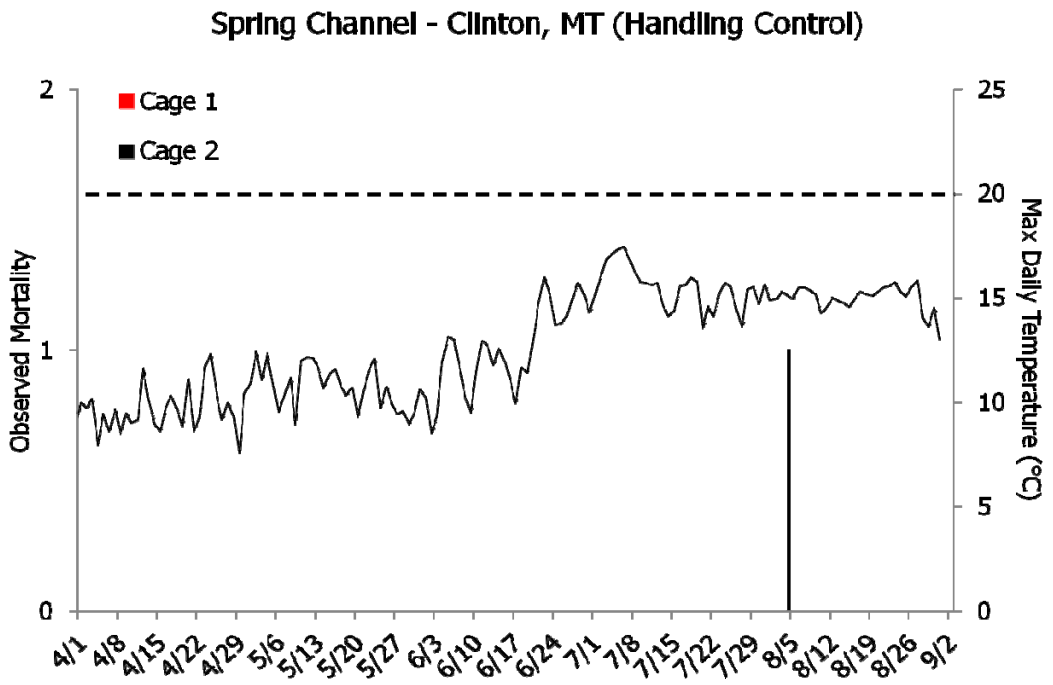

Figure 4-15. Mortalities, water temperatures (black) and discharges (blue) observed in the spring channel near Clinton, MT.

4.3.2 Growth

Initial lengths were measured at all the sites on March 31. Individuals were also measured during the second stocking of the Little Blackfoot cages on April 4. Final lengths were measured on either August 31 or September 1. A one-way Analysis of Variance indicated initial lengths differed among sites (mean range: 64–70 mm). Thus, growth was evaluated by mean change in total length (Figure 4-16). Growth varied by site and appeared to be related to location on the mainstem. Growth at the mainstem sites followed a decreasing trend from upstream to down, and growth in the tributary and handling control sites was slightly faster than at adjacent mainstem sites.

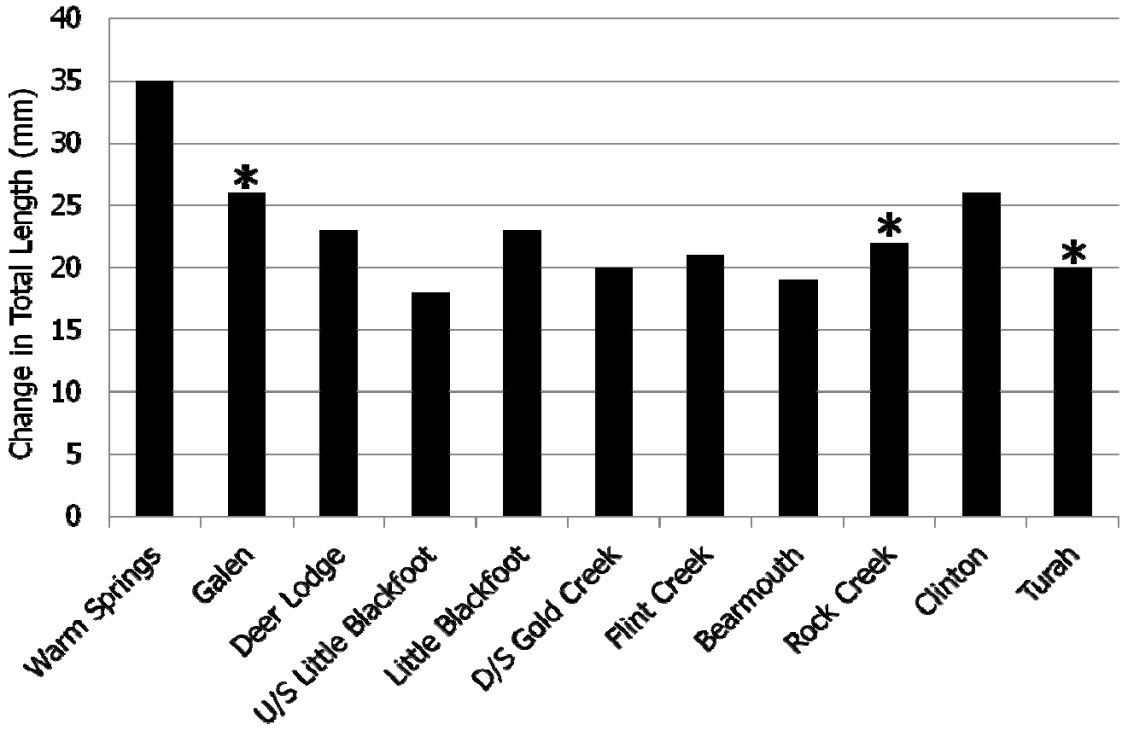

Figure 4-16. Mean change in total length observed in 2011, arranged from upstream to downstream.
Asterisks denote estimates derived from means of one cage at the completion of the study. This occurred when fewer than 25 fish remained in the replacement cage (the original replicate cage).

4.3.3 Water Quality

Water samples collected during 2011 indicate concentrations of toxic metals were elevated or exceeded Freshwater ALS during the study. The ALS were calculated using the hardness relationships described by MDEQ or obtained from the table of standards for Montana waters (MDEQ, 2010). Aquatic Life Standards were calculated using the mean hardness values from across all sites at each sampling event. These values are represented by dashed horizontal lines or listed in the upper right in the following graphs. No water quality standards were listed for magnesium.

Arsenic concentrations exceeded neither the acute nor the chronic ALS, but often exceeded the HH/DW standard of 0.010 mg/L (Figure 4-17). Calcium concentrations varied across sites, but remained relatively low at the Rock Creek control site (Figure 4-18). Cadmium concentrations never reached the Acute ALS, but TR cadmium exceeded the chronic standard at five of the mainstem sites and approached the chronic standard at two additional sites in early May (Figure 4-19). Dissolved and TR cadmium concentrations at Deer Lodge exceeded the Chronic ALS in late June, as did TR cadmium in the Little Blackfoot River and at Gold Creek. Dissolved copper concentrations exceeded the Chronic ALS at Deer Lodge and upstream of the Little Blackfoot River and TR copper exceeded both standards at six mainstem sites in early May (Figure 4-20). All mainstem sites exceeded the Acute ALS for dissolved copper concentrations except for Turah in late June, and all mainstem sites, as well as the Clinton handling control, exceeded the Acute ALS for TR copper (Figure 4-20). Dissolved copper concentrations at the site upstream of the Little Blackfoot River exceeded the Chronic ALS, and TR copper exceeded the Acute ALS in early August. Total recoverable copper concentrations at the Galen and Deer Lodge sites

also exceeded the Acute ALS. Dissolved lead concentrations were low across all sites and seasons, but TR lead exceeded the Chronic ALS at all but three sites in early May and seven sites total in late June (Figure 4-21). Similar to calcium, concentrations of magnesium varied across sites, but remained relatively low at the Rock Creek control site (Figure 4-22). The Acute and Chronic ALS of zinc were calculated as the same value based on the constants presented by MDEQ (2010). Total recoverable zinc concentrations exceeded the Acute/Chronic ALS once in early May at the Bearmouth site (Figure 4-23). Both dissolved and TR zinc concentrations at Deer Lodge exceeded the combined ALS in late June. All dissolved and TR zinc levels were below standards in early August. Ammonia (NH3-N) was only detected at the Deer Lodge site on May 10 at a concentration of 0.06 mg/L.

At low gradient sites on the mainstem, small changes in discharge often yielded relatively large changes in elevation. In a few instances this left temperature loggers near the surface. Thus temperatures recorded between checks (once every 3–4 days) at these sites may not represent the exact temperatures experienced within the cages. Loggers were noted near the surface once at Warm Springs in mid-July, twice at Deer Lodge in mid- and late July, thrice at the site upstream of the Little Blackfoot River and once at Bearmouth in late July. With these caveats in mind, maximum daily water temperatures recorded exceeded 20°C at eight of the 11 sites (Figure 4-6 through Figure 4-15). On the mainstem, water temperatures exceeded 20°C on 27 days at Warm Springs, 11 days at Deer Lodge, 17 days upstream of the Little Blackfoot, nine days at Gold Creek, 12 days at Bearmouth and five days at Turah. In control tributaries, water temperatures exceeded 20°C on 10 days in the Little Blackfoot, and eight days in Flint Creek.

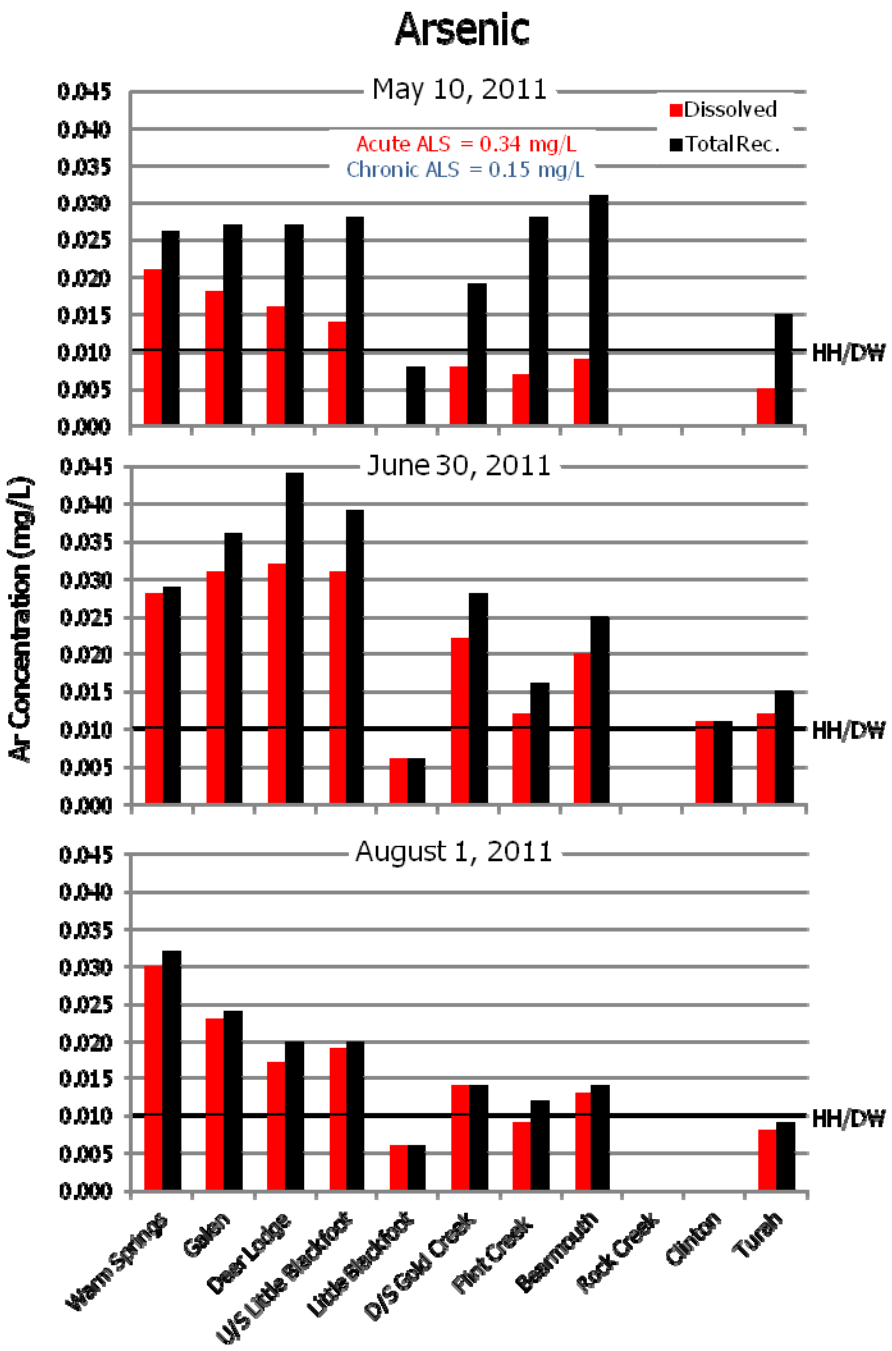

Figure 4-17. Arsenic concentrations at the 11 cage sites arranged from upstream to downstream.
The calculated Acute ALS and Chronic ALS were 0.34 mg/L and 0.15 mg/L, respectively.

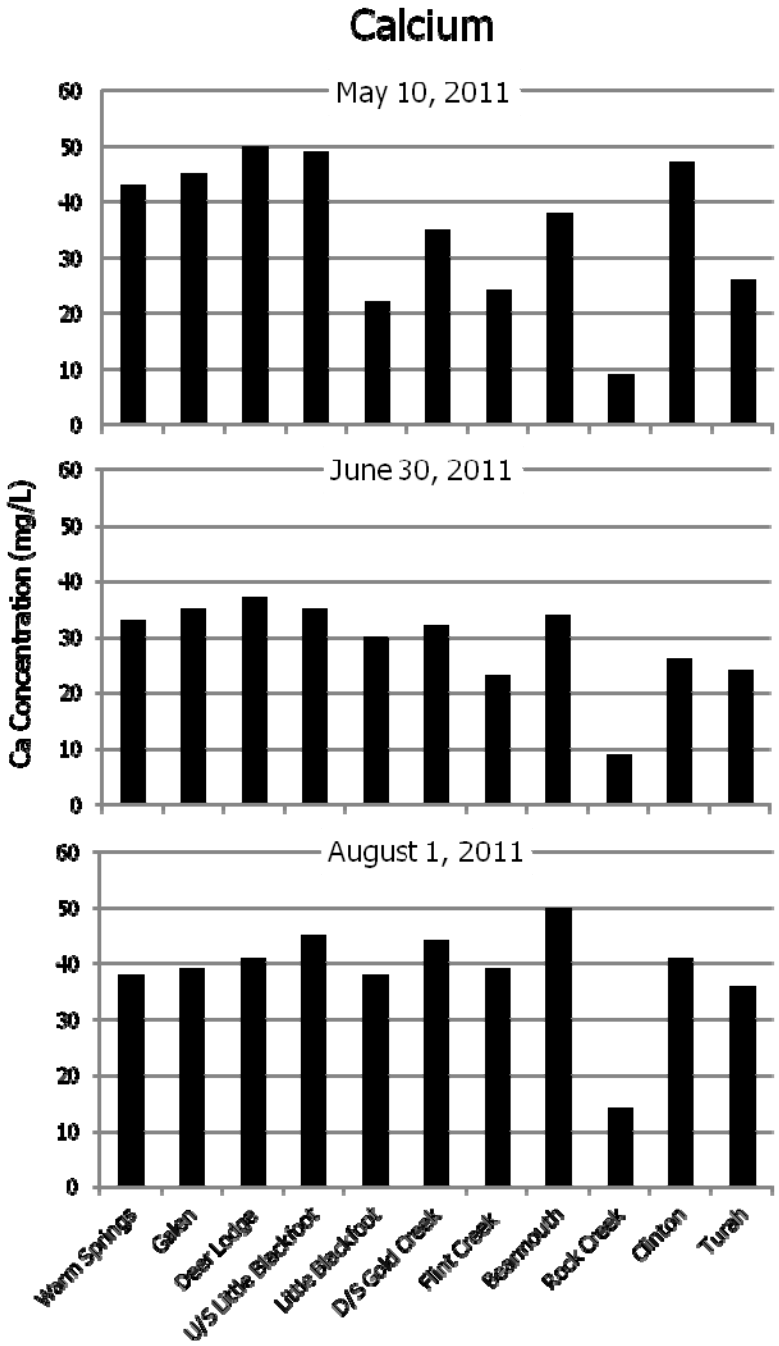

Figure 4-18. Calcium concentrations at the 11 cage sites arranged from upstream to downstream.

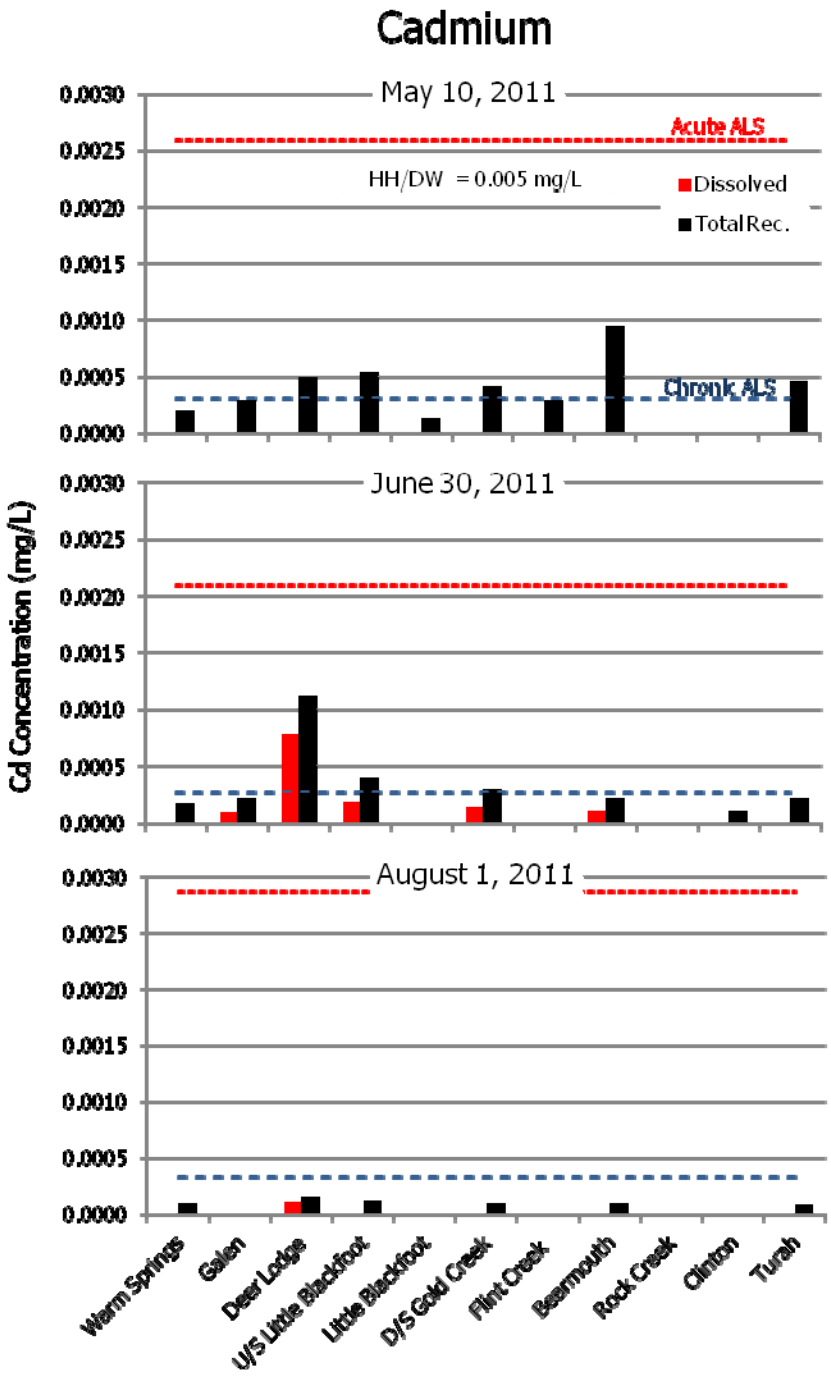

Figure 4-19. Cadmium concentrations at the 11 cage sites arranged from upstream to downstream.

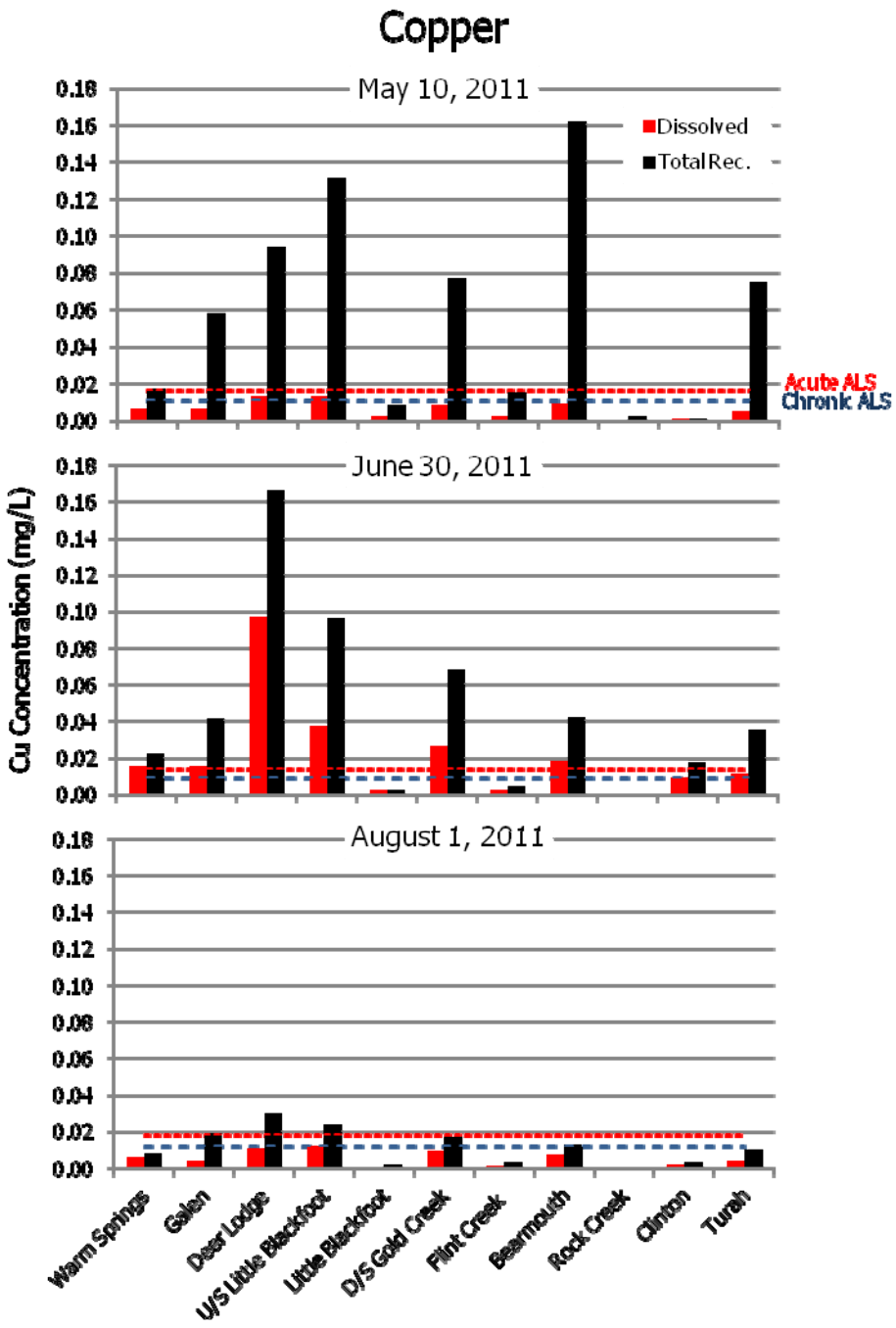

Figure 4-20. Copper concentrations at the 11 cage sites arranged from upstream to downstream.

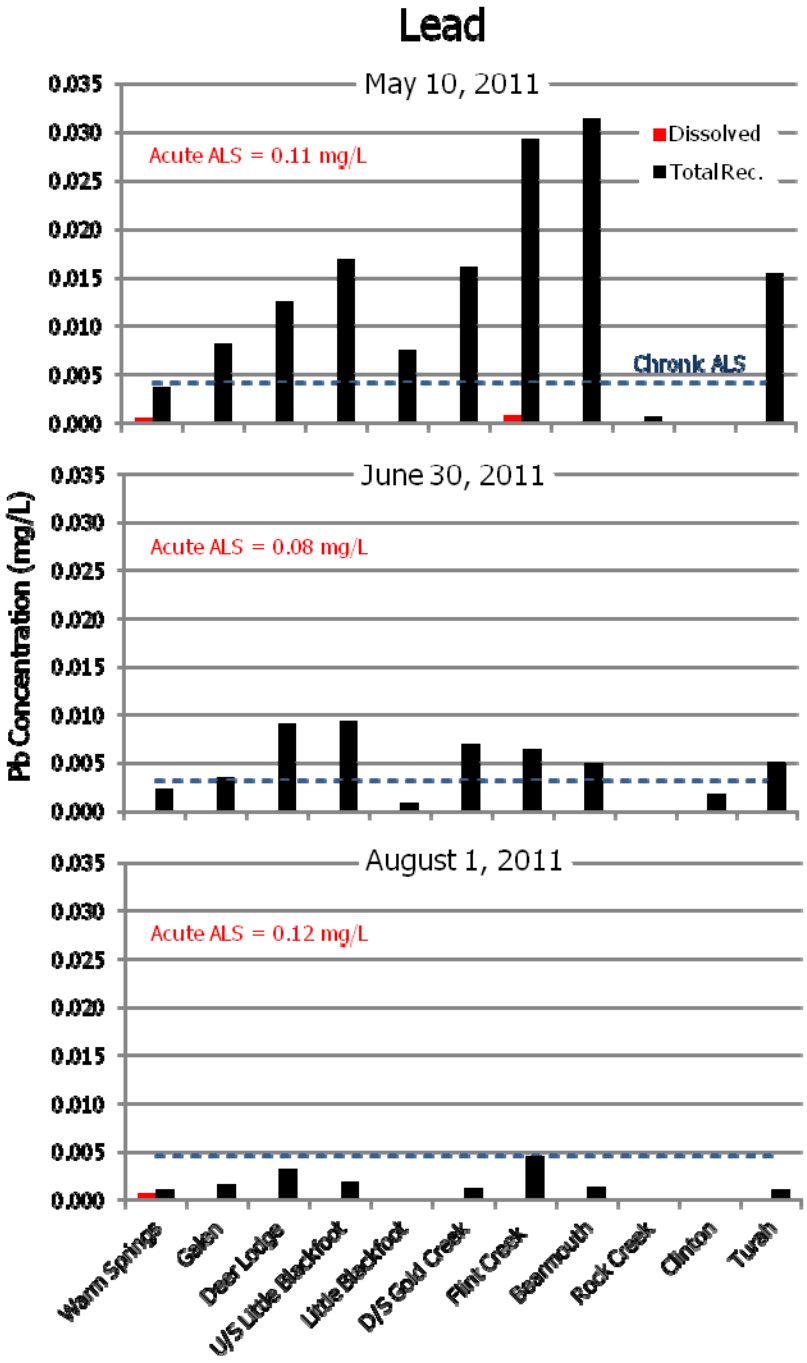

Figure 4-21. Lead concentrations at the 11 cage sites arranged from upstream to downstream.

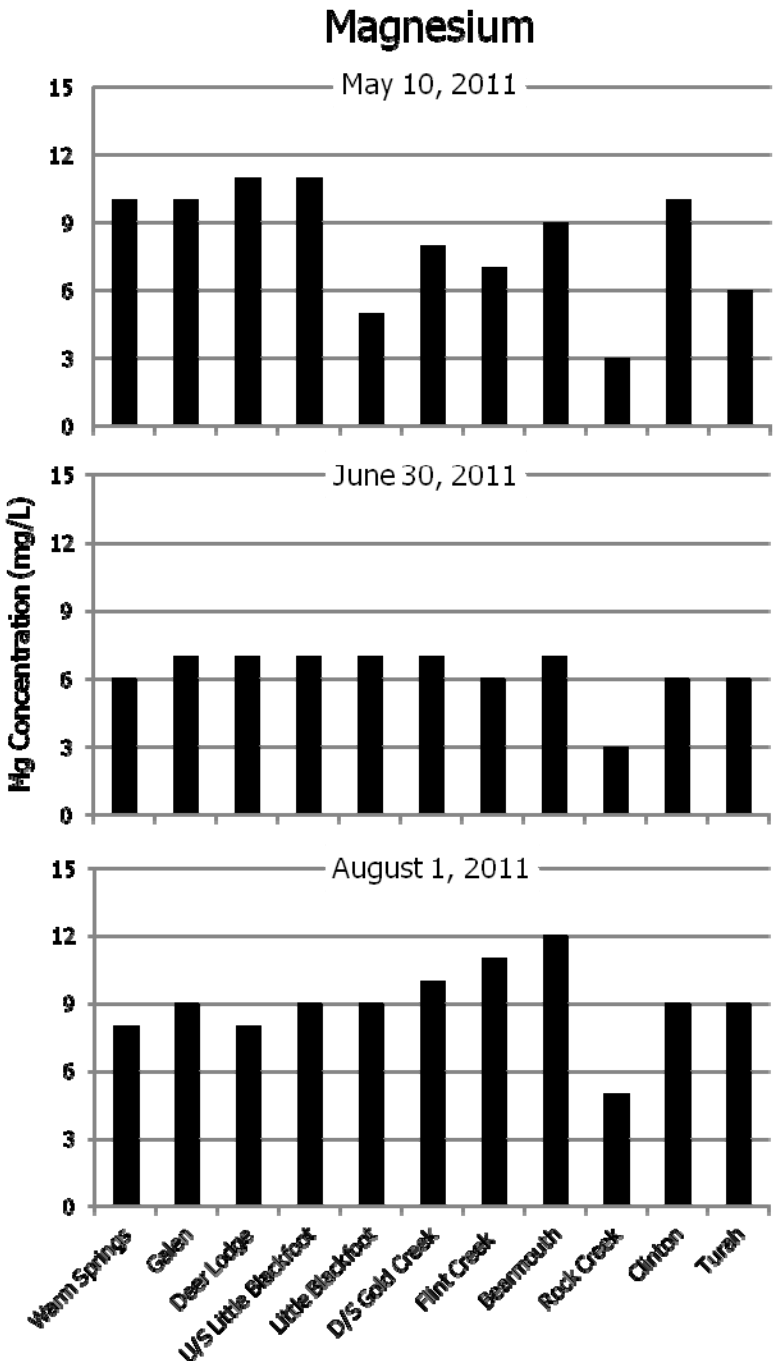

Figure 4-22. Magnesium concentrations at the 11 cage sites arranged from upstream to downstream.

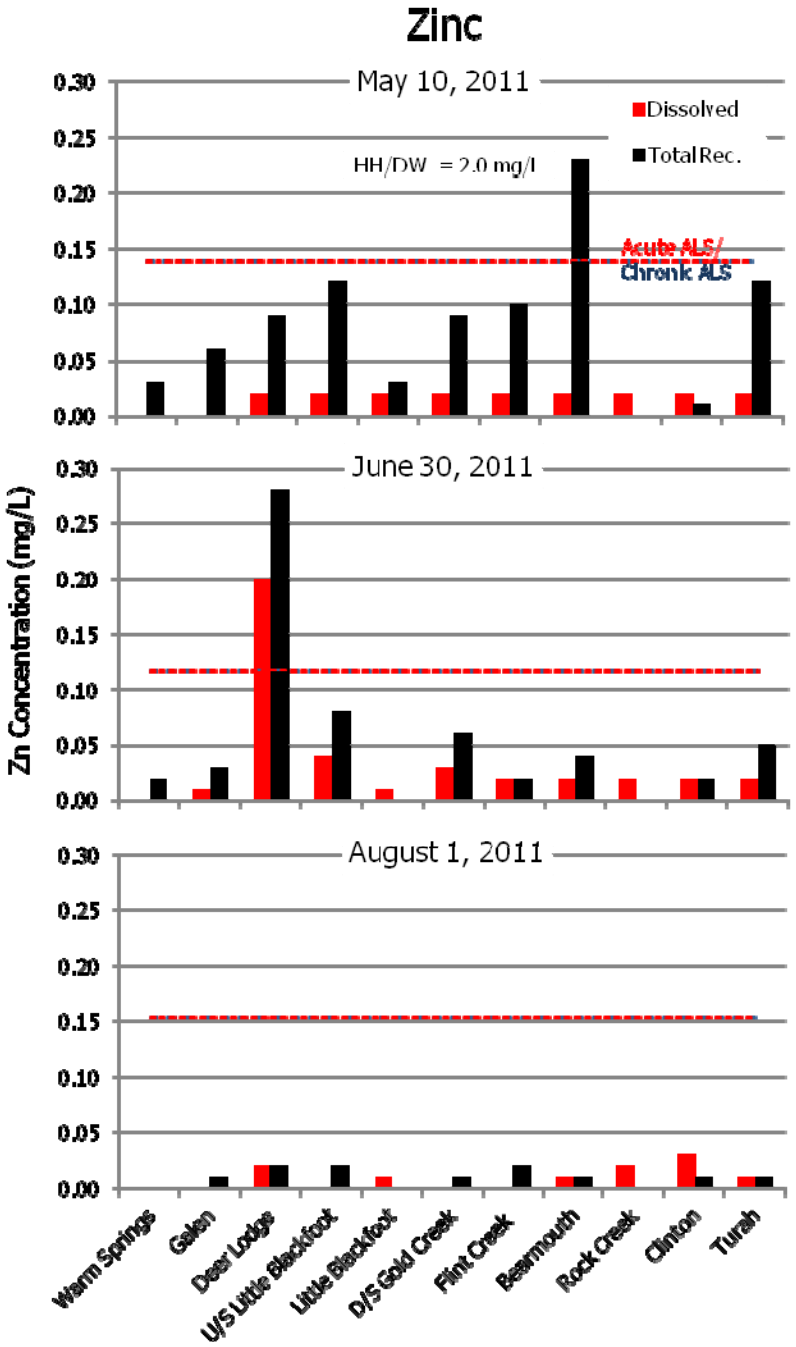

Figure 4-23. Zinc concentrations at the 11 cage sites arranged from upstream to downstream.

4.3.4 Histology

Histology analyses were performed by a consultant located in Bozeman, Montana. Specimens from seven of the eleven sites were submitted to evaluate physiological condition. The specimens were collected on August 4, 2011 following substantial increases in mortality. At this point the trout had been held in the cages approximately four months. The seven sites submitted included: Warms Springs, Galen, Gold Creek and Turah and the three controls (Little Blackfoot River, Flint Creek, and Rock Creek). Histology results indicated liver and kidney conditions varied across the seven sites. The least severe changes in liver and kidney tissues were noted at the Warm Springs site, while the most severe changes in kidney tissue were noted at the Galen site. In general, most of the downstream cages were not as affected as at Galen, and specimens from the Warm Springs site were the only fish showing signs of recovery from tissue injury. No bacteria or parasites were found, nor was there evidence of infectious disease.

Kidney lesions were observed in the specimens (both hematopoietic and nephron elements), indicating the occurrence of a blood borne toxicant that resulted in a hemolytic crisis. Proliferation of interrenal cells (produce corticosteroids) in head kidney tissue was also noted in several fish, indicating a stress response that has been reported in fish exposed to heavy metals or other stressors. Cellular changes observed in liver hepatocytes also suggest exposure to toxicants.

4.4 Discussion

Trout are exposed to hazardous substances (i.e., metals) in the Clark Fork River through the surface water pathway and the food chain pathway as suggested by Lipton et al. (1995). This study investigated the affect of direct contact with metals (i.e., the surface water pathway). Caged juvenile trout were fed an uncontaminated diet and thus exposure to metals via diet was minimized (i.e., the food chain pathway). As with most field research, in situ toxicity studies must consider variability in discharge, climate, and water temperature, but additionally specimen diet, physiology and origin (e.g., resident stream or hatchery origin). This study occurred during a high-water year and used age-0 hatchery brown trout fed a commercial diet.

Brown trout mortality varied on spatial and temporal scales. In the early seasons (April through June) mortality was highest at the Galen site and at the Rock Creek site. Similar trends continued as the field season progressed, but mortalities became more widespread. Mortality was generally reduced from late May to mid-July, and increased from late July to August (Figure 4-6 through Figure 4-15). Reduced mortality coincided with elevated discharges, as well as the highest concentrations of arsenic, cadmium, copper and zinc documented by the three water collections (Figure 4-17 though Figure 4-23). The increased volume of water in the system did not appear to dilute metals concentrations. This trend was also documented by Atkins (2012), and has been noted historically on the Upper Clark Fork River (e.g., Hornberger et al., 2009).

During this period, water temperatures fell within suitable ranges (less than 20°C). Increased mortality coincided with reduced discharges and generally the lowest concentrations of cadmium, copper and zinc. Water temperatures rose during this period and temperatures at or above 20°C were recorded (higher values tentative at four sites). Although water temperatures may have been a contributing factor to late season mortality, brown trout are known to be more tolerant of elevated water temperatures, and it was unlikely the primary stressor. Unexpectedly high mortality at the Rock Creek control site raises a few questions. Although water temperatures and metals concentrations remained low at Rock Creek (Figure 4-17 through Figure 4-23), considerable mortality was observed in August (Figure 4-14). The potential

causes of these mortalities and the effects on Turah downstream will be further investigated in 2012.

Chi-square analyses supported our preliminary interpretations that survival at the Galen site through June 20 differed from expected survival, given the observations at the Warm Springs site upstream. There was no significant difference between observed and expected survival in the lower sites (Little Blackfoot River and below). However, observations of mortality in the lower section following peak runoff suggest contaminated sediments were redistributed downstream, as documented in mine-impacted rivers such as the Clark Fork River (Hornberger et al., 2009).

The intermittency of water data made it difficult to associate specific mortality events with changes in metals concentrations. Philips and Spoon (1990) also declared periodic water sampling may not be sufficient for assessing toxicity potential during their in situ studies in the late-1980s. In 2008 however, a caged fish study conducted by FWP on Silverbow Creek was able to document the effects of a rain event on instream metals concentrations and fish survival (Selch, 2009). During the one month study, water samples were collected daily for the first week and every second or third day following.

Despite what was considered a relatively small event; a rainstorm spiked concentrations of arsenic, copper, lead and zinc, and caused acute mortality of westslope cutthroat trout. The 2008 study showed westslope cutthroat trout, of hatchery origin, survive degraded water quality even during August when water temperatures are generally highest. Thus, it was proposed trout could survive in the study section during other times of the year when water quality conditions are more favorable. However, as with this study, the hatchery westslope cutthroat trout used in Silverbow Creek may have been more tolerant of metals due to their naivety to the Creek (i.e., shorter exposure to toxicants relative to resident fishes; Lipton et al., 1995).

Most of the fish kills documented on the Upper Clark Fork River have been attributed to thunderstorms (Averett, 1961; Johnson & Schmidt, 1988; Philips & Spoon, 1990; Phillips, 1992; Phillips & Lipton, 1995). Intense events have released pulses of metals into the mainstem which have resulted in fish kills dating back to the 1950s (Phillips, 1992; Lipton et al., 1995). During 2011, no thunderstorms were observed on the mainstem, but localized events may have occurred. However, during the peak of 2011 runoff, over-land flow was noted on slickens just downstream of the Warm Springs Ponds and in other locations along the Upper Clark Fork River.

Although metals concentrations were not elevated at the Galen site (Figure 4-17 through Figure 4-23), mortality and histology observations indicate stressors are present in the vicinity. This aligns well with the reduced fish densities documented in the mainstem 1–2 miles downstream of the Warm Springs Ponds (Louma et al., 2008; Lindstrom, 2011), and increased mortality of adult radio-tagged trout (Mayfield & McMahon, 2010). The continuation of the caged fish study in 2012 will provide additional information and may reinforce or contradict this trend. The floodplain below the Warm Springs Ponds is scheduled for remediation (i.e., removal of slickens) within coming years and this effort will likely lessen the impacts of metals downstream (Hornberger et al., 2009).

Growth varied during the study, but growth on the mainstem followed a decreasing trend moving downstream (Figure 4-16). Greater growth at the Warm Springs site may have been a result of increased productivity and invertebrate availability below the Warm Springs Ponds (Louma et al., 2008; Lindstrom, 2011). Although trout fed well on pelleted feed throughout the study, a variety of aquatic insects invertebrates were also available from April to early June. Trout were observed feeding on these insects numerous occasions and other invertebrates were likely consumed as well. The greatest abundances were noted below the Warm Springs Ponds, and

other studies support these anecdotal observations (e.g., Louma et al., 2008). Although diet can be a significant pathway for bioaccumulation of metals (Lipton et al., 1995; Louma et al., 2008), the consumption of invertebrates at the Warm Springs site did not appear to affect growth or survival.

Trends in this study compare favorably to recent studies on the Clark Fork River. Mortality of caged rainbow trout on the Middle Clark Fork River also coincided with low elevation run-off and the descending limb of the hydrograph when water temperatures rose (D. Schmetterling, FWP, personal communication). A recent radio-telemetry study on the Upper Clark Fork River documented less than 50 percent survival of adult trout tagged in the spring through fall (Mayfield & McMahon; 2010; Mayfield & McMahon, 2011). Most mortalities during the telemetry study occurred during high spring discharges. These patterns have also been noted on the Middle Clark Fork River, where radio-tagged adults expire prior to caged juveniles (D. Schmetterling, FWP, personal communication). Thus, since greater size is generally accompanied by greater resistance to metals (Lipton et al., 1995; Louma et al., 2008), these studies suggest resident fish, even as adults, have lower tolerances of metals concentrations than young hatchery origin trout.

The results of this study suggest acute mortalities of caged fish may be more related to over-land flow following thunderstorms, as has been documented historically (e.g., Phillips, 1992), than due to bank erosion and limited over-land flow during flood events. Although mortality and discharge were generally inverse in 2011, additional field seasons will be necessary to better identify the distribution and timing of caged trout mortality in the Upper Clark Fork River.

4.5 Future Study Plans

During 2011, mortalities often occurred more consistently in one cage than others at a site. Cages were brushed clean to ensure water exchange, but water quality may have been lower when carcasses were present. This will be closely monitored in 2012, and mortalities may be removed more frequently.

The locations of the cages will remain the same at all sites except downstream of Gold Creek and in Rock Creek. Debris washed downstream during peak runoff 2011 changed the hydrodynamics of the Gold Creek site and the cages will be deployed a few hundred meters upstream in 2012. The new location will remain downstream of the Gold Creek confluence. The cages at the Rock Creek site may also be relocated, dependent on 2012 discharges.

The 2011 study season provides trout survival data during a high-water year. These observations will be used as the expected values in 2012 to identify longitudinal trends in brown trout survival within the Upper Clark Fork River, as well as the variability between years.

4.6 Acknowledgements

In addition to the co-authors of this report, several individuals were involved with this study in 2011. Montana FWP technicians Ben Whiteford, Russell Adams, and Colin Cooney assisted with field work. Ben Whiteford deserves special thanks for assisting in cage deployment and monitoring all cages from Warm Springs to Gold Creek. Rob Clark provided advice for cage construction, site selection and maintenance schedules. David Schmetterling provided invaluable advice on study design and assisted with analyses of the 2011 data. Jim Drissell authorized the delivery of brown trout from Big Springs Trout Hatchery. Brian Bartkowiak provided water sampling equipment and technical support. The 2011 field season yielded few complications thanks to the support of the individuals listed above.

5.0 SUPPLEMENTAL STUDIES

In addition to the standard suite of surface water, sediment, and biological monitoring, 2011 included three supplemental studies, as described below:

5.1 Upper Clark Fork Flow Monitoring

The objective of this project was to monitor stream stage continuously at two locations on the upper Clark Fork River using digital stage recorders during the low flow period of summer and early fall 2011. Periodic streamflow measurements were made throughout the stage recorder deployment period and used to develop ratings describing the stage-discharge relationship at each site. These ratings, in conjunction with the continuous stage data, allowed for the estimation of streamflow at the two monitoring locations. Digital stage recorders were deployed for a period of 13 weeks, from late July through late October 2011. Results of the 2011 flow study are presented in Appendix F.

5.2 Upper Clark Fork Groundwater Monitoring

In November 2011, 14 wells in Reach A of the CFROU were monitored for dissolved metals, common ions, and field parameters. Results of the 2011 groundwater monitoring are presented in Appendix G.

5.3 Synoptic Water Quality Monitoring Below Warm Springs Ponds

Synoptic water quality monitoring for metals, nutrient, common ions, and field parameters was conducted on August 30–31, 2011 at 11 sites in the upper Clark Fork River between Warm Springs Ponds and the Galen Bridge. The objectives of this monitoring were to: 1) evaluate pollutant loading to the upper Clark Fork River from Warm Springs Ponds; 2) identify potential tributary and/or near-stream sources of pollutant loading to the upper Clark Fork; and 3) help explain recent reductions in fish populations in this section of the river. Results of the 2011 synoptic water quality monitoring are presented in Appendix H.

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APPENDIX A

QA/QC REVIEW AND SUMMARY

Clark Fork River Operable Unit, 2011

August 2012

A.1 QA/QC REVIEW

Specific quality assurance/quality control (QA/QC) requirements for field measurements, sample collection, laboratory analysis, and the reporting of resulting data generally are defined by protocols contained in a quality assurance project plan (QAPP), under an approved sampling and analysis plan (SAP). The Quality Control Checklist (see below) is a component of Montana DEQ's QA/QC protocols, and is an initial step in the review and validation of water chemistry and related data generated under environmental monitoring programs. The checklist provides an outline for reviewing and assessing numerous factors potentially affecting data quality, and assists in identifying questionable data that may be invalid or require additional documentation.

A.2 QUALITY CONTROL CHECKLIST

+ Condition of samples upon receipt.
+ Cooler/sample temperature.
+ Proper collection containers.
+ All containers intact.
+ Sample pH of acidified samples < 2.
+ All field documentation complete. If incomplete areas cannot be completed, document the issue.
+ Holding times met.
+ Field duplicates collected at the proper frequency (specified in SAP).
+ Field blanks collected at the proper frequency (specified in SAP).
+ All sample IDs match those provided in the SAP. Field duplicates are clearly marked on samples and noted as such in lab results.
+ Analyses carried out as described within the SAP (e.g. analytical methods, photo documentation, field protocols).
+ Reporting detection limit met the project-required detection limit.
- All blanks were less than the project-required detection limit.

- **Dissolved Zinc was measured in field blanks collected on April 12 (1st Quarter) and on June 8 (2nd Quarter) monitoring events at concentrations greater than the RL of 0.01 mg/L (in both instances 0.02 mg/L).**

+ If any blanks exceeded the project-required detection limit, associated data is flagged (The DEQ PM will set the criteria for determining associated data. Contact the DEQ PM to discuss blank results prior to flagging data).

- **The criterion for determining associated data is that all results less than ten times the blank value will be B-flagged. Dissolved Zinc values less than 0.2 mg/L from the March event, and less than 0.3 mg/L from the June event will be flagged; this amounts to two results from March and five results from June.**

+ Laboratory blanks/duplicates/matrix spikes/lab control samples were analyzed at a 10 percent frequency.
+ Laboratory blanks/duplicates/matrix spikes/lab control samples were all within the required control limits defined within the SAP.

+ Project DQOs and DQIs were met (as described in SAP).
+ Completed summary of QC analysis results, issues encountered, and how issues were addressed (corrective action).

A.3 SUMMARY OF QUALITY CONTROL ANALYSIS RESULTS

Summarized in this appendix are quality control measures performed on field and laboratory data generated from surface water, in-stream sediment and biological monitoring samples collected in 2011 from the Clark Fork River Operable Unit during four quarterly monitoring events and one synoptic monitoring event in late August. Assessed under MDEQ's standard quality assurance/quality control protocols are Data Quality Objectives (DQOs), including: Representativeness, Comparability and Completeness, and Data Quality Indicators (DQI) including Sensitivity, Lab Precision, Overall Precision, Bias and Accuracy.

Overall, DQOs and DQIs for surface water monitoring were met at all monitoring sites in the Clark Fork River Operable Unit. Water samples were collected and analyzed for TSS, Nutrients, Dissolved and Total Recoverable Metals, and Common Ions at seven sites during all four quarters of 2011, and at an additional nine upper Clark Fork sites during the August synoptic monitoring. DQOs and DQIs for in-stream sediment metals monitoring were achieved at the seven primary CFROU sites during the single third quarter monitoring event in September 2011. Biological sampling for macroinvertebrates and periphyton was conducted as scheduled during the single third quarter monitoring event in September. All DQOs were achieved, with four replicate 0.1 m2 Hess macroinvertebrate samples and a composite periphyton sample collected from each of the seven sites. DQIs for biological sample results are assessed in Appendix E.

A.3.1 Representativeness

All seven surface water sampling sites in the Clark Fork River Operable Unit met stated objectives for spatial representativeness, i.e. they were established at the road crossings specified in the Long-Term Monitoring Plan. In-stream sediments and biological samples were collected as close as possible to the surface water sampling locations, with suitable sites generally found within 100-200 meters of the bridge. For CFR-116A surface water was sampled at the Turah bridge, while in-stream sediment, macroinvertebrate and periphyton samples were collected approximately ¼ mile upstream at the Turah fishing access. At CFR-84F, in-stream sediment, macroinvertebrate and periphyton samples were collected adjacent to the Interstate 90 rest area near Bearmouth, approximately ¼ mile downstream of the surface water sampling location at Bearmouth bridge. The nine synoptic monitoring sites were established in the headwaters reach between Warm Springs Creek and Galen.

Temporally, surface water monitoring was conducted once during each quarter of 2011, as specified in the CFROU Long-Term Monitoring Plan. Within the quarterly framework, water samples and field data were to be collected during specific hydrologic conditions: pre-runoff base flow (quarter 1), spring runoff rising/peak flow (quarter 2); post-runoff low flow (quarter 3), and late fall base flow (quarter 4); these goals were achieved. The nine additional sites on the upper Clark Fork were sampled synoptically for surface water and field parameters two days before the 3rd quarter monitoring event. In-stream sediment, macroinvertebrate and periphyton samples were collected during early September low flow conditions.

A.3.2 Comparability

Comparability is the applicability of the project's data to the project's decision rule. The project decision rules stated in the Long-Term Monitoring Plan are the acute and chronic aquatic life and drinking water criteria listed in DEQ Circular DEQ-7 and the TEC and PEC sediment metals concentration guidelines. Data acquired through the 2011 monitoring are highly applicable to the project's decision rule. All methods conformed to the requirements of DEQ-7 and to the Clark Fork River Standard Operating Procedures SS-3, G-6 and G-8 (MDEQ 2008b; ARCO 1992).

A.3.3 Completeness

Completeness of useable data actually collected during the 2011 monitoring compared to the amount prescribed in the SAP is assessed in Table A-1. Data completeness for the 2011 quarterly and synoptic monitoring was 100 percent in all categories. Overall data completeness of 100 percent exceeded the project goal of 85 percent.

Table A-1. Completeness Evaluation for 2011 Monitoring Data - Clark Fork River Operable Unit.

	TSS	Metals in comb. (water)	Metals in comb. (sediment)	Hardness (as CaCO3)	Common Ions (water)	Nutrients in combination (water)	Macro-invertebrate samples	Periphyton Samples	Field Measures in combination	Field Notes complete	Total #	Total %
Total # of Analytical Tests Requested in SAP	47	564	40	47	141	188	28	7	246	42	1350	100
Total # of Analytical Tests Reported	47	564	40	47	141	188	28	7	246	42	1350	100
Tests not performed	0	0	0	0	0	0	0	0	0	0	0	0*
Total # of Tests H Flagged (counted against completeness)	0	0	0	0	0	0	NA	NA	NA	NA	0	0**
Total # of Tests J Flagged (not counted against completeness)	0	0	7	0	0	0	NA	NA	NA	NA	7	0.5**
Total # of Tests B Flagged (not counted against completeness)	0	16	NA	0	0	0	NA	NA	NA	NA	16	1.2**
Total # of Tests Useful	47	564	40	47	141	188	28	7	246	42	1350	100**
Overall Completeness (%)	100	100	100	100	100	100	100	100	100	100	100	

** as % of Total # Analytical Tests Requested in SAP; **as % of Total # Analytical Tests Reported*

A.3.4 Sensitivity

The Method Detection Limit (MDL) established by Energy Laboratories through laboratory blank analyses is an expression of sensitivity. The MDL documented in QA/QC Summary Reports that accompany each set of Laboratory Analytical Reports was less than the project-required Reporting Limit (RL), and was often below detection, for all analytical methods pertaining to Clark Fork River Operable Unit monitoring (Appendix B).

Sensitivity of field methods was determined through field blank analyses, at a frequency of at least 10 percent of field samples collected. One de-ionized water field blank was prepared during each quarterly monitoring event and the synoptic event, for an actual frequency of 13.5 percent of surface water samples collected. Results for all metals, common ions and suspended sediment parameters (Table A-2) were less than detection (ND) at the Reporting Limit, with the exception of dissolved zinc during the March and June monitoring events. All surface water dissolved zinc values associated with the March and June events that were less than 10 times the respective blank values (in both cases 0.2 mg/L) will be qualified with B flags in the database.

Table A-2. Surface water field blank sample analysis, 2011 CFROU Monitoring.

Lab ID #:		H11040177-	H11060184-	H11080566-	H11090040-	H11120043-
Sample Date:		4/12/2011	6/8/2011	8/31/2011	9/2/2011	12/2/2011
Parameter	RL1 (mg/L)	Result				
TSS	1	ND2	4 (B)3	ND	ND	ND
Total Alkalinity	4	ND	ND	ND	ND	ND
Bicarbonate Alkalinity	4	ND	ND	ND	ND	ND
Sulfate	1	ND	ND	ND	ND	ND
Hardness	1	ND	ND	ND	ND	ND
Ammonia Nitrogen	0.05	ND	ND	ND	ND	ND
Nitrate+Nitrite Nitrogen	0.05	ND	ND	ND	ND	ND
Total Nitrogen	0.05	ND	ND	ND	ND	ND
Total Phosphorus	0.005	ND	ND	ND	ND	ND
Arsenic, Dissolved	0.005	ND	ND	ND	ND	ND
Cadmium, Dissolved	0.00008	ND	ND	ND	ND	ND
Copper, Dissolved	0.001	ND	ND	ND	ND	ND
Lead, Dissolved	0.0005	ND	ND	ND	ND	ND
Zinc, Dissolved	0.01	0.02 (B)3	0.02(B)3	ND	ND	ND
Arsenic, TR	0.005	ND	ND	ND	ND	ND
Cadmium, TR	0.00008	ND	ND	ND	ND	ND
Calcium, TR	1	ND	ND	ND	ND	ND
Copper, TR	0.001	ND	ND	ND	ND	ND
Lead, TR	0.0005	ND	ND	ND	ND	ND
Magnesium, TR	1	ND	ND	ND	ND	ND
Zinc, TR	0.01	ND	ND	ND	ND	ND

1RL = Reporting Limit; 2ND = Not Detected at the Reporting Limit; 3(B) = associated results <10X require B flags in database

A.3.5 Lab Precision

Laboratory Precision was assessed through the Relative Percent Difference (RPD) of laboratory sample and internal analytical duplicate results, calculated for all parameters measured under the Clark Fork River Operable Unit monitoring plan. Established criteria allow a maximum of 20 percent RPD for water sample results > 5 times the Reporting Limit (RL), and 35 percent RPD for sediment samples > 5 times the RL. None of the RPD values for internal duplicate analyses exceeded the criteria and required qualification of associated data, and no corrective actions were required (Appendix B).

A.3.6 Overall Precision

Overall Precision was assessed through the Relative Percent Difference (RPD) of co-located field duplicate samples, collected at a frequency of just over 14 percent of field samples. Established criteria allow a maximum of 25 percent RPD for water sample results > 5 times the Reporting Limit (RL), and 40 percent RPD for sediment samples > 5 times the RL. None of the surface water sample results > 5 times the RL had RPD values for co-located field duplicate samples that exceeded the criteria and required qualification of associated data (Table A-3), and no corrective actions were required. A single sediment result, for total lead in the 1-2mm size category, was > 5 times the RL and exceeded the 40 percent RPD criterion for the co-located field duplicate sample (Table A-4). Associated total lead results will be J-flagged.

A.3.7 Bias and Accuracy

Bias is defined as directional error from the true value of individual measurements. For field measurements (water temperature, pH, specific conductance, dissolved oxygen (DO) concentration, DO percent saturation, and turbidity), potential bias was addressed through frequent calibration of field instruments documented in calibration logs, and consistent field procedures. For water chemistry and sediment results, potential bias was minimized through close adherence to approved field procedures for sample collection and handling, and cleaning and use of sampling equipment.

Accuracy is the combination of high precision and low bias. Accuracy of laboratory results was assessed by reviewing the analytical method controls (i.e. lab control sample, continuing calibration verification, lab fortified blank, standard reference material) and analytical batch controls (i.e. matrix spike and matrix spike duplicate). Limits established by the laboratory through control charting of each method's performance served as assessment criteria. Method QC descriptions are contained in Appendix A. None of the analytical method controls or analytical batch controls had values outside of the acceptable recovery range, as detailed in the Energy Labs QA/QC Summary Reports in Appendix B.

Table A-3. Surface water field duplicate sample analysis for CFROU 1st Quarter Monitoring, March 2011.

Station ID:		CFR-53C	CFR-53C Dup		
Lab ID #:		H10120038-003	H11040177-004		
Sample Date:		4/12/2011	4/12/2011		
Parameter	**RL (mg/L)**	**Sample Result (mg/L)**	**Duplicate Result (mg/L)**	**RPD**	**Flags**
TSS	1	26	24	8.0	
Total Alkalinity	4	150	150	0.0	
Bicarbonate Alkalinity	4	170	170	0.0	
Sulfate	1	51	51	0.0	
Hardness	1	181	181	0.0	
Ammonia Nitrogen	0.05	ND	ND	0.0	
Nitrate+Nitrite Nitrogen	0.05	0.05	0.06	18.2	
Total Nitrogen	0.05	0.35	0.39	10.8	
Total Phosphorus	0.005	0.032	0.034	6.1	
Arsenic, Dissolved	0.005	0.007	0.007	0.0	
Cadmium, Dissolved	0.00008	ND	ND	0.0	
Copper, Dissolved	0.001	0.006	0.006	0.0	
Lead, Dissolved	0.0005	ND	ND	0.0	
Zinc, Dissolved	0.01	ND	ND	0.0	
Arsenic, TR	0.005	0.01	0.01	0.0	
Cadmium, TR	0.00008	0.00013	0.00013	0.0	
Calcium, TR	1	53	52	1.9	
Copper, TR	0.001	0.027	0.027	0.0	
Lead, TR	0.0005	0.0036	0.0034	5.7	
Magnesium, TR	1	12	12	0.0	
Zinc, TR	0.01	0.03	0.03	0.0	

Table A-4. Surface water field duplicate sample analysis for CFROU 2nd Quarter Monitoring, June 2011.*

Station ID:		CFR-27H	CFR-27H Dup		
Lab ID #:		H11060184-006	H11060184-007		
Sample Date:		6/8/2011	6/8/2011		
Parameter	**RL (mg/L)**	**Sample Result (mg/L)**	**Duplicate Result (mg/L)**	**RPD**	**Flags**
TSS	1	96	96	0.00	
Total Alkalinity	4	92	92	0.00	
Bicarbonate Alkalinity	4	110	110	0.00	
Sulfate	1	46	46	0.00	
Hardness	1	138	138	0.00	
Ammonia Nitrogen	0.05	ND	ND	0.00	
Nitrate+Nitrite Nitrogen	0.05	0.09	0.08	11.7	
Total Nitrogen	0.05	0.57	0.58	1.74	
Total Phosphorus	0.005	0.176	0.184	4.44	
Arsenic, Dissolved	0.005	0.025	0.026	3.92	
Cadmium, Dissolved	0.00008	0.00017	0.00016	6.06	
Copper, Dissolved	0.001	0.044	0.041	7.06	
Lead, Dissolved	0.0005	ND	0.0005	0.00	
Zinc, Dissolved	0.01	0.03	0.03	0.00	
Arsenic, TR	0.005	0.048	0.048	0.00	
Cadmium, TR	0.00008	0.00086	0.00081	5.99	
Calcium, TR	1	41	41	0.00	
Copper, TR	0.001	0.214	0.208	2.84	
Lead, TR	0.0005	0.0263	0.0255	3.09	
Magnesium, TR	1	9	9	0.00	
Zinc, TR	0.01	0.18	0.17	5.71	

**Continued from Table A-3.*

Table A-5. Surface water field duplicate sample analysis for CFROU Synoptic Monitoring, August 2011.*

Station ID:		CFR-03A	CFR-03A Dup		
Lab ID #:		H11080566-001	H11080566-002		
Sample Date:		8/30/2011	8/30/2011		
Parameter	**RL (mg/L)**	**Sample Result (mg/L)**	**Duplicate Result (mg/L)**	**RPD**	**Flags**
TSS	1	0.5	6	169.2	
Total Alkalinity	4	120	120	0.0	
Bicarbonate Alkalinity	4	130	140	7.4	
Sulfate	1	45	44	2.2	
Hardness	1	156	152	2.6	
Ammonia Nitrogen	0.05	ND	ND	0.0	
Nitrate+Nitrite Nitrogen	0.05	0.06	0.06	0.0	
Total Nitrogen	0.05	0.31	0.2	0.0	
Total Phosphorus	0.005	0.023	0.022	4.4	
Arsenic, Dissolved	0.005	0.015	0.015	0.0	
Cadmium, Dissolved	0.00008	ND	ND	0.0	
Calcium, Dissolved	1	46	44	4.4	
Copper, Dissolved	0.001	0.004	0.004	0.0	
Lead, Dissolved	0.0005	ND	ND	0.0	
Magnesium, Dissolved	1	10	10	0.0	
Zinc, Dissolved	0.01	ND	ND	0.0	
Arsenic, TR	0.005	0.015	0.015	0.0	
Cadmium, TR	0.00008	ND	ND	0.0	
Copper, TR	0.001	0.012	0.01	18.2	
Lead, TR	0.0005	0.0011	0.001	9.5	
Zinc, TR	0.01	ND	ND	0.0	

**Continued from Table A-3.*

Table A-6. Surface water field duplicate sample analysis for CFROU 3rd Quarter Monitoring, September 2011.*

Station ID:		CFR-27H	CFR-27H Dupe		
Lab ID #:		H11090040-005	H11090040-006		
Sample Date:		9/2/2011	9/2/2011		
Parameter	**RL (mg/L)**	**Sample Result (mg/L)**	**Duplicate Result (mg/L)**	**RPD**	**Flags**
TSS	1	6	6	0.0	
Total Alkalinity	4	150	160	6.5	
Bicarbonate Alkalinity	4	190	190	0.0	
Sulfate	1	56	56	0.0	
Hardness	1	173	170	1.7	
Ammonia Nitrogen	0.05	ND	ND	0.0	
Nitrate+Nitrite Nitrogen	0.05	0.08	0.08	12.8	
Total Nitrogen	0.05	0.25	0.22	5.7	
Total Phosphorus	0.005	0.017	0.018	5.7	
Arsenic, Dissolved	0.005	0.016	0.016	0.0	
Cadmium, Dissolved	0.00008	ND	ND	0.0	
Copper, Dissolved	0.001	0.008	0.007	13.3	
Lead, Dissolved	0.0005	ND	ND	0.0	
Zinc, Dissolved	0.01	0.01	0.01	0.0	
Arsenic, TR	0.005	0.017	0.017	0.0	
Cadmium, TR	0.00008	0.00014	0.00013	7.4	
Calcium, TR	1	50	49	2.0	
Copper, TR	0.001	0.019	0.019	0.0	
Lead, TR	0.0005	0.0019	0.0019	0.0	
Magnesium, TR	1	12	12	0.0	
Zinc, TR	0.01	0.02	0.02	0.0	

**Continued from Table A-3.*

Table A-7. Surface water field duplicate sample analysis for 4th Quarter CFROU Monitoring, December 2011.*

Station ID:		CFR-27H	CFR-27H Dupe		
Lab ID #:		H11120043-005	H11120043-006		
Sample Date:		12/2/2011	12/2/2011		
Parameter	**RL (mg/L)**	**Sample Result (mg/L)**	**Duplicate Result (mg/L)**	**RPD**	**Flags**
TSS	1	0.5	8	176.5	
Total Alkalinity	4	150	160	6.5	
Bicarbonate Alkalinity	4	180	190	5.4	
Sulfate	1	70	70	0.0	
Hardness	1	214	214	0.0	
Ammonia Nitrogen	0.05	0	0	0.0	
Nitrate+Nitrite Nitrogen	0.05	0.27	0.27	7.4	
Total Nitrogen	0.05	0.39	0.42	0.0	
Total Phosphorus	0.005	0.013	0.013	0.0	
Arsenic, Dissolved	0.005	0.01	0.01	0.0	
Cadmium, Dissolved	0.00008	0	0	0.0	
Copper, Dissolved	0.001	0.005	0.005	0.0	
Lead, Dissolved	0.0005	0	0	0.0	
Zinc, Dissolved	0.01	0.01	0.01	0.0	
Arsenic, TR	0.005	0.011	0.011	0.0	
Cadmium, TR	0.00008	0.00013	0.00013	0.0	
Calcium, TR	1	62	62	0.0	
Copper, TR	0.001	0.013	0.014	7.4	
Lead, TR	0.0005	0.0013	0.0014	7.4	
Magnesium, TR	1	14	14	0.0	
Zinc, TR	0.01	0.02	0.02	0.0	

**Continued from Table A-3.*

Table A-8. In-stream sediment field duplicate sample analysis for CFROU Monitoring, September 2011.

Station ID:		CFR-27H	CFR-27H Dupe		
Sample Date:		9/2/2011	9/2/2011		
Lab ID #:		H11090040-020	H11090040-023		
Sediment Parameter (size fraction<0.065mm)	RL (mg/kg)	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD	Flags
Arsenic, Total	5	49	48	2.1	
Cadmium, Total	0.2	1.2	1.3	8.0	
Copper, Total	5	511	445	13.8	
Lead, Total	5	77	95	20.9	
Zinc, Total	5	440	419	4.9	
	Lab ID #:	H11090040-021	H11090040-024		
Sediment Parameter (size fraction 0.065-1mm)	RL (mg/kg)	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD	Flags
Arsenic, Total	5	16	15	6.5	
Cadmium, Total	0.2	0.3	0.3	0.0	
Copper, Total	5	119	106	11.6	
Lead, Total	5	36	43	17.7	
Zinc, Total	5	211	161	26.9	
	Lab ID #:	H11090040-022	H11090040-025		
Sediment Parameter (size fraction 1-2mm)	RL (mg/kg)	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD	Flags
Arsenic, Total	5	13	11	16.7	
Cadmium, Total	0.2	<0.2	0.3	40.0	
Copper, Total	5	154	103	39.7	
Lead, Total	5	31	54	54.1	J
Zinc, Total	5	190	214	11.9	

APPENDIX B

ANALYTICAL LABORARTOY DATA FORMS

Clark Fork River Operable Unit, 2011

August 2012

Appendix B1

1st Quarter Surface Water Reports

ANALYTICAL SUMMARY REPORT

April 27, 2011

MT DEQ-Federal Superfund
PO Box 200901
Helena, MT 59620-0901

Workorder No.: H11040177 Quote ID: H624

Project Name: CFR Monitoring-474374

Energy Laboratories Inc Helena MT received the following 9 samples for MT DEQ-Federal Superfund on 4/13/2011 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H11040177-001	CFR-116A	04/12/11 9:00	04/13/11	Surface Water	Metals by ICP/ICPMS, Dissolved Metals by ICP/ICPMS, Tot. Rec. Alkalinity Conductivity Hardness as CaCO3 Anions by Ion Chromatography Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite Nitrogen, Total Persulfate Metals Digestion by EPA 200.2 Digestion, Total P Water Nitrogen, Total Persulfate Preparation for TSS Phosphorus, Total Solids, Total Suspended
H11040177-002	CFR-84F	04/12/11 11:00	04/13/11	Surface Water	Same As Above
H11040177-003	CFR-53C	04/12/11 13:15	04/13/11	Surface Water	Same As Above
H11040177-004	CFR-53C Dup	04/12/11 13:45	04/13/11	Surface Water	Same As Above
H11040177-005	Field Blank	04/12/11 14:45	04/13/11	Surface Water	Same As Above
H11040177-006	CFR-42G	04/12/11 15:15	04/13/11	Surface Water	Same As Above
H11040177-007	CFR-27H	04/13/11 8:45	04/13/11	Surface Water	Same As Above
H11040177-008	CFR-03A	04/13/11 10:15	04/13/11	Surface Water	Same As Above
H11040177-009	SS-25	04/13/11 11:00	04/13/11	Surface Water	Same As Above

This report was prepared by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11040177-001
Client Sample ID CFR-116A

Report Date: 04/27/11
Collection Date: 04/12/11 09:00
DateReceived: 04/13/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	18	mg/L		1		A2540 D	04/14/11 14:47 / glj
INORGANICS							
Alkalinity, Total as CaCO3	130	mg/L		4		A2320 B	04/15/11 00:53 / zeg
Bicarbonate as HCO3	150	mg/L		4		A2320 B	04/15/11 00:53 / zeg
Sulfate	39	mg/L		1		E300.0	04/14/11 20:46 / zeg
Hardness as CaCO3	155	mg/L		1		A2340 B	04/15/11 17:39 / abb
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/18/11 13:32 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	04/14/11 16:13 / reh
Nitrogen, Total	0.27	mg/L		0.05		A4500 N-C	04/19/11 11:03 / reh
Phosphorus, Total as P	0.020	mg/L		0.005		E365.1	04/15/11 16:33 / reh
METALS, DISSOLVED							
Arsenic	0.005	mg/L		0.005		E200.8	04/15/11 17:39 / dck
Cadmium	ND	mg/L		0.00008		E200.8	04/15/11 17:39 / dck
Calcium	44	mg/L		1		E200.8	04/15/11 17:39 / dck
Copper	0.004	mg/L		0.001		E200.8	04/15/11 17:39 / dck
Lead	ND	mg/L		0.0005		E200.8	04/15/11 17:39 / dck
Magnesium	11	mg/L		1		E200.8	04/15/11 17:39 / dck
Zinc	0.01	mg/L		0.01		E200.8	04/18/11 13:58 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.031	mg/L		0.005		E200.8	04/15/11 18:18 / dck
Cadmium	0.00012	mg/L		0.00008		E200.8	04/15/11 18:18 / dck
Calcium	44	mg/L		1		E200.8	04/18/11 14:25 / dck
Copper	0.017	mg/L		0.001		E200.8	04/15/11 18:18 / dck
Lead	0.0025	mg/L		0.0005		E200.8	04/15/11 18:18 / dck
Magnesium	12	mg/L		1		E200.8	04/15/11 18:18 / dck
Zinc	0.06	mg/L		0.01		E200.8	04/15/11 18:18 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11040177-002
Client Sample ID CFR-84F

Report Date: 04/27/11
Collection Date: 04/12/11 11:00
DateReceived: 04/13/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	25	mg/L		1		A2540 D	04/14/11 14:47 / glj
INORGANICS							
Alkalinity, Total as CaCO3	160	mg/L		4		A2320 B	04/15/11 01:01 / zeg
Bicarbonate as HCO3	180	mg/L		4		A2320 B	04/15/11 01:01 / zeg
Sulfate	56	mg/L		1		E300.0	04/14/11 21:01 / zeg
Hardness as CaCO3	198	mg/L		1		A2340 B	04/19/11 10:46 / abb
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/18/11 13:33 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	04/14/11 16:15 / reh
Nitrogen, Total	0.24	mg/L		0.05		A4500 N-C	04/19/11 11:05 / reh
Phosphorus, Total as P	0.027	mg/L		0.005		E365.1	04/15/11 16:34 / reh
METALS, DISSOLVED							
Arsenic	0.008	mg/L		0.005		E200.8	04/15/11 18:35 / dck
Cadmium	ND	mg/L		0.00008		E200.8	04/15/11 18:35 / dck
Calcium	55	mg/L		1		E200.8	04/18/11 14:29 / dck
Copper	0.005	mg/L		0.001		E200.8	04/15/11 18:35 / dck
Lead	ND	mg/L		0.0005		E200.8	04/15/11 18:35 / dck
Magnesium	13	mg/L		1		E200.8	04/15/11 18:35 / dck
Zinc	0.01	mg/L		0.01		E200.8	04/18/11 14:29 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.010	mg/L		0.005		E200.8	04/15/11 18:57 / dck
Cadmium	0.00016	mg/L		0.00008		E200.8	04/15/11 18:57 / dck
Calcium	56	mg/L		1		E200.8	04/18/11 14:34 / dck
Copper	0.025	mg/L		0.001		E200.8	04/15/11 18:57 / dck
Lead	0.0037	mg/L		0.0005		E200.8	04/15/11 18:57 / dck
Magnesium	14	mg/L		1		E200.8	04/15/11 18:57 / dck
Zinc	0.03	mg/L		0.01		E200.8	04/15/11 18:57 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11040177-003
Client Sample ID CFR-53C

Report Date: 04/27/11
Collection Date: 04/12/11 13:15
DateReceived: 04/13/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	26	mg/L		1		A2540 D	04/14/11 14:48 / glj
INORGANICS							
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	04/15/11 01:08 / zeg
Bicarbonate as HCO3	170	mg/L		4		A2320 B	04/15/11 01:08 / zeg
Sulfate	51	mg/L		1		E300.0	04/14/11 21:16 / zeg
Hardness as CaCO3	181	mg/L		1		A2340 B	04/19/11 10:46 / abb
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/18/11 13:35 / reh
Nitrogen, Nitrate+Nitrite as N	0.05	mg/L		0.05		E353.2	04/14/11 16:17 / reh
Nitrogen, Total	0.35	mg/L		0.05		A4500 N-C	04/19/11 11:07 / reh
Phosphorus, Total as P	0.032	mg/L		0.005		E365.1	04/15/11 16:35 / reh
METALS, DISSOLVED							
Arsenic	0.007	mg/L		0.005		E200.8	04/15/11 19:02 / dck
Cadmium	ND	mg/L		0.00008		E200.8	04/15/11 19:02 / dck
Calcium	52	mg/L		1		E200.8	04/18/11 14:38 / dck
Copper	0.006	mg/L		0.001		E200.8	04/15/11 19:02 / dck
Lead	ND	mg/L		0.0005		E200.8	04/15/11 19:02 / dck
Magnesium	12	mg/L		1		E200.8	04/15/11 19:02 / dck
Zinc	ND	mg/L		0.01		E200.8	04/15/11 19:02 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.010	mg/L		0.005		E200.8	04/15/11 19:06 / dck
Cadmium	0.00013	mg/L		0.00008		E200.8	04/15/11 19:06 / dck
Calcium	53	mg/L		1		E200.8	04/18/11 14:42 / dck
Copper	0.027	mg/L		0.001		E200.8	04/15/11 19:06 / dck
Lead	0.0036	mg/L		0.0005		E200.8	04/15/11 19:06 / dck
Magnesium	12	mg/L		1		E200.8	04/15/11 19:06 / dck
Zinc	0.03	mg/L		0.01		E200.8	04/15/11 19:06 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11040177-004
Client Sample ID CFR-53C Dup

Report Date: 04/27/11
Collection Date: 04/12/11 13:45
DateReceived: 04/13/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	24	mg/L		1		A2540 D	04/14/11 14:48 / glj
INORGANICS							
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	04/15/11 01:16 / zeg
Bicarbonate as HCO3	170	mg/L		4		A2320 B	04/15/11 01:16 / zeg
Sulfate	51	mg/L		1		E300.0	04/14/11 21:32 / zeg
Hardness as CaCO3	181	mg/L		1		A2340 B	04/19/11 10:46 / abb
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/18/11 13:37 / reh
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L		0.05		E353.2	04/14/11 16:19 / reh
Nitrogen, Total	0.39	mg/L		0.05		A4500 N-C	04/19/11 11:09 / reh
Phosphorus, Total as P	0.034	mg/L		0.005		E365.1	04/15/11 16:39 / reh
METALS, DISSOLVED							
Arsenic	0.007	mg/L		0.005		E200.8	04/15/11 19:11 / dck
Cadmium	ND	mg/L		0.00008		E200.8	04/15/11 19:11 / dck
Calcium	52	mg/L		1		E200.8	04/18/11 15:05 / dck
Copper	0.006	mg/L		0.001		E200.8	04/15/11 19:11 / dck
Lead	ND	mg/L		0.0005		E200.8	04/15/11 19:11 / dck
Magnesium	12	mg/L		1		E200.8	04/15/11 19:11 / dck
Zinc	ND	mg/L		0.01		E200.8	04/15/11 19:11 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.010	mg/L		0.005		E200.8	04/15/11 19:15 / dck
Cadmium	0.00013	mg/L		0.00008		E200.8	04/15/11 19:15 / dck
Calcium	52	mg/L		1		E200.8	04/18/11 15:09 / dck
Copper	0.027	mg/L		0.001		E200.8	04/15/11 19:15 / dck
Lead	0.0034	mg/L		0.0005		E200.8	04/15/11 19:15 / dck
Magnesium	12	mg/L		1		E200.8	04/15/11 19:15 / dck
Zinc	0.03	mg/L		0.01		E200.8	04/15/11 19:15 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11040177-005
Client Sample ID Field Blank

Report Date: 04/27/11
Collection Date: 04/12/11 14:45
DateReceived: 04/13/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	04/14/11 14:48 / glj
INORGANICS							
Alkalinity, Total as CaCO3	ND	mg/L		4		A2320 B	04/15/11 01:20 / zeg
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	04/15/11 01:20 / zeg
Sulfate	ND	mg/L		1		E300.0	04/14/11 22:18 / zeg
Hardness as CaCO3	ND	mg/L		1		A2340 B	04/19/11 10:01 / wjj
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/18/11 13:39 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	04/14/11 16:25 / reh
Nitrogen, Total	ND	mg/L		0.05		A4500 N-C	04/19/11 11:11 / reh
Phosphorus, Total as P	ND	mg/L		0.005		E365.1	04/15/11 16:40 / reh
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	04/15/11 19:19 / dck
Cadmium	ND	mg/L		0.00008		E200.8	04/15/11 19:19 / dck
Calcium	ND	mg/L		1		E200.8	04/15/11 19:19 / dck
Copper	ND	mg/L		0.001		E200.8	04/15/11 19:19 / dck
Lead	ND	mg/L		0.0005		E200.8	04/15/11 19:19 / dck
Magnesium	ND	mg/L		1		E200.8	04/15/11 19:19 / dck
Zinc	0.02	mg/L		0.01		E200.8	04/19/11 14:02 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	ND	mg/L		0.005		E200.8	04/15/11 19:24 / dck
Cadmium	ND	mg/L		0.00008		E200.8	04/15/11 19:24 / dck
Calcium	ND	mg/L		1		E200.8	04/15/11 19:24 / dck
Copper	ND	mg/L		0.001		E200.8	04/15/11 19:24 / dck
Lead	ND	mg/L		0.0005		E200.8	04/15/11 19:24 / dck
Magnesium	ND	mg/L		1		E200.8	04/15/11 19:24 / dck
Zinc	ND	mg/L		0.01		E200.8	04/15/11 19:24 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11040177-006
Client Sample ID CFR-42G

Report Date: 04/27/11
Collection Date: 04/12/11 15:15
DateReceived: 04/13/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	28	mg/L		1		A2540 D	04/14/11 14:48 / glj
INORGANICS							
Alkalinity, Total as CaCO3	160	mg/L		4		A2320 B	04/15/11 01:27 / zeg
Bicarbonate as HCO3	180	mg/L		4		A2320 B	04/15/11 01:27 / zeg
Sulfate	73	mg/L		1		E300.0	04/14/11 22:34 / zeg
Hardness as CaCO3	212	mg/L		1		A2340 B	04/19/11 10:46 / abb
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/18/11 13:41 / reh
Nitrogen, Nitrate+Nitrite as N	0.18	mg/L		0.05		E353.2	04/14/11 16:27 / reh
Nitrogen, Total	0.47	mg/L		0.05		A4500 N-C	04/19/11 11:21 / reh
Phosphorus, Total as P	0.032	mg/L		0.005		E365.1	04/15/11 16:41 / reh
METALS, DISSOLVED							
Arsenic	0.010	mg/L		0.005		E200.8	04/15/11 19:28 / dck
Cadmium	ND	mg/L		0.00008		E200.8	04/15/11 19:28 / dck
Calcium	63	mg/L		1		E200.8	04/18/11 15:18 / dck
Copper	0.008	mg/L		0.001		E200.8	04/15/11 19:28 / dck
Lead	ND	mg/L		0.0005		E200.8	04/15/11 19:28 / dck
Magnesium	14	mg/L		1		E200.8	04/15/11 19:28 / dck
Zinc	0.01	mg/L		0.01		E200.8	04/18/11 15:18 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.015	mg/L		0.005		E200.8	04/15/11 19:33 / dck
Cadmium	0.00021	mg/L		0.00008		E200.8	04/15/11 19:33 / dck
Calcium	62	mg/L		1		E200.8	04/18/11 15:22 / dck
Copper	0.043	mg/L		0.001		E200.8	04/15/11 19:33 / dck
Lead	0.0055	mg/L		0.0005		E200.8	04/15/11 19:33 / dck
Magnesium	14	mg/L		1		E200.8	04/15/11 19:33 / dck
Zinc	0.04	mg/L		0.01		E200.8	04/15/11 19:33 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11040177-007
Client Sample ID CFR-27H

Report Date: 04/27/11
Collection Date: 04/13/11 08:45
DateReceived: 04/13/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	24	mg/L		1		A2540 D	04/14/11 14:49 / glj
INORGANICS							
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	04/15/11 01:34 / zeg
Bicarbonate as HCO3	170	mg/L		4		A2320 B	04/15/11 01:34 / zeg
Sulfate	79	mg/L		1		E300.0	04/14/11 22:49 / zeg
Hardness as CaCO3	211	mg/L		1		A2340 B	04/19/11 10:46 / abb
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/18/11 13:46 / reh
Nitrogen, Nitrate+Nitrite as N	0.15	mg/L		0.05		E353.2	04/14/11 16:29 / reh
Nitrogen, Total	0.65	mg/L		0.05		A4500 N-C	04/19/11 11:23 / reh
Phosphorus, Total as P	0.027	mg/L		0.005		E365.1	04/15/11 16:42 / reh
METALS, DISSOLVED							
Arsenic	0.010	mg/L		0.005		E200.8	04/15/11 19:55 / dck
Cadmium	ND	mg/L		0.00008		E200.8	04/15/11 19:55 / dck
Calcium	58	mg/L		1		E200.8	04/18/11 15:26 / dck
Copper	0.007	mg/L		0.001		E200.8	04/15/11 19:55 / dck
Lead	ND	mg/L		0.0005		E200.8	04/15/11 19:55 / dck
Magnesium	13	mg/L		1		E200.8	04/15/11 19:55 / dck
Zinc	0.02	mg/L		0.01		E200.8	04/15/11 19:55 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.015	mg/L		0.005		E200.8	04/15/11 19:59 / dck
Cadmium	0.00022	mg/L		0.00008		E200.8	04/15/11 19:59 / dck
Calcium	62	mg/L		1		E200.8	04/18/11 15:31 / dck
Copper	0.040	mg/L		0.001		E200.8	04/15/11 19:59 / dck
Lead	0.0054	mg/L		0.0005		E200.8	04/15/11 19:59 / dck
Magnesium	14	mg/L		1		E200.8	04/15/11 19:59 / dck
Zinc	0.04	mg/L		0.01		E200.8	04/15/11 19:59 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11040177-008
Client Sample ID CFR-03A

Report Date: 04/27/11
Collection Date: 04/13/11 10:15
DateReceived: 04/13/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	10	mg/L		1		A2540 D	04/14/11 14:49 / glj
INORGANICS							
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	04/15/11 01:58 / zeg
Bicarbonate as HCO3	140	mg/L		4		A2320 B	04/15/11 01:58 / zeg
Sulfate	86	mg/L		1		E300.0	04/14/11 23:04 / zeg
Hardness as CaCO3	195	mg/L		1		A2340 B	04/19/11 10:46 / abb
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/18/11 14:01 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	04/14/11 16:35 / reh
Nitrogen, Total	0.37	mg/L		0.05		A4500 N-C	04/19/11 11:25 / reh
Phosphorus, Total as P	0.025	mg/L		0.005		E365.1	04/15/11 16:43 / reh
METALS, DISSOLVED							
Arsenic	0.010	mg/L		0.005		E200.8	04/15/11 20:04 / dck
Cadmium	ND	mg/L		0.00008		E200.8	04/15/11 20:04 / dck
Calcium	55	mg/L		1		E200.8	04/18/11 15:35 / dck
Copper	0.004	mg/L		0.001		E200.8	04/15/11 20:04 / dck
Lead	ND	mg/L		0.0005		E200.8	04/15/11 20:04 / dck
Magnesium	13	mg/L		1		E200.8	04/15/11 20:04 / dck
Zinc	0.01	mg/L		0.01		E200.8	04/18/11 15:35 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.012	mg/L		0.005		E200.8	04/15/11 20:08 / dck
Cadmium	0.00017	mg/L		0.00008		E200.8	04/15/11 20:08 / dck
Calcium	57	mg/L		1		E200.8	04/18/11 15:40 / dck
Copper	0.017	mg/L		0.001		E200.8	04/15/11 20:08 / dck
Lead	0.0031	mg/L		0.0005		E200.8	04/15/11 20:08 / dck
Magnesium	13	mg/L		1		E200.8	04/15/11 20:08 / dck
Zinc	0.02	mg/L		0.01		E200.8	04/15/11 20:08 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11040177-009
Client Sample ID SS-25

Report Date: 04/27/11
Collection Date: 04/13/11 11:00
DateReceived: 04/13/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	11	mg/L		1		A2540 D	04/14/11 14:49 / glj
INORGANICS							
Alkalinity, Total as CaCO3	110	mg/L		4		A2320 B	04/15/11 02:13 / zeg
Bicarbonate as HCO3	130	mg/L		4		A2320 B	04/15/11 02:13 / zeg
Sulfate	110	mg/L		1		E300.0	04/14/11 23:20 / zeg
Hardness as CaCO3	201	mg/L		1		A2340 B	04/19/11 10:46 / abb
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/18/11 14:03 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	04/14/11 16:37 / reh
Nitrogen, Total	0.49	mg/L		0.05		A4500 N-C	04/19/11 11:27 / reh
Phosphorus, Total as P	0.036	mg/L		0.005		E365.1	04/15/11 16:44 / reh
METALS, DISSOLVED							
Arsenic	0.014	mg/L		0.005		E200.8	04/15/11 20:12 / dck
Cadmium	ND	mg/L		0.00008		E200.8	04/15/11 20:12 / dck
Calcium	56	mg/L		1		E200.8	04/18/11 15:44 / dck
Copper	0.004	mg/L		0.001		E200.8	04/15/11 20:12 / dck
Lead	0.0007	mg/L		0.0005		E200.8	04/15/11 20:12 / dck
Magnesium	13	mg/L		1		E200.8	04/18/11 15:44 / dck
Zinc	ND	mg/L		0.01		E200.8	04/15/11 20:12 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.016	mg/L		0.005		E200.8	04/15/11 20:17 / dck
Cadmium	0.00023	mg/L		0.00008		E200.8	04/15/11 20:17 / dck
Calcium	58	mg/L		1		E200.8	04/18/11 18:17 / dck
Copper	0.016	mg/L		0.001		E200.8	04/15/11 20:17 / dck
Lead	0.0043	mg/L		0.0005		E200.8	04/15/11 20:17 / dck
Magnesium	14	mg/L		1		E200.8	04/18/11 18:17 / dck
Zinc	0.03	mg/L		0.01		E200.8	04/15/11 20:17 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 04/27/11
Project: CFR Monitoring-474374
Work Order: H11040177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R70228
Sample ID: MBLK		Method Blank				Run: MAN-TECH_110414B				04/14/11 18:52
Alkalinity, Total as CaCO3		2	mg/L	0.6						
Sample ID: LCS		Laboratory Control Sample				Run: MAN-TECH_110414B				04/14/11 19:00
Alkalinity, Total as CaCO3		610	mg/L	4.0	101	90	110			
Sample ID: H11040177-008BMS		Sample Matrix Spike				Run: MAN-TECH_110414B				04/15/11 02:06
Alkalinity, Total as CaCO3		680	mg/L	4.0	92	90	110			
Sample ID: H11040177-009BDUP	2	Sample Duplicate				Run: MAN-TECH_110414B				04/15/11 02:19
Alkalinity, Total as CaCO3		110	mg/L	4.0				0.8	20	
Bicarbonate as HCO3		120	mg/L	4.0				1.3	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 04/27/11
Project: CFR Monitoring-474374
Work Order: H11040177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 D										Batch: 11872
Sample ID: MB-11872		Method Blank				Run: ACCU-124 (14410200)_110414				04/14/11 14:45
Solids, Total Suspended TSS @ 105 C		ND	mg/L	1						
Sample ID: LCS-11872		Laboratory Control Sample				Run: ACCU-124 (14410200)_110414				04/14/11 14:46
Solids, Total Suspended TSS @ 105 C		1950	mg/L	10	97	70	130			
Sample ID: H11040172-001BDUP		Sample Duplicate				Run: ACCU-124 (14410200)_110414				04/14/11 14:46
Solids, Total Suspended TSS @ 105 C		ND	mg/L	10					5	
Sample ID: H11040182-002CDUP		Sample Duplicate				Run: ACCU-124 (14410200)_110414				04/14/11 14:57
Solids, Total Suspended TSS @ 105 C		ND	mg/L	10					5	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 04/27/11
Project: CFR Monitoring-474374
Work Order: H11040177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500 N-C									Analytical Run: NUTRIENTS_110419A	
Sample ID: ICV-1	Initial Calibration Verification Standard								04/19/11 10:43	
Nitrogen, Total		1.04	mg/L	0.10	104	90	110			
Sample ID: CCV-4	Continuing Calibration Verification Standard								04/19/11 10:49	
Nitrogen, Total		0.540	mg/L	0.10	108	90	110			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								04/19/11 10:50	
Nitrogen, Total		ND	mg/L	0.10		0	0			
Sample ID: CCV-19	Continuing Calibration Verification Standard								04/19/11 11:19	
Nitrogen, Total		0.480	mg/L	0.10	96	90	110			
Method: A4500 N-C									Batch: 11910	
Sample ID: LCS-2	Laboratory Control Sample				Run: NUTRIENTS_110419A				04/19/11 10:45	
Nitrogen, Total		33.2	mg/L	1.0	110	90	110			
Sample ID: MBLK-6	Method Blank				Run: NUTRIENTS_110419A				04/19/11 10:52	
Nitrogen, Total		ND	mg/L	0.02						
Sample ID: H11040177-005AMS	Sample Matrix Spike				Run: NUTRIENTS_110419A				04/19/11 11:13	
Nitrogen, Total		1.07	mg/L	0.10	107	90	110			
Sample ID: H11040177-005AMSD	Sample Matrix Spike Duplicate				Run: NUTRIENTS_110419A				04/19/11 11:15	
Nitrogen, Total		1.11	mg/L	0.10	111	90	110	3.7	20	S
Sample ID: H11040182-004BMS	Sample Matrix Spike				Run: NUTRIENTS_110419A				04/19/11 11:37	
Nitrogen, Total		1.12	mg/L	0.10	95	90	110			
Sample ID: H11040182-004BMSD	Sample Matrix Spike Duplicate				Run: NUTRIENTS_110419A				04/19/11 11:39	
Nitrogen, Total		1.14	mg/L	0.10	97	90	110	1.8	20	

Qualifiers:

RL - Analyte reporting limit.
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 04/27/11
Project: CFR Monitoring-474374
Work Order: H11040177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Analytical Run: ICPMS204-B_110415B	
Sample ID: ICV STD	7	Initial Calibration Verification Standard							04/15/11 13:36	
Arsenic		0.0508	mg/L	0.0050	102	90	110			
Cadmium		0.0264	mg/L	0.0010	106	90	110			
Calcium		2.57	mg/L	0.50	103	90	110			
Copper		0.0520	mg/L	0.010	104	90	110			
Lead		0.0505	mg/L	0.010	101	90	110			
Magnesium		2.56	mg/L	0.50	103	90	110			
Zinc		0.0514	mg/L	0.010	103	90	110			
Sample ID: ICSA	7	Interference Check Sample A							04/15/11 13:40	
Arsenic		0.000179	mg/L	0.0050						
Cadmium		0.000560	mg/L	0.0010						
Calcium		112	mg/L	0.50						
Copper		0.000337	mg/L	0.010						
Lead		8.10E-05	mg/L	0.010						
Magnesium		39.2	mg/L	0.50						
Zinc		0.000724	mg/L	0.010						
Sample ID: ICSAB	7	Interference Check Sample AB							04/15/11 13:45	
Arsenic		0.0101	mg/L	0.0050	101	70	130			
Cadmium		0.0103	mg/L	0.0010	103	70	130			
Calcium		112	mg/L	0.50	93	70	130			
Copper		0.0199	mg/L	0.010	100	70	130			
Lead		6.60E-05	mg/L	0.010		0	0			
Magnesium		39.7	mg/L	0.50	99	70	130			
Zinc		0.0104	mg/L	0.010	104	70	130			
Method: E200.8									Batch: 11882	
Sample ID: MB-11882	7	Method Blank				Run: ICPMS204-B_110415B			04/15/11 18:05	
Arsenic		0.0003	mg/L	5E-05						
Cadmium		ND	mg/L	2E-05						
Calcium		ND	mg/L	0.04						
Copper		ND	mg/L	0.0004						
Lead		ND	mg/L	2E-05						
Magnesium		0.02	mg/L	0.003						
Zinc		0.0007	mg/L	0.0003						
Sample ID: LCS-11882	7	Laboratory Control Sample				Run: ICPMS204-B_110415B			04/15/11 18:10	
Arsenic		0.508	mg/L	0.0050	101	85	115			
Cadmium		0.263	mg/L	0.0010	105	85	115			
Calcium		26.9	mg/L	1.0	108	85	115			
Copper		0.519	mg/L	0.010	104	85	115			
Lead		0.513	mg/L	0.010	103	85	115			
Magnesium		25.8	mg/L	1.0	103	85	115			
Zinc		0.518	mg/L	0.010	104	85	115			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 04/27/11

Project: CFR Monitoring-474374 **Work Order:** H11040177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: 11882
Sample ID: H11040177-001DMS3	7	Sample Matrix Spike				Run: ICPMS204-B_110415B				04/15/11 18:23
Arsenic		0.545	mg/L	0.0050	103	70	130			
Cadmium		0.265	mg/L	0.0010	106	70	130			
Calcium		70.2	mg/L	1.0	100	70	130			
Copper		0.537	mg/L	0.010	104	70	130			
Lead		0.522	mg/L	0.010	104	70	130			
Magnesium		37.2	mg/L	1.0	102	70	130			
Zinc		0.575	mg/L	0.010	102	70	130			
Sample ID: H11040177-001DMSD3	7	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110415B				04/15/11 18:27
Arsenic		0.532	mg/L	0.0050	100	70	130	2.4	20	
Cadmium		0.259	mg/L	0.0010	104	70	130	2.1	20	
Calcium		69.6	mg/L	1.0	98	70	130	0.8	20	
Copper		0.530	mg/L	0.010	103	70	130	1.3	20	
Lead		0.509	mg/L	0.010	101	70	130	2.5	20	
Magnesium		37.0	mg/L	1.0	102	70	130	0.5	20	
Zinc		0.567	mg/L	0.010	101	70	130	1.4	20	
Method: E200.8										Batch: R70288
Sample ID: ICB	7	Method Blank				Run: ICPMS204-B_110415B				04/15/11 14:11
Arsenic		ND	mg/L	3E-05						
Cadmium		ND	mg/L	1E-05						
Calcium		ND	mg/L	0.003						
Copper		ND	mg/L	3E-05						
Lead		ND	mg/L	1.0E-05						
Magnesium		ND	mg/L	0.0007						
Zinc		0.0007	mg/L	0.0003						
Sample ID: LFB	7	Laboratory Fortified Blank				Run: ICPMS204-B_110415B				04/15/11 14:16
Arsenic		0.0500	mg/L	0.0050	100	85	115			
Cadmium		0.0495	mg/L	0.0010	99	85	115			
Calcium		48.5	mg/L	0.50	97	85	115			
Copper		0.0493	mg/L	0.010	99	85	115			
Lead		0.0499	mg/L	0.010	100	85	115			
Magnesium		48.4	mg/L	0.50	97	85	115			
Zinc		0.0499	mg/L	0.010	98	85	115			
Sample ID: H11040165-016DMS	7	Sample Matrix Spike				Run: ICPMS204-B_110415B				04/15/11 17:25
Arsenic		0.494	mg/L	0.0050	98	70	130			
Cadmium		0.493	mg/L	0.0010	99	70	130			
Calcium		711	mg/L	1.0	91	70	130			
Copper		0.493	mg/L	0.010	96	70	130			
Lead		0.501	mg/L	0.010	100	70	130			
Magnesium		544	mg/L	1.0	96	70	130			
Zinc		0.497	mg/L	0.010	97	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 04/27/11

Project: CFR Monitoring-474374 **Work Order:** H11040177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Batch: R70288	
Sample ID: H11040165-016DMSD	7	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110415B			04/15/11 17:30	
Arsenic		0.504	mg/L	0.0050	100	70	130	1.9	20	
Cadmium		0.480	mg/L	0.0010	96	70	130	2.9	20	
Calcium		731	mg/L	1.0	95	70	130	2.8	20	
Copper		0.506	mg/L	0.010	99	70	130	2.5	20	
Lead		0.499	mg/L	0.010	100	70	130	0.3	20	
Magnesium		555	mg/L	1.0	98	70	130	2.1	20	
Zinc		0.501	mg/L	0.010	98	70	130	0.8	20	
Sample ID: H11040183-001BMS	7	Sample Matrix Spike				Run: ICPMS204-B_110415B			04/15/11 20:57	
Arsenic		0.0534	mg/L	0.0050	100	70	130			
Cadmium		0.0482	mg/L	0.0010	96	70	130			
Calcium		99.7	mg/L	1.0	94	70	130			
Copper		0.0484	mg/L	0.010	97	70	130			
Lead		0.0494	mg/L	0.010	99	70	130			
Magnesium		59.6	mg/L	1.0	96	70	130			
Zinc		0.0491	mg/L	0.010	96	70	130			
Sample ID: H11040183-001BMSD	7	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110415B			04/15/11 21:01	
Arsenic		0.0518	mg/L	0.0050	97	70	130	3.0	20	
Cadmium		0.0489	mg/L	0.0010	98	70	130	1.4	20	
Calcium		97.6	mg/L	1.0	90	70	130	2.2	20	
Copper		0.0472	mg/L	0.010	94	70	130	2.6	20	
Lead		0.0500	mg/L	0.010	100	70	130	1.2	20	
Magnesium		57.5	mg/L	1.0	92	70	130	3.7	20	
Zinc		0.0468	mg/L	0.010	92	70	130	4.7	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 04/27/11
Project: CFR Monitoring-474374
Work Order: H11040177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_110418A		
Sample ID: ICV STD	3	Initial Calibration Verification Standard							04/18/11 12:18	
Calcium		2.46	mg/L	0.50	98	90	110			
Magnesium		2.44	mg/L	0.50	98	90	110			
Zinc		0.0488	mg/L	0.010	98	90	110			
Sample ID: ICSA	3	Interference Check Sample A							04/18/11 12:23	
Calcium		112	mg/L	0.50						
Magnesium		39.0	mg/L	0.50						
Zinc		0.00114	mg/L	0.010						
Sample ID: ICSAB	3	Interference Check Sample AB							04/18/11 12:27	
Calcium		114	mg/L	0.50	95	70	130			
Magnesium		39.3	mg/L	0.50	98	70	130			
Zinc		0.0109	mg/L	0.010	109	70	130			
Sample ID: ICV STD	3	Initial Calibration Verification Standard							04/18/11 17:42	
Calcium		2.56	mg/L	0.50	103	90	110			
Magnesium		2.49	mg/L	0.50	100	90	110			
Zinc		0.0509	mg/L	0.010	102	90	110			
Sample ID: ICSA	3	Interference Check Sample A							04/18/11 17:46	
Calcium		117	mg/L	0.50						
Magnesium		40.1	mg/L	0.50						
Zinc		0.00112	mg/L	0.010						
Sample ID: ICSAB	3	Interference Check Sample AB							04/18/11 17:50	
Calcium		112	mg/L	0.50	93	70	130			
Magnesium		38.8	mg/L	0.50	97	70	130			
Zinc		0.0107	mg/L	0.010	107	70	130			
Sample ID: ICV STD	3	Initial Calibration Verification Standard							04/19/11 00:00	
Calcium		2.47	mg/L	0.50	99	90	110			
Magnesium		2.50	mg/L	0.50	100	90	110			
Zinc		0.0503	mg/L	0.010	101	90	110			
Sample ID: ICSA	3	Interference Check Sample A							04/19/11 00:05	
Calcium		113	mg/L	0.50						
Magnesium		39.9	mg/L	0.50						
Zinc		0.000986	mg/L	0.010						
Sample ID: ICSAB	3	Interference Check Sample AB							04/19/11 00:09	
Calcium		114	mg/L	0.50	95	70	130			
Magnesium		40.4	mg/L	0.50	101	70	130			
Zinc		0.0107	mg/L	0.010	107	70	130			
Method: E200.8									Batch: 11882	
Sample ID: MB-11882	7	Method Blank				Run: ICPMS204-B_110418A			04/18/11 14:20	
Arsenic		0.001	mg/L	5E-05						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 04/27/11

Project: CFR Monitoring-474374 **Work Order:** H11040177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: 11882
Sample ID: MB-11882	7	Method Blank				Run: ICPMS204-B_110418A				04/18/11 14:20
Cadmium		ND	mg/L	2E-05						
Calcium		ND	mg/L	0.04						
Copper		ND	mg/L	0.0004						
Lead		3E-05	mg/L	2E-05						
Magnesium		0.004	mg/L	0.003						
Zinc		0.0007	mg/L	0.0003						
Method: E200.8										Batch: R70303
Sample ID: ICB	3	Method Blank				Run: ICPMS204-B_110418A				04/18/11 13:05
Calcium		ND	mg/L	0.003						
Magnesium		ND	mg/L	0.0007						
Zinc		ND	mg/L	0.0003						
Sample ID: LFB	3	Laboratory Fortified Blank				Run: ICPMS204-B_110418A				04/18/11 13:09
Calcium		45.5	mg/L	0.50	91	85	115			
Magnesium		45.4	mg/L	0.50	91	85	115			
Zinc		0.0475	mg/L	0.010	95	85	115			
Sample ID: H11040177-001CMS	3	Sample Matrix Spike				Run: ICPMS204-B_110418A				04/18/11 14:03
Calcium		85.0	mg/L	1.0	85	70	130			
Magnesium		54.4	mg/L	1.0	88	70	130			
Zinc		0.0570	mg/L	0.010	93	70	130			
Sample ID: H11040177-001CMSD	3	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110418A				04/18/11 14:07
Calcium		89.1	mg/L	1.0	93	70	130	4.8	20	
Magnesium		56.6	mg/L	1.0	92	70	130	3.9	20	
Zinc		0.0591	mg/L	0.010	97	70	130	3.7	20	
Sample ID: LFB	3	Laboratory Fortified Blank				Run: ICPMS204-B_110418A				04/18/11 16:12
Calcium		46.3	mg/L	0.50	93	85	115			
Magnesium		44.0	mg/L	0.50	88	85	115			
Zinc		0.0474	mg/L	0.010	95	85	115			
Sample ID: H11040183-001BMS	3	Sample Matrix Spike				Run: ICPMS204-B_110418A				04/18/11 18:30
Calcium		95.4	mg/L	1.0	89	70	130			
Magnesium		56.4	mg/L	1.0	90	70	130			
Zinc		0.0483	mg/L	0.010	94	70	130			
Sample ID: H11040183-001BMSD	3	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110418A				04/18/11 18:34
Calcium		96.0	mg/L	1.0	91	70	130	0.6	20	
Magnesium		57.1	mg/L	1.0	91	70	130	1.2	20	
Zinc		0.0488	mg/L	0.010	95	70	130	1.1	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 04/27/11
Project: CFR Monitoring-474374
Work Order: H11040177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Analytical Run: ICPMS204-B_110419B	
Sample ID: ICV STD		Initial Calibration Verification Standard							04/19/11 10:41	
Zinc		0.0529	mg/L	0.010	106	90	110			
Sample ID: ICSA		Interference Check Sample A							04/19/11 10:45	
Zinc		0.00117	mg/L	0.010						
Sample ID: ICSAB		Interference Check Sample AB							04/19/11 10:50	
Zinc		0.0111	mg/L	0.010	111	70	130			
Method: E200.8									Batch: 11882	
Sample ID: MB-11882	7	Method Blank				Run: ICPMS204-B_110419B			04/19/11 15:04	
Arsenic		0.0008	mg/L	5E-05						
Cadmium		ND	mg/L	2E-05						
Calcium		ND	mg/L	0.04						
Copper		ND	mg/L	0.0004						
Lead		2E-05	mg/L	2E-05						
Magnesium		0.02	mg/L	0.003						
Zinc		0.001	mg/L	0.0003						
Method: E200.8									Batch: R70326	
Sample ID: ICB		Method Blank				Run: ICPMS204-B_110419B			04/19/11 12:25	
Zinc		0.0009	mg/L	0.0003						
Sample ID: LFB		Laboratory Fortified Blank				Run: ICPMS204-B_110419B			04/19/11 12:29	
Zinc		0.0496	mg/L	0.010	97	85	115			
Sample ID: H11040183-020CMS		Sample Matrix Spike				Run: ICPMS204-B_110419B			04/19/11 14:15	
Zinc		0.399	mg/L	0.010	92	70	130			
Sample ID: H11040183-020CMSD		Sample Matrix Spike Duplicate				Run: ICPMS204-B_110419B			04/19/11 14:20	
Zinc		0.406	mg/L	0.010	94	70	130	1.6	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 04/27/11
Project: CFR Monitoring-474374
Work Order: H11040177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC101-H_110414A	
Sample ID: ICV041411-13		Initial Calibration Verification Standard							04/14/11 15:37	
Sulfate		410	mg/L	1.0	103	90	110			
Sample ID: CCV041411-30		Continuing Calibration Verification Standard							04/14/11 20:15	
Sulfate		410	mg/L	1.0	102	90	110			
Method: E300.0									Batch: R70233	
Sample ID: ICB041411-14		Method Blank				Run: IC101-H_110414A			04/14/11 15:53	
Sulfate		ND	mg/L	0.5						
Sample ID: LFB041411-14		Laboratory Fortified Blank				Run: IC101-H_110414A			04/14/11 16:08	
Sulfate		200	mg/L	1.1	99	90	110			
Sample ID: H11040177-004BMS		Sample Matrix Spike				Run: IC101-H_110414A			04/14/11 21:47	
Sulfate		260	mg/L	1.1	103	90	110			
Sample ID: H11040177-004BMSD		Sample Matrix Spike Duplicate				Run: IC101-H_110414A			04/14/11 22:03	
Sulfate		250	mg/L	1.1	101	90	110	1.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 04/27/11
Project: CFR Monitoring-474374
Work Order: H11040177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E350.1									Analytical Run: NUTRIENTS_110417A	
Sample ID: ICV-1	Initial Calibration Verification Standard								04/18/11 12:43	
Nitrogen, Ammonia as N		1.00	mg/L	0.10	100	90	110			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								04/18/11 12:51	
Nitrogen, Ammonia as N		ND	mg/L	0.10		0	0			
Sample ID: CCV-22	Continuing Calibration Verification Standard								04/18/11 13:25	
Nitrogen, Ammonia as N		0.510	mg/L	0.10	102	90	110			
Sample ID: CCV-36	Continuing Calibration Verification Standard								04/18/11 13:53	
Nitrogen, Ammonia as N		0.520	mg/L	0.10	104	90	110			
Method: E350.1									Batch: A2011-04-18_5_NH3_01	
Sample ID: LCS-2	Laboratory Control Sample					Run: NUTRIENTS_110417A			04/18/11 12:45	
Nitrogen, Ammonia as N		16.5	mg/L	0.50	105	90	110			
Sample ID: LFB-3	Laboratory Fortified Blank					Run: NUTRIENTS_110417A			04/18/11 12:47	
Nitrogen, Ammonia as N		0.990	mg/L	0.10	99	90	110			
Sample ID: MBLK-6	Method Blank					Run: NUTRIENTS_110417A			04/18/11 12:53	
Nitrogen, Ammonia as N		ND	mg/L	0.009						
Sample ID: H11040182-004GMS	Sample Matrix Spike					Run: NUTRIENTS_110417A			04/18/11 14:17	
Nitrogen, Ammonia as N		1.1	mg/L	0.10	107	0	0			
Sample ID: H11040182-004GMSD	Sample Matrix Spike Duplicate					Run: NUTRIENTS_110417A			04/18/11 14:19	
Nitrogen, Ammonia as N		1.1	mg/L	0.10	109	0	0			
Method: E350.1									Batch: R70299	
Sample ID: H11040177-006EMS	Sample Matrix Spike					Run: NUTRIENTS_110417A			04/18/11 13:43	
Nitrogen, Ammonia as N		1.04	mg/L	0.10	101	90	110			
Sample ID: H11040177-006EMSD	Sample Matrix Spike Duplicate					Run: NUTRIENTS_110417A			04/18/11 13:45	
Nitrogen, Ammonia as N		1.03	mg/L	0.10	100	90	110	1.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 04/27/11
Project: CFR Monitoring-474374
Work Order: H11040177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2									Analytical Run: NUTRIENTS_110414A	
Sample ID: ICV-1	Initial Calibration Verification Standard								04/14/11 15:03	
Nitrogen, Nitrate+Nitrite as N		1.01	mg/L	0.050	101	90	110			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								04/14/11 15:13	
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.050		0	0			
Sample ID: CCV-33	Continuing Calibration Verification Standard								04/14/11 16:07	
Nitrogen, Nitrate+Nitrite as N		0.490	mg/L	0.050	98	90	110			
Sample ID: CCV-46	Continuing Calibration Verification Standard								04/14/11 16:33	
Nitrogen, Nitrate+Nitrite as N		0.480	mg/L	0.050	96	90	110			
Method: E353.2									Batch: A2011-04-14_5_NO3_01	
Sample ID: LCS-2	Laboratory Control Sample				Run: NUTRIENTS_110414A				04/14/11 15:05	
Nitrogen, Nitrate+Nitrite as N		24.1	mg/L	0.15	100	90	110			
Sample ID: LFB-3	Laboratory Fortified Blank				Run: NUTRIENTS_110414A				04/14/11 15:07	
Nitrogen, Nitrate+Nitrite as N		1.04	mg/L	0.050	104	90	110			
Sample ID: MBLK-7	Method Blank				Run: NUTRIENTS_110414A				04/14/11 15:15	
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.006						
Sample ID: H11040177-004EMS	Sample Matrix Spike				Run: NUTRIENTS_110414A				04/14/11 16:21	
Nitrogen, Nitrate+Nitrite as N		1.08	mg/L	0.050	102	90	110			
Sample ID: H11040177-004EMSD	Sample Matrix Spike Duplicate				Run: NUTRIENTS_110414A				04/14/11 16:23	
Nitrogen, Nitrate+Nitrite as N		1.11	mg/L	0.050	105	90	110	2.7	20	
Sample ID: H11040182-004GMS	Sample Matrix Spike				Run: NUTRIENTS_110414A				04/14/11 16:49	
Nitrogen, Nitrate+Nitrite as N		1.00	mg/L	0.050	100	90	110			
Sample ID: H11040182-004GMSD	Sample Matrix Spike Duplicate				Run: NUTRIENTS_110414A				04/14/11 16:51	
Nitrogen, Nitrate+Nitrite as N		1.02	mg/L	0.050	102	90	110	2.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 04/27/11
Project: CFR Monitoring-474374
Work Order: H11040177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E365.1									Analytical Run: FIA202-HE_110415B	
Sample ID: ICV		Initial Calibration Verification Standard							04/15/11 16:01	
Phosphorus, Total as P		0.240	mg/L	0.010	96	90	110			
Sample ID: ICB		Initial Calibration Blank, Instrument Blank							04/15/11 16:06	
Phosphorus, Total as P		-0.00247	mg/L	0.010		0	0			
Sample ID: CCV		Continuing Calibration Verification Standard							04/15/11 16:21	
Phosphorus, Total as P		0.253	mg/L	0.010	101	90	110			
Sample ID: CCV1		Continuing Calibration Verification Standard							04/15/11 16:22	
Phosphorus, Total as P		0.00527	mg/L	0.010	53	50	150			
Sample ID: CCV		Continuing Calibration Verification Standard							04/15/11 16:37	
Phosphorus, Total as P		0.253	mg/L	0.010	101	90	110			
Sample ID: CCV1		Continuing Calibration Verification Standard							04/15/11 16:38	
Phosphorus, Total as P		0.00574	mg/L	0.010	57	50	150			
Method: E365.1									Batch: 11885	
Sample ID: LCS-11885		Laboratory Control Sample				Run: FIA202-HE_110415B			04/15/11 16:02	
Phosphorus, Total as P		8.56	mg/L	0.020	102	90	110			
Sample ID: MB-11885		Method Blank				Run: FIA202-HE_110415B			04/15/11 16:07	
Phosphorus, Total as P		ND	mg/L	0.0004						
Sample ID: H11040172-001DMS		Sample Matrix Spike				Run: FIA202-HE_110415B			04/15/11 16:28	
Phosphorus, Total as P		0.190	mg/L	0.010	94	90	110			
Sample ID: H11040172-001DMSD		Sample Matrix Spike Duplicate				Run: FIA202-HE_110415B			04/15/11 16:29	
Phosphorus, Total as P		0.196	mg/L	0.010	97	90	110	3.3	20	
Method: E365.1									Batch: 11886	
Sample ID: H11040182-004HMS		Sample Matrix Spike				Run: FIA202-HE_110415B			04/15/11 16:49	
Phosphorus, Total as P		0.187	mg/L	0.010	93	90	110			
Sample ID: H11040182-004HMSD		Sample Matrix Spike Duplicate				Run: FIA202-HE_110415B			04/15/11 16:50	
Phosphorus, Total as P		0.192	mg/L	0.010	96	90	110	3.0	20	
Sample ID: MB-11886		Method Blank				Run: FIA202-HE_110415B			04/15/11 17:15	
Phosphorus, Total as P		ND	mg/L	0.0004						
Sample ID: LCS-11886		Laboratory Control Sample				Run: FIA202-HE_110415B			04/15/11 17:17	
Phosphorus, Total as P		8.86	mg/L	0.020	106	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Workorder Receipt Checklist

H11040177

MT DEQ-Federal Superfund

Login completed by: Tracy L. Lorash
Date Received: 4/13/2011

Reviewed by: BL2000\sdull
Received by: abb

Reviewed Date: 4/27/2011
Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature:	3.4°C On Ice		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	Not Applicable ☐

Contact and Corrective Action Comments:

None

Chain of Custody and Analytical Request Record

PLEASE PRINT (Provide as much information as possible.)

Company Name: MT DEQ	Project Name, PWS, Permit, Etc.: CFR Monitoring - 474374	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: P.O. Box 200901 Helena, MT 59620-0901	Contact Name: Brian Bartkowiak Phone/Fax: 461-3070 Email: bbartkowiak@mt.gov		Sampler: (Please Print) Weber Ingman Bartkowiak
Invoice Address: above	Invoice Contact & Phone: above	Purchase Order:	Quote/Bottle Order: 624/7562

Special Report/Formats:

☐ DW ☐ EDD/EDT (Electronic Data)
☐ POTW/WWTP Format: _____
☐ State: _____ ☐ LEVEL IV
☐ Other: _____ ☐ NELAC

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids Vegetation Bioassay Other DW - Drinking Water

ANALYSIS REQUESTED

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	TR As, Cd, Cu, Pb, Zn	Diss As, Ca, Cd, Cu, Mg, Pb, Zn	TPN	NO_{3+2}, NH_3, TP	TSS, Total Alk., $SO_4^{=}$	SEE ATTACHED	Standard Turnaround (TAT)
1 CFR-116A	4/12/11	09:00	SW	x	x	x	x	x		
2 CFR-84F	4/12/11	11:00	SW	x	x	x	x	x		
3 CFR-53C	4/12/11	13:15	SW	x	x	x	x	x		
4 CFR-53C dup	4/12/11	13:45	SW	x	x	x	x	x		
5 Field Blank	4/12/11	14:45	SW	x	x	x	x	x		
6 CFR-42G	4/12/11	15:15	SW	x	x	x	x	x		
7 CFR-27H	4/13/11	08:45	SW	x	x	x	x	x		
8 CFR-03A	4/13/11	10:15	SW	x	x	x	x	x		
9 SS-25	4/13/11	11:00	SW	x	x	x	x	x		
10										

RUSH

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments: Hardness from TR Ca & Mg

Shipped by: hand del.
Cooler ID(s): yes
Receipt Temp: 3.4 °C
On Ice: (Y) N
Custody Seal On Bottle Y (N) On Cooler Y (N)
Intact Y N
Signature Match Y N

LABORATORY USE ONLY H11040177

Custody Record MUST be Signed

Relinquished by (print): Erich Weber	Date/Time: 4/13/11 16:20	Signature:	Received by (print):
Relinquished by (print):	Date/Time:	Signature:	Received by (print):
Sample Disposal: Return to Client: _____ Lab Disposal: _____			Received by Laboratory: Amanda Blackburn

Date/Time: 4/13/11 16:20 Signature: Amanda Blackburn

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.
This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

Analyte Limits For Quote #: H-624

Schedule Name / TestName	Analyte	Report Limit	Units
Surface Water Sampling			
Alkalinity	Alkalinity, Total as CaCO3	4	mg/L
	Bicarbonate as HCO3	4	mg/L
Anions by Ion Chromatography	Chloride	1	mg/L
	Sulfate	1	mg/L
Metals by ICP/ICPMS, Dissolved	Arsenic	0.005	mg/L
	Cadmium	0.00008	mg/L
	Calcium	1	mg/L
	Copper	0.001	mg/L
	Lead	0.0005	mg/L
	Magnesium	1	mg/L
	Zinc	0.01	mg/L
Metals by ICP/ICPMS, Tot. Rec.	Arsenic	0.005	mg/L
	Cadmium	0.00008	mg/L
	Calcium	1	mg/L
	Copper	0.001	mg/L
	Lead	0.0005	mg/L
	Magnesium	1	mg/L
	Zinc	0.01	mg/L
Nitrogen, Ammonia	Nitrogen, Ammonia as N	0.05	mg/L
Nitrogen, Nitrate + Nitrite	Nitrogen, Nitrate+Nitrite as N	0.05	mg/L
Nitrogen, Total Persulfate	Nitrogen, Total	0.05	mg/L
Phosphorus, Total	Phosphorus, Total as P	0.005	mg/L
Solids, Total Suspended	Solids, Total Suspended TSS @ 105 C	1	mg/L

Appendix B2

2nd Quarter Surface Water Reports

ANALYTICAL SUMMARY REPORT

June 27, 2011

MT DEQ-Federal Superfund
PO Box 200901
Helena, MT 59620-0901

Workorder No.: H11060184 Quote ID: H624

Project Name: CFR Monitoring-474374

Energy Laboratories Inc Helena MT received the following 9 samples for MT DEQ-Federal Superfund on 6/9/2011 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H11060184-001	CFR-116A	06/07/11 10:30	06/09/11	Aqueous	Metals by ICP/ICPMS, Dissolved Metals by ICP/ICPMS, Tot. Rec. Alkalinity Conductivity Hardness as CaCO3 Anions by Ion Chromatography Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite Nitrogen, Total Persulfate Metals Digestion by EPA 200.2 Digestion, Total P Water Nitrogen, Total Persulfate Preparation for TSS Phosphorus, Total Solids, Total Suspended
H11060184-002	CFR-84F	06/07/11 13:00	06/09/11	Aqueous	Same As Above
H11060184-003	CFR-53C	06/07/11 15:15	06/09/11	Aqueous	Same As Above
H11060184-004	CFR-42G	06/07/11 16:30	06/09/11	Aqueous	Same As Above
H11060184-005	Field Blank	06/08/11 8:45	06/09/11	Aqueous	Same As Above
H11060184-006	CFR-27H	06/08/11 9:00	06/09/11	Aqueous	Same As Above
H11060184-007	CFR-27H Dup	06/08/11 9:00	06/09/11	Aqueous	Same As Above
H11060184-008	CFR-03A	06/08/11 11:15	06/09/11	Aqueous	Same As Above
H11060184-009	SS-25	06/08/11 13:15	06/09/11	Aqueous	Same As Above

This report was prepared by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11060184-001
Client Sample ID CFR-116A

Report Date: 06/27/11
Collection Date: 06/07/11 10:30
DateReceived: 06/09/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	130	mg/L		1		A2540 D	06/10/11 10:23 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	64	mg/L		4		A2320 B	06/10/11 16:13 / cmm
Bicarbonate as HCO3	78	mg/L		4		A2320 B	06/10/11 16:13 / cmm
Sulfate	10	mg/L		1		E300.0	06/13/11 19:03 / zeg
Hardness as CaCO3	76	mg/L		1		A2340 B	06/13/11 15:17 / wjj
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/13/11 11:53 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/14/11 12:05 / reh
Nitrogen, Total	0.25	mg/L		0.05		A4500 N-C	06/16/11 10:04 / reh
Phosphorus, Total as P	0.133	mg/L		0.005		E365.1	06/15/11 11:21 / reh
METALS, DISSOLVED							
Arsenic	0.007	mg/L		0.005		E200.8	06/13/11 14:51 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/13/11 14:51 / dck
Copper	0.008	mg/L		0.001		E200.8	06/13/11 14:51 / dck
Lead	ND	mg/L		0.0005		E200.8	06/13/11 14:51 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/13/11 14:51 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.013	mg/L		0.005		E200.8	06/13/11 15:17 / dck
Cadmium	0.00033	mg/L		0.00008		E200.8	06/13/11 15:17 / dck
Calcium	21	mg/L		1		E200.8	06/13/11 15:17 / dck
Copper	0.058	mg/L		0.001		E200.8	06/13/11 15:17 / dck
Lead	0.0095	mg/L		0.0005		E200.8	06/13/11 15:17 / dck
Magnesium	6	mg/L		1		E200.8	06/13/11 15:17 / dck
Zinc	0.09	mg/L		0.01		E200.8	06/13/11 15:17 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11060184-002
Client Sample ID CFR-84F

Report Date: 06/27/11
Collection Date: 06/07/11 13:00
DateReceived: 06/09/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	92	mg/L		1		A2540 D	06/10/11 10:23 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	99	mg/L		4		A2320 B	06/10/11 16:27 / cmm
Bicarbonate as HCO3	120	mg/L		4		A2320 B	06/10/11 16:27 / cmm
Sulfate	19	mg/L		1		E300.0	06/13/11 19:37 / zeg
Hardness as CaCO3	119	mg/L		1		A2340 B	06/13/11 16:14 / wjj
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/13/11 11:54 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/14/11 12:06 / reh
Nitrogen, Total	0.40	mg/L		0.05		A4500 N-C	06/16/11 10:06 / reh
Phosphorus, Total as P	0.134	mg/L		0.005		E365.1	06/15/11 11:22 / reh
METALS, DISSOLVED							
Arsenic	0.014	mg/L		0.005		E200.8	06/13/11 15:56 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/15/11 13:41 / dck
Copper	0.014	mg/L		0.001		E200.8	06/13/11 15:56 / dck
Lead	ND	mg/L		0.0005		E200.8	06/13/11 15:56 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/13/11 15:56 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.025	mg/L		0.005		E200.8	06/13/11 16:14 / dck
Cadmium	0.00042	mg/L		0.00008		E200.8	06/15/11 13:54 / dck
Calcium	34	mg/L		1		E200.8	06/13/11 16:14 / dck
Copper	0.085	mg/L		0.001		E200.8	06/13/11 16:14 / dck
Lead	0.0142	mg/L		0.0005		E200.8	06/13/11 16:14 / dck
Magnesium	8	mg/L		1		E200.8	06/13/11 16:14 / dck
Zinc	0.11	mg/L		0.01		E200.8	06/13/11 16:14 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11060184-003
Client Sample ID CFR-53C

Report Date: 06/27/11
Collection Date: 06/07/11 15:15
DateReceived: 06/09/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	124	mg/L		1		A2540 D	06/10/11 10:24 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	86	mg/L		4		A2320 B	06/10/11 16:42 / cmm
Bicarbonate as HCO3	110	mg/L		4		A2320 B	06/10/11 16:42 / cmm
Sulfate	16	mg/L		1		E300.0	06/13/11 19:49 / zeg
Hardness as CaCO3	109	mg/L		1		A2340 B	06/13/11 16:23 / wjj
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/13/11 11:55 / reh
Nitrogen, Nitrate+Nitrite as N	0.05	mg/L		0.05		E353.2	06/14/11 12:07 / reh
Nitrogen, Total	0.36	mg/L		0.05		A4500 N-C	06/16/11 10:08 / reh
Phosphorus, Total as P	0.170	mg/L		0.005		E365.1	06/15/11 11:23 / reh
METALS, DISSOLVED							
Arsenic	0.012	mg/L		0.005		E200.8	06/13/11 16:18 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/13/11 16:18 / dck
Copper	0.013	mg/L		0.001		E200.8	06/13/11 16:18 / dck
Lead	ND	mg/L		0.0005		E200.8	06/13/11 16:18 / dck
Zinc	0.01	mg/L		0.01		E200.8	06/15/11 14:17 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.024	mg/L		0.005		E200.8	06/13/11 16:23 / dck
Cadmium	0.00059	mg/L		0.00008		E200.8	06/13/11 16:23 / dck
Calcium	32	mg/L		1		E200.8	06/13/11 16:23 / dck
Copper	0.087	mg/L		0.001		E200.8	06/13/11 16:23 / dck
Lead	0.0136	mg/L		0.0005		E200.8	06/13/11 16:23 / dck
Magnesium	7	mg/L		1		E200.8	06/13/11 16:23 / dck
Zinc	0.10	mg/L		0.01		E200.8	06/13/11 16:23 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11060184-004
Client Sample ID CFR-42G

Report Date: 06/27/11
Collection Date: 06/07/11 16:30
DateReceived: 06/09/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	268	mg/L		1		A2540 D	06/10/11 10:24 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	94	mg/L		4		A2320 B	06/10/11 16:49 / cmm
Bicarbonate as HCO3	110	mg/L		4		A2320 B	06/10/11 16:49 / cmm
Sulfate	27	mg/L		1		E300.0	06/13/11 20:24 / zeg
Hardness as CaCO3	136	mg/L		1		A2340 B	06/13/11 16:49 / wjj
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/13/11 11:59 / reh
Nitrogen, Nitrate+Nitrite as N	0.10	mg/L		0.05		E353.2	06/14/11 12:09 / reh
Nitrogen, Total	0.51	mg/L		0.05		A4500 N-C	06/16/11 10:10 / reh
Phosphorus, Total as P	0.300	mg/L		0.005		E365.1	06/15/11 11:24 / reh
METALS, DISSOLVED							
Arsenic	0.023	mg/L		0.005		E200.8	06/13/11 16:45 / dck
Cadmium	0.00009	mg/L		0.00008		E200.8	06/15/11 14:21 / dck
Copper	0.021	mg/L		0.001		E200.8	06/13/11 16:45 / dck
Lead	ND	mg/L		0.0005		E200.8	06/13/11 16:45 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/13/11 16:45 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.072	mg/L		0.005		E200.8	06/13/11 16:49 / dck
Cadmium	0.00123	mg/L		0.00008		E200.8	06/13/11 16:49 / dck
Calcium	39	mg/L		1		E200.8	06/13/11 16:49 / dck
Copper	0.303	mg/L		0.001		E200.8	06/13/11 16:49 / dck
Lead	0.0515	mg/L		0.0005		E200.8	06/13/11 16:49 / dck
Magnesium	10	mg/L		1		E200.8	06/13/11 16:49 / dck
Zinc	0.25	mg/L		0.01		E200.8	06/13/11 16:49 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11060184-005
Client Sample ID Field Blank

Report Date: 06/27/11
Collection Date: 06/08/11 08:45
DateReceived: 06/09/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	4	mg/L		1		A2540 D	06/10/11 10:24 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	ND	mg/L		4		A2320 B	06/10/11 16:53 / cmm
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	06/10/11 16:53 / cmm
Sulfate	ND	mg/L		1		E300.0	06/13/11 20:35 / zeg
Hardness as CaCO3	ND	mg/L		1		A2340 B	06/23/11 07:56 / sld
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/13/11 12:00 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/14/11 12:10 / reh
Nitrogen, Total	ND	mg/L		0.05		A4500 N-C	06/16/11 10:12 / reh
Phosphorus, Total as P	ND	mg/L		0.005		E365.1	06/15/11 11:25 / reh
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	06/13/11 16:53 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/13/11 16:53 / dck
Copper	ND	mg/L		0.001		E200.8	06/13/11 16:53 / dck
Lead	ND	mg/L		0.0005		E200.8	06/13/11 16:53 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/13/11 16:53 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	ND	mg/L		0.005		E200.8	06/13/11 16:58 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/13/11 16:58 / dck
Calcium	ND	mg/L		1		E200.8	06/13/11 16:58 / dck
Copper	ND	mg/L		0.001		E200.8	06/13/11 16:58 / dck
Lead	ND	mg/L		0.0005		E200.8	06/13/11 16:58 / dck
Magnesium	ND	mg/L		1		E200.8	06/13/11 16:58 / dck
Zinc	ND	mg/L		0.01		E200.8	06/13/11 16:58 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11060184-006
Client Sample ID CFR-27H

Report Date: 06/27/11
Collection Date: 06/08/11 09:00
DateReceived: 06/09/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	96	mg/L		1		A2540 D	06/10/11 10:25 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	92	mg/L		4		A2320 B	06/10/11 17:00 / cmm
Bicarbonate as HCO3	110	mg/L		4		A2320 B	06/10/11 17:00 / cmm
Sulfate	46	mg/L		1		E300.0	06/13/11 20:47 / zeg
Hardness as CaCO3	138	mg/L		1		A2340 B	06/13/11 17:20 / wjj
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/13/11 12:04 / reh
Nitrogen, Nitrate+Nitrite as N	0.09	mg/L		0.05		E353.2	06/14/11 12:13 / reh
Nitrogen, Total	0.57	mg/L		0.05		A4500 N-C	06/16/11 10:18 / reh
Phosphorus, Total as P	0.176	mg/L		0.005		E365.1	06/15/11 11:33 / reh
METALS, DISSOLVED							
Arsenic	0.025	mg/L		0.005		E200.8	06/13/11 17:16 / dck
Cadmium	0.00017	mg/L		0.00008		E200.8	06/13/11 17:16 / dck
Copper	0.044	mg/L		0.001		E200.8	06/13/11 17:16 / dck
Lead	ND	mg/L		0.0005		E200.8	06/13/11 17:16 / dck
Zinc	0.03	mg/L		0.01		E200.8	06/13/11 17:16 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.048	mg/L		0.005		E200.8	06/13/11 17:20 / dck
Cadmium	0.00086	mg/L		0.00008		E200.8	06/13/11 17:20 / dck
Calcium	41	mg/L		1		E200.8	06/13/11 17:20 / dck
Copper	0.214	mg/L		0.001		E200.8	06/13/11 17:20 / dck
Lead	0.0263	mg/L		0.0005		E200.8	06/13/11 17:20 / dck
Magnesium	9	mg/L		1		E200.8	06/13/11 17:20 / dck
Zinc	0.18	mg/L		0.01		E200.8	06/13/11 17:20 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11060184-007
Client Sample ID CFR-27H Dup

Report Date: 06/27/11
Collection Date: 06/08/11 09:00
DateReceived: 06/09/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	96	mg/L		1		A2540 D	06/10/11 10:25 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	92	mg/L		4		A2320 B	06/10/11 17:07 / cmm
Bicarbonate as HCO3	110	mg/L		4		A2320 B	06/10/11 17:07 / cmm
Sulfate	46	mg/L		1		E300.0	06/13/11 20:59 / zeg
Hardness as CaCO3	138	mg/L		1		A2340 B	06/13/11 17:47 / wjj
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/13/11 12:05 / reh
Nitrogen, Nitrate+Nitrite as N	0.08	mg/L		0.05		E353.2	06/14/11 12:17 / reh
Nitrogen, Total	0.58	mg/L		0.05		A4500 N-C	06/16/11 10:20 / reh
Phosphorus, Total as P	0.184	mg/L		0.005		E365.1	06/15/11 11:34 / reh
METALS, DISSOLVED							
Arsenic	0.026	mg/L		0.005		E200.8	06/13/11 17:42 / dck
Cadmium	0.00016	mg/L		0.00008		E200.8	06/13/11 17:42 / dck
Copper	0.041	mg/L		0.001		E200.8	06/13/11 17:42 / dck
Lead	0.0005	mg/L		0.0005		E200.8	06/13/11 17:42 / dck
Zinc	0.03	mg/L		0.01		E200.8	06/13/11 17:42 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.048	mg/L		0.005		E200.8	06/13/11 17:47 / dck
Cadmium	0.00081	mg/L		0.00008		E200.8	06/13/11 17:47 / dck
Calcium	41	mg/L		1		E200.8	06/13/11 17:47 / dck
Copper	0.208	mg/L		0.001		E200.8	06/13/11 17:47 / dck
Lead	0.0255	mg/L		0.0005		E200.8	06/13/11 17:47 / dck
Magnesium	9	mg/L		1		E200.8	06/13/11 17:47 / dck
Zinc	0.17	mg/L		0.01		E200.8	06/13/11 17:47 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11060184-008
Client Sample ID CFR-03A

Report Date: 06/27/11
Collection Date: 06/08/11 11:15
DateReceived: 06/09/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	38	mg/L		1		A2540 D	06/10/11 10:25 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	78	mg/L		4		A2320 B	06/10/11 17:14 / cmm
Bicarbonate as HCO3	91	mg/L		4		A2320 B	06/10/11 17:14 / cmm
Sulfate	36	mg/L		1		E300.0	06/13/11 21:10 / zeg
Hardness as CaCO3	117	mg/L		1		A2340 B	06/13/11 17:55 / wjj
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/13/11 12:06 / reh
Nitrogen, Nitrate+Nitrite as N	0.10	mg/L		0.05		E353.2	06/14/11 12:18 / reh
Nitrogen, Total	1.94	mg/L		0.05		A4500 N-C	06/16/11 10:22 / reh
Phosphorus, Total as P	0.093	mg/L		0.005		E365.1	06/15/11 11:35 / reh
METALS, DISSOLVED							
Arsenic	0.027	mg/L		0.005		E200.8	06/13/11 17:51 / dck
Cadmium	0.00016	mg/L		0.00008		E200.8	06/13/11 17:51 / dck
Copper	0.025	mg/L		0.001		E200.8	06/13/11 17:51 / dck
Lead	ND	mg/L		0.0005		E200.8	06/13/11 17:51 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/13/11 17:51 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.037	mg/L		0.005		E200.8	06/13/11 17:55 / dck
Cadmium	0.00041	mg/L		0.00008		E200.8	06/13/11 17:55 / dck
Calcium	36	mg/L		1		E200.8	06/13/11 17:55 / dck
Copper	0.086	mg/L		0.001		E200.8	06/13/11 17:55 / dck
Lead	0.0092	mg/L		0.0005		E200.8	06/13/11 17:55 / dck
Magnesium	7	mg/L		1		E200.8	06/13/11 17:55 / dck
Zinc	0.08	mg/L		0.01		E200.8	06/13/11 17:55 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11060184-009
Client Sample ID SS-25

Report Date: 06/27/11
Collection Date: 06/08/11 13:15
DateReceived: 06/09/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	8	mg/L		1		A2540 D	06/10/11 10:26 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	68	mg/L		4		A2320 B	06/10/11 17:20 / cmm
Bicarbonate as HCO3	79	mg/L		4		A2320 B	06/10/11 17:20 / cmm
Sulfate	36	mg/L		1		E300.0	06/13/11 21:45 / zeg
Hardness as CaCO3	102	mg/L		1		A2340 B	06/13/11 18:17 / wjj
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/13/11 12:07 / reh
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L		0.05		E353.2	06/14/11 12:19 / reh
Nitrogen, Total	0.59	mg/L		0.05		A4500 N-C	06/16/11 10:24 / reh
Phosphorus, Total as P	0.062	mg/L		0.005		E365.1	06/15/11 11:36 / reh
METALS, DISSOLVED							
Arsenic	0.039	mg/L		0.005		E200.8	06/13/11 18:00 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/13/11 18:00 / dck
Copper	0.012	mg/L		0.001		E200.8	06/13/11 18:00 / dck
Lead	ND	mg/L		0.0005		E200.8	06/13/11 18:00 / dck
Zinc	ND	mg/L		0.01		E200.8	06/13/11 18:00 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.042	mg/L		0.005		E200.8	06/13/11 18:17 / dck
Cadmium	0.00016	mg/L		0.00008		E200.8	06/15/11 14:25 / dck
Calcium	31	mg/L		1		E200.8	06/13/11 18:17 / dck
Copper	0.019	mg/L		0.001		E200.8	06/13/11 18:17 / dck
Lead	0.0022	mg/L		0.0005		E200.8	06/13/11 18:17 / dck
Magnesium	6	mg/L		1		E200.8	06/13/11 18:17 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/13/11 18:17 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 06/27/11
Project: CFR Monitoring-474374
Work Order: H11060184

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R71746
Sample ID: MB		Method Blank				Run: MAN-TECH_110610A				06/10/11 15:58
Alkalinity, Total as CaCO3		2	mg/L	0.6						
Sample ID: LCS ALK 6/10/11		Laboratory Control Sample				Run: MAN-TECH_110610A				06/10/11 16:06
Alkalinity, Total as CaCO3		620	mg/L	4.0	103	90	110			
Sample ID: H11060184-001ADUP	2	Sample Duplicate				Run: MAN-TECH_110610A				06/10/11 16:19
Alkalinity, Total as CaCO3		64	mg/L	4.0				0.2	20	
Bicarbonate as HCO3		78	mg/L	4.0				0.2	20	
Sample ID: H11060184-002AMS		Sample Matrix Spike				Run: MAN-TECH_110610A				06/10/11 16:35
Alkalinity, Total as CaCO3		700	mg/L	4.0	101	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 06/27/11
Project: CFR Monitoring-474374
Work Order: H11060184

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 D										Batch: 12512
Sample ID: MB-12512		Method Blank				Run: ACCU-124 (14410200)_110610				06/10/11 10:22
Solids, Total Suspended TSS @ 105 C		ND	mg/L	1						
Sample ID: LCS-12512		Laboratory Control Sample				Run: ACCU-124 (14410200)_110610				06/10/11 10:22
Solids, Total Suspended TSS @ 105 C		1800	mg/L	10	90	70	130			
Sample ID: H11060184-001ADUP		Sample Duplicate				Run: ACCU-124 (14410200)_110610				06/10/11 10:23
Solids, Total Suspended TSS @ 105 C		130	mg/L	10				0.0	5	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 06/27/11
Project: CFR Monitoring-474374
Work Order: H11060184

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500 N-C								Analytical Run: NUTRIENTS_110616A		
Sample ID: ICV-1		Initial Calibration Verification Standard							06/16/11 09:52	
Nitrogen, Total		1.02	mg/L	0.10	102	90	110			
Sample ID: CCV-4		Continuing Calibration Verification Standard							06/16/11 09:58	
Nitrogen, Total		0.520	mg/L	0.10	104	90	110			
Method: A4500 N-C									Batch: 12583	
Sample ID: LCS-2		Laboratory Control Sample				Run: NUTRIENTS_110616A			06/16/11 09:54	
Nitrogen, Total		32.0	mg/L	1.0	106	90	110			
Sample ID: MBLK-6		Method Blank				Run: NUTRIENTS_110616A			06/16/11 10:02	
Nitrogen, Total		ND	mg/L	0.02						
Sample ID: H11060184-005BMSD		Sample Matrix Spike Duplicate				Run: NUTRIENTS_110616A			06/16/11 10:14	
Nitrogen, Total		1.03	mg/L	0.10	103	90	110			
Sample ID: H11060184-005BMSD		Sample Matrix Spike Duplicate				Run: NUTRIENTS_110616A			06/16/11 10:16	
Nitrogen, Total		1.04	mg/L	0.10	104	90	110			
Sample ID: H11060210-001AMS		Sample Matrix Spike				Run: NUTRIENTS_110616A			06/16/11 10:38	
Nitrogen, Total		1.74	mg/L	0.10	91	90	110			
Sample ID: H11060210-001AMSD		Sample Matrix Spike Duplicate				Run: NUTRIENTS_110616A			06/16/11 10:40	
Nitrogen, Total		1.75	mg/L	0.10	92	90	110	0.6	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 06/27/11
Project: CFR Monitoring-474374
Work Order: H11060184

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_110613A		
Sample ID: ICV STD	7	Initial Calibration Verification Standard							06/13/11 11:29	
Arsenic		0.0494	mg/L	0.0050	99	90	110			
Cadmium		0.0259	mg/L	0.0010	103	90	110			
Calcium		2.57	mg/L	0.50	103	90	110			
Copper		0.0514	mg/L	0.010	103	90	110			
Lead		0.0505	mg/L	0.010	101	90	110			
Magnesium		2.55	mg/L	0.50	102	90	110			
Zinc		0.0510	mg/L	0.010	102	90	110			
Sample ID: ICSA	7	Interference Check Sample A							06/13/11 11:33	
Arsenic		0.000151	mg/L	0.0050						
Cadmium		0.000724	mg/L	0.0010						
Calcium		112	mg/L	0.50						
Copper		0.000469	mg/L	0.010						
Lead		8.50E-05	mg/L	0.010						
Magnesium		41.0	mg/L	0.50						
Zinc		0.00102	mg/L	0.010						
Sample ID: ICSAB	7	Interference Check Sample AB							06/13/11 11:37	
Arsenic		0.0106	mg/L	0.0050	106	70	130			
Cadmium		0.0108	mg/L	0.0010	108	70	130			
Calcium		112	mg/L	0.50	94	70	130			
Copper		0.0203	mg/L	0.010	102	70	130			
Lead		6.20E-05	mg/L	0.010		0	0			
Magnesium		41.8	mg/L	0.50	105	70	130			
Zinc		0.0113	mg/L	0.010	113	70	130			
Sample ID: ICV STD	7	Initial Calibration Verification Standard							06/13/11 14:15	
Arsenic		0.0496	mg/L	0.0050	99	90	110			
Cadmium		0.0256	mg/L	0.0010	103	90	110			
Calcium		2.56	mg/L	0.50	102	90	110			
Copper		0.0512	mg/L	0.010	102	90	110			
Lead		0.0502	mg/L	0.010	100	90	110			
Magnesium		2.56	mg/L	0.50	103	90	110			
Zinc		0.0514	mg/L	0.010	103	90	110			
Sample ID: ICSA	7	Interference Check Sample A							06/13/11 14:20	
Arsenic		0.000231	mg/L	0.0050						
Cadmium		0.000790	mg/L	0.0010						
Calcium		112	mg/L	0.50	93	70	130			
Copper		0.000649	mg/L	0.010						
Lead		9.60E-05	mg/L	0.010						
Magnesium		40.8	mg/L	0.50	102	70	130			
Zinc		0.00115	mg/L	0.010						
Sample ID: ICSAB	7	Interference Check Sample AB							06/13/11 14:24	
Arsenic		0.0105	mg/L	0.0050	105	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 06/27/11
Project: CFR Monitoring-474374
Work Order: H11060184

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_110613A		
Sample ID: ICSAB	7	Interference Check Sample AB							06/13/11 14:24	
Cadmium		0.0108	mg/L	0.0010	108	70	130			
Calcium		113	mg/L	0.50	94	70	130			
Copper		0.0208	mg/L	0.010	104	70	130			
Lead		6.40E-05	mg/L	0.010		0	0			
Magnesium		42.0	mg/L	0.50	105	70	130			
Zinc		0.0111	mg/L	0.010	111	70	130			
Method: E200.8									Batch: 12513	
Sample ID: MB-12513	7	Method Blank				Run: ICPMS204-B_110613A			06/13/11 15:00	
Arsenic		0.0001	mg/L	5E-05						
Cadmium		ND	mg/L	2E-05						
Calcium		ND	mg/L	0.04						
Copper		0.001	mg/L	0.0004						
Lead		ND	mg/L	2E-05						
Magnesium		0.008	mg/L	0.003						
Zinc		0.001	mg/L	0.0003						
Sample ID: LCS-12513	7	Laboratory Control Sample				Run: ICPMS204-B_110613A			06/13/11 15:04	
Arsenic		0.505	mg/L	0.0050	101	85	115			
Cadmium		0.256	mg/L	0.0010	102	85	115			
Calcium		26.2	mg/L	1.0	105	85	115			
Copper		0.515	mg/L	0.010	103	85	115			
Lead		0.510	mg/L	0.010	102	85	115			
Magnesium		25.9	mg/L	1.0	104	85	115			
Zinc		0.513	mg/L	0.010	102	85	115			
Sample ID: H11060184-001DMS3	7	Sample Matrix Spike				Run: ICPMS204-B_110613A			06/13/11 15:21	
Arsenic		1.04	mg/L	0.0050	102	70	130			
Cadmium		0.511	mg/L	0.0010	102	70	130			
Calcium		73.2	mg/L	1.0	105	70	130			
Copper		1.08	mg/L	0.010	102	70	130			
Lead		1.04	mg/L	0.010	103	70	130			
Magnesium		57.4	mg/L	1.0	103	70	130			
Zinc		1.12	mg/L	0.010	103	70	130			
Sample ID: H11060184-001DMSD3	7	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110613A			06/13/11 15:25	
Arsenic		1.03	mg/L	0.0050	102	70	130	0.4	20	
Cadmium		0.516	mg/L	0.0010	103	70	130	0.9	20	
Calcium		72.9	mg/L	1.0	104	70	130	0.3	20	
Copper		1.08	mg/L	0.010	102	70	130	0.1	20	
Lead		1.03	mg/L	0.010	102	70	130	1.4	20	
Magnesium		58.0	mg/L	1.0	105	70	130	1.0	20	
Zinc		1.10	mg/L	0.010	102	70	130	0.9	20	
Method: E200.8									Batch: R71837	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 06/27/11
Project: CFR Monitoring-474374
Work Order: H11060184

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R71837
Sample ID: ICB	7	Method Blank				Run: ICPMS204-B_110613A				06/13/11 12:25
Arsenic		ND	mg/L	3E-05						
Cadmium		ND	mg/L	1E-05						
Calcium		ND	mg/L	0.003						
Copper		ND	mg/L	3E-05						
Lead		ND	mg/L	1.0E-05						
Magnesium		0.001	mg/L	0.0007						
Zinc		0.0009	mg/L	0.0003						
Sample ID: LFB	7	Laboratory Fortified Blank				Run: ICPMS204-B_110613A				06/13/11 12:29
Arsenic		0.0483	mg/L	0.0050	97	85	115			
Cadmium		0.0482	mg/L	0.0010	96	85	115			
Calcium		45.7	mg/L	0.50	91	85	115			
Copper		0.0501	mg/L	0.010	100	85	115			
Lead		0.0498	mg/L	0.010	100	85	115			
Magnesium		48.7	mg/L	0.50	97	85	115			
Zinc		0.0510	mg/L	0.010	100	85	115			
Sample ID: H11060184-002CMS	7	Sample Matrix Spike				Run: ICPMS204-B_110613A				06/13/11 16:01
Arsenic		0.0632	mg/L	0.0050	99	70	130			
Cadmium		0.0483	mg/L	0.0010	96	70	130			
Calcium		74.0	mg/L	1.0	84	70	130			
Copper		0.0644	mg/L	0.010	101	70	130			
Lead		0.0507	mg/L	0.010	101	70	130			
Magnesium		53.9	mg/L	1.0	94	70	130			
Zinc		0.0661	mg/L	0.010	97	70	130			
Sample ID: H11060184-002CMSD	7	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110613A				06/13/11 16:05
Arsenic		0.0625	mg/L	0.0050	98	70	130	1.0	20	
Cadmium		0.0480	mg/L	0.0010	96	70	130	0.6	20	
Calcium		72.2	mg/L	1.0	80	70	130	2.5	20	
Copper		0.0637	mg/L	0.010	100	70	130	1.1	20	
Lead		0.0495	mg/L	0.010	98	70	130	2.3	20	
Magnesium		53.8	mg/L	1.0	93	70	130	0.1	20	
Zinc		0.0661	mg/L	0.010	97	70	130	0.1	20	
Sample ID: H11060184-005DMS	7	Sample Matrix Spike				Run: ICPMS204-B_110613A				06/13/11 17:02
Arsenic		0.0487	mg/L	0.0050	97	70	130			
Cadmium		0.0491	mg/L	0.0010	98	70	130			
Calcium		43.7	mg/L	1.0	87	70	130			
Copper		0.0503	mg/L	0.010	101	70	130			
Lead		0.0503	mg/L	0.010	101	70	130			
Magnesium		46.7	mg/L	1.0	93	70	130			
Zinc		0.0507	mg/L	0.010	99	70	130			
Sample ID: H11060184-005DMSD	7	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110613A				06/13/11 17:07
Arsenic		0.0499	mg/L	0.0050	100	70	130	2.4	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 06/27/11

Project: CFR Monitoring-474374 **Work Order:** H11060184

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R71837
Sample ID: H11060184-005DMSD	7	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110613A				06/13/11 17:07
Cadmium		0.0493	mg/L	0.0010	99	70	130	0.5	20	
Calcium		45.5	mg/L	1.0	91	70	130	3.9	20	
Copper		0.0517	mg/L	0.010	103	70	130	2.7	20	
Lead		0.0514	mg/L	0.010	103	70	130	2.2	20	
Magnesium		48.4	mg/L	1.0	97	70	130	3.6	20	
Zinc		0.0516	mg/L	0.010	101	70	130	1.6	20	
Sample ID: H11060184-009CMS	7	Sample Matrix Spike				Run: ICPMS204-B_110613A				06/13/11 18:04
Arsenic		0.0882	mg/L	0.0050	99	70	130			
Cadmium		0.0493	mg/L	0.0010	99	70	130			
Calcium		71.5	mg/L	1.0	83	70	130			
Copper		0.0622	mg/L	0.010	101	70	130			
Lead		0.0511	mg/L	0.010	101	70	130			
Magnesium		53.8	mg/L	1.0	96	70	130			
Zinc		0.0585	mg/L	0.010	99	70	130			
Sample ID: H11060184-009CMSD	7	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110613A				06/13/11 18:08
Arsenic		0.0865	mg/L	0.0050	95	70	130	1.9	20	
Cadmium		0.0484	mg/L	0.0010	97	70	130	1.9	20	
Calcium		70.3	mg/L	1.0	81	70	130	1.7	20	
Copper		0.0608	mg/L	0.010	98	70	130	2.3	20	
Lead		0.0499	mg/L	0.010	99	70	130	2.4	20	
Magnesium		52.4	mg/L	1.0	93	70	130	2.6	20	
Zinc		0.0564	mg/L	0.010	94	70	130	3.7	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 06/27/11

Project: CFR Monitoring-474374 **Work Order:** H11060184

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Analytical Run: ICPMS204-B_110615A	
Sample ID: ICV STD	2	Initial Calibration Verification Standard							06/15/11 11:42	
Cadmium		0.0260	mg/L	0.0010	104	90	110			
Zinc		0.0512	mg/L	0.010	102	90	110			
Sample ID: ICSA	2	Interference Check Sample A							06/15/11 11:47	
Cadmium		0.000726	mg/L	0.0010						
Zinc		0.00110	mg/L	0.010						
Sample ID: ICSAB	2	Interference Check Sample AB							06/15/11 11:51	
Cadmium		0.0109	mg/L	0.0010	109	70	130			
Zinc		0.0112	mg/L	0.010	112	70	130			
Method: E200.8									Batch: 12513	
Sample ID: MB-12513	7	Method Blank				Run: ICPMS204-B_110615A			06/15/11 13:50	
Arsenic		0.0001	mg/L	5E-05						
Cadmium		ND	mg/L	2E-05						
Calcium		ND	mg/L	0.04						
Copper		0.0005	mg/L	0.0004						
Lead		ND	mg/L	2E-05						
Magnesium		0.010	mg/L	0.003						
Zinc		0.0007	mg/L	0.0003						
Method: E200.8									Batch: R71846	
Sample ID: ICB	2	Method Blank				Run: ICPMS204-B_110615A			06/15/11 13:19	
Cadmium		ND	mg/L	1E-05						
Zinc		0.0004	mg/L	0.0003						
Sample ID: LFB	2	Laboratory Fortified Blank				Run: ICPMS204-B_110615A			06/15/11 13:24	
Cadmium		0.0478	mg/L	0.0010	96	85	115			
Zinc		0.0500	mg/L	0.010	99	85	115			
Sample ID: H11060194-001BMS	2	Sample Matrix Spike				Run: ICPMS204-B_110615A			06/15/11 14:43	
Cadmium		0.0436	mg/L	0.0010	87	70	130			
Zinc		0.0518	mg/L	0.010	90	70	130			
Sample ID: H11060194-001BMSD	2	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110615A			06/15/11 14:47	
Cadmium		0.0435	mg/L	0.0010	87	70	130	0.2	20	
Zinc		0.0512	mg/L	0.010	89	70	130	1.1	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 06/27/11
Project: CFR Monitoring-474374
Work Order: H11060184

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC102-H_110613A	
Sample ID: ICV061311-12		Initial Calibration Verification Standard							06/13/11 16:20	
Sulfate		410	mg/L	1.0	103	90	110			
Sample ID: CCV061311-15		Continuing Calibration Verification Standard							06/13/11 17:07	
Sulfate		400	mg/L	1.0	101	90	110			
Sample ID: CCV061311-30		Continuing Calibration Verification Standard							06/13/11 20:01	
Sulfate		400	mg/L	1.0	101	90	110			
Method: E300.0									Batch: R71793	
Sample ID: ICB061311-13		Method Blank				Run: IC102-H_110613A			06/13/11 16:32	
Sulfate		ND	mg/L	0.02						
Sample ID: LFB061311-14		Laboratory Fortified Blank				Run: IC102-H_110613A			06/13/11 16:43	
Sulfate		200	mg/L	1.1	100	90	110			
Sample ID: LFBD061311-14		Laboratory Fortified Blank				Run: IC102-H_110613A			06/13/11 16:55	
Sulfate		200	mg/L	1.1	99	90	110			
Sample ID: H11060184-001AMS		Sample Matrix Spike				Run: IC102-H_110613A			06/13/11 19:14	
Sulfate		210	mg/L	1.1	102	90	110			
Sample ID: H11060184-001AMSD		Sample Matrix Spike Duplicate				Run: IC102-H_110613A			06/13/11 19:26	
Sulfate		220	mg/L	1.1	104	90	110	2.1	20	
Sample ID: H11060184-008AMS		Sample Matrix Spike				Run: IC102-H_110613A			06/13/11 21:22	
Sulfate		200	mg/L	1.1	83	90	110			S
Sample ID: H11060184-008AMSD		Sample Matrix Spike Duplicate				Run: IC102-H_110613A			06/13/11 21:33	
Sulfate		210	mg/L	1.1	85	90	110	2.0	20	S

Qualifiers:

RL - Analyte reporting limit.
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 06/27/11
Project: CFR Monitoring-474374
Work Order: H11060184

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E350.1									Analytical Run: FIA203-HE_110613A	
Sample ID: ICV	Initial Calibration Verification Standard								06/13/11 11:34	
Nitrogen, Ammonia as N		1.04	mg/L	0.10	104	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								06/13/11 11:37	
Nitrogen, Ammonia as N		0.514	mg/L	0.10	103	90	110			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								06/13/11 11:39	
Nitrogen, Ammonia as N		0.00111	mg/L	0.10		0	0			
Sample ID: CCV	Continuing Calibration Verification Standard								06/13/11 11:58	
Nitrogen, Ammonia as N		0.500	mg/L	0.10	100	90	110			
Method: E350.1									Batch: R71771	
Sample ID: LCS	Laboratory Control Sample				Run: FIA203-HE_110613A				06/13/11 11:35	
Nitrogen, Ammonia as N		16.6	mg/L	0.50	106	90	110			
Sample ID: LFB	Laboratory Fortified Blank				Run: FIA203-HE_110613A				06/13/11 11:36	
Nitrogen, Ammonia as N		1.02	mg/L	0.10	102	90	110			
Sample ID: MBLK	Method Blank				Run: FIA203-HE_110613A				06/13/11 11:40	
Nitrogen, Ammonia as N		ND	mg/L	0.03						
Sample ID: H11060184-005EMS	Sample Matrix Spike				Run: FIA203-HE_110613A				06/13/11 12:01	
Nitrogen, Ammonia as N		0.984	mg/L	0.10	98	90	110			
Sample ID: H11060184-005EMSD	Sample Matrix Spike Duplicate				Run: FIA203-HE_110613A				06/13/11 12:03	
Nitrogen, Ammonia as N		0.965	mg/L	0.10	96	90	110	1.9	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 06/27/11
Project: CFR Monitoring-474374
Work Order: H11060184

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2									Analytical Run: FIA203-HE_110614A	
Sample ID: ICV		Initial Calibration Verification Standard							06/14/11 11:30	
Nitrogen, Nitrate+Nitrite as N		1.06	mg/L	0.050	106	90	110			
Sample ID: ICB		Initial Calibration Blank, Instrument Blank							06/14/11 11:36	
Nitrogen, Nitrate+Nitrite as N		-0.00244	mg/L	0.050		0	0			
Sample ID: CCV		Continuing Calibration Verification Standard							06/14/11 11:56	
Nitrogen, Nitrate+Nitrite as N		0.483	mg/L	0.050	97	90	110			
Sample ID: CCV		Continuing Calibration Verification Standard							06/14/11 12:12	
Nitrogen, Nitrate+Nitrite as N		0.495	mg/L	0.050	99	90	110			
Method: E353.2									Batch: R71803	
Sample ID: LCS		Laboratory Control Sample				Run: FIA203-HE_110614A			06/14/11 11:32	
Nitrogen, Nitrate+Nitrite as N		26.1	mg/L	0.20	108	90	110			
Sample ID: LFB		Laboratory Fortified Blank				Run: FIA203-HE_110614A			06/14/11 11:33	
Nitrogen, Nitrate+Nitrite as N		0.996	mg/L	0.050	100	90	110			
Sample ID: MBLK		Method Blank				Run: FIA203-HE_110614A			06/14/11 11:38	
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.01						
Sample ID: H11060183-001CMS		Sample Matrix Spike				Run: FIA203-HE_110614A			06/14/11 11:58	
Nitrogen, Nitrate+Nitrite as N		0.987	mg/L	0.050	99	90	110			
Sample ID: H11060183-001CMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_110614A			06/14/11 11:59	
Nitrogen, Nitrate+Nitrite as N		0.849	mg/L	0.050	85	90	110	15	20	S
Sample ID: H11060184-006EMS		Sample Matrix Spike				Run: FIA203-HE_110614A			06/14/11 12:15	
Nitrogen, Nitrate+Nitrite as N		1.01	mg/L	0.050	92	90	110			
Sample ID: H11060184-006EMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_110614A			06/14/11 12:16	
Nitrogen, Nitrate+Nitrite as N		1.03	mg/L	0.050	94	90	110	2.3	20	

Qualifiers:

RL - Analyte reporting limit.
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 06/27/11
Project: CFR Monitoring-474374
Work Order: H11060184

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E365.1									Analytical Run: FIA202-HE_110615B	
Sample ID: ICV	Initial Calibration Verification Standard								06/15/11 11:10	
Phosphorus, Total as P		0.248	mg/L	0.010	99	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								06/15/11 11:13	
Phosphorus, Total as P		0.257	mg/L	0.010	103	90	110			
Sample ID: CCV1	Continuing Calibration Verification Standard								06/15/11 11:14	
Phosphorus, Total as P		0.00661	mg/L	0.010	66	50	150			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								06/15/11 11:15	
Phosphorus, Total as P		-0.000600	mg/L	0.010		0	0			
Sample ID: CCV	Continuing Calibration Verification Standard								06/15/11 11:30	
Phosphorus, Total as P		0.250	mg/L	0.010	100	90	110			
Sample ID: CCV1	Continuing Calibration Verification Standard								06/15/11 11:32	
Phosphorus, Total as P		0.00687	mg/L	0.010	69	50	150			
Method: E365.1									Batch: 12548	
Sample ID: LCS-12548	Laboratory Control Sample					Run: FIA202-HE_110615B			06/15/11 11:11	
Phosphorus, Total as P		8.47	mg/L	0.020	101	90	110			
Sample ID: MB-12548	Method Blank					Run: FIA202-HE_110615B			06/15/11 11:16	
Phosphorus, Total as P		ND	mg/L	0.0010						
Sample ID: H11060184-005EMS	Sample Matrix Spike					Run: FIA202-HE_110615B			06/15/11 11:26	
Phosphorus, Total as P		0.191	mg/L	0.010	96	90	110			
Sample ID: H11060184-005EMSD	Sample Matrix Spike Duplicate					Run: FIA202-HE_110615B			06/15/11 11:27	
Phosphorus, Total as P		0.194	mg/L	0.010	97	90	110	1.5	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Workorder Receipt Checklist

MT DEQ-Federal Superfund

H11060184

Login completed by: Tracy L. Lorash
Date Received: 6/9/2011
Reviewed by: BL2000\ablackburn
Received by: wjj
Reviewed Date: 6/13/2011
Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature:	0.2°C On Ice		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	Not Applicable ☐

Contact and Corrective Action Comments:

None

Chain of Custody and Analytical Request Record

Page 1 of 1

PLEASE PRINT (Provide as much information as possible.)

Company Name: MT DEQ	Project Name, PWS, Permit, Etc.: CFR Monitoring 4774374	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: P.O. Box 200901 Helena MT 59620-0901	Contact Name: Phone/Fax: Brian Bartkowick 461-3070 Email: bbartkowick@mt.gov		Sampler: (Please Print) Ingman, Weber
Invoice Address: above	Invoice Contact & Phone: above	Purchase Order:	Quote/Bottle Order: 624/7800

Special Report/Formats:

☐ DW ☐ EDD/EDT (Electronic Data)
☐ POTW/WWTP Format: _____
☐ State: _____ ☐ LEVEL IV
☐ Other: _____ ☐ NELAC

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids Vegetation Bioassay Other
DW - Drinking Water

ANALYSIS REQUESTED

Standard Turnaround (TAT)

RUSH

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments: all dissolved samples field filtered; hardness from TR Ca & Mg

Shipped by: hand del
Cooler ID(s): Y
Receipt Temp 0.2 °C
On Ice: Y N
Custody Seal On Bottle Y N / On Cooler Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	TR As, Cd, Cu, Pb, Zn	Diss As, Cd, Cu, Pb, Zn	TPN	NO_{3+2}, NH_3, TP	TSS, Total Alk., SO_4	Hardness (TR Ca & Mg)	SEE ATTACHED
1	CFR-116A	6/7/11	10:30	SW	X	X	X	X	X	X	
2	CFR-84F	6/7/11	13:00	SW							
3	CFR-53C	6/7/11	15:15	SW							
4	CFR-42G	6/7/11	16:30	SW							
5	Field Blank	6/8/11	08:45	SW							
6	CFR-27H	6/8/11	09:00	SW							
7	CFR-27H dup	6/8/11	09:00	SW							
8	CFR-03A	6/8/11	11:15	SW							
9	SS-25	6/8/11	13:15	SW	X	X	X	X	X	X	
10											

LABORATORY USE ONLY H110601841

Custody Record MUST be Signed

Relinquished by (print): Erich Weber	Date/Time: 6/9/11 14:17	Signature:	Received by (print): / Date/Time: / Signature:
Relinquished by (print):	Date/Time:	Signature:	Received by (print): / Date/Time: / Signature:
Sample Disposal: Return to Client: _____ Lab Disposal: _____			Received by Laboratory: Wandasons 6-9-11 14:17

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

Analyte Limits For Quote #: H-624

Schedule Name / TestName	Analyte	Report Limit	Units
Surface Water Sampling			
Alkalinity	Alkalinity, Total as CaCO3	4	mg/L
	Bicarbonate as HCO3	4	mg/L
Anions by Ion Chromatography	Chloride	1	mg/L
	Sulfate	1	mg/L
Metals by ICP/ICPMS, Dissolved	Arsenic	0.005	mg/L
	Cadmium	0.00008	mg/L
	Calcium	1	mg/L
	Copper	0.001	mg/L
	Lead	0.0005	mg/L
	Magnesium	1	mg/L
	Zinc	0.01	mg/L
Metals by ICP/ICPMS, Tot. Rec.	Arsenic	0.005	mg/L
	Cadmium	0.00008	mg/L
	Calcium	1	mg/L
	Copper	0.001	mg/L
	Lead	0.0005	mg/L
	Magnesium	1	mg/L
	Zinc	0.01	mg/L
Nitrogen, Ammonia	Nitrogen, Ammonia as N	0.05	mg/L
Nitrogen, Nitrate + Nitrite	Nitrogen, Nitrate+Nitrite as N	0.05	mg/L
Nitrogen, Total Persulfate	Nitrogen, Total	0.05	mg/L
Phosphorus, Total	Phosphorus, Total as P	0.005	mg/L
Solids, Total Suspended	Solids, Total Suspended TSS @ 105 C	1	mg/L

Appendix B3

3rd Quarter Surface Water and In-Stream Sediment Reports

ANALYTICAL SUMMARY REPORT

October 14, 2011

MT DEQ-Federal Superfund
PO Box 200901
Helena, MT 59620-0901

Workorder No.: H11090040 Quote ID: H624

Project Name: CFR Monitoring-474374

Energy Laboratories Inc Helena MT received the following 31 samples for MT DEQ-Federal Superfund on 9/2/2011 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H11090040-001	CFR-116A	09/01/11 9:00	09/02/11	Aqueous	Metals by ICP/ICPMS, Dissolved Metals by ICP/ICPMS, Tot. Rec. Alkalinity Conductivity Hardness as CaCO3 Anions by Ion Chromatography Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite Nitrogen, Total Persulfate Metals Digestion by EPA 200.2 Digestion, Total P Water Nitrogen, Total Persulfate Preparation for TSS Phosphorus, Total Solids, Total Suspended
H11090040-002	CFR-84F	09/01/11 12:00	09/02/11	Aqueous	Same As Above
H11090040-003	CFR-53C	09/01/11 14:30	09/02/11	Aqueous	Same As Above
H11090040-004	CFR-42G	09/01/11 16:30	09/02/11	Aqueous	Same As Above
H11090040-005	CFR-27H	09/02/11 9:30	09/02/11	Aqueous	Same As Above
H11090040-006	CFR-27H Dupe	09/02/11 9:45	09/02/11	Aqueous	Same As Above
H11090040-007	Field Blank	09/02/11 10:00	09/02/11	Aqueous	Same As Above
H11090040-008	CFR-116A Sediment Sieve <0.065mm	09/01/11 9:00	09/02/11	Sediment	Metals by ICP/ICPMS, Total Digestion, Total Metals Sieves
H11090040-009	CFR-116A Sediment Sieve 0.065-1mm	09/01/11 9:00	09/02/11	Sediment	Same As Above
H11090040-010	CFR-116A Sediment Sieve 1-2mm	09/01/11 9:00	09/02/11	Sediment	Same As Above
H11090040-011	CFR-84F Sediment Sieve <0.065mm	09/01/11 12:00	09/02/11	Sediment	Same As Above
H11090040-012	CFR-84F Sediment Sieve 0.065-1mm	09/01/11 12:00	09/02/11	Sediment	Same As Above
H11090040-013	CFR-84F Sediment Sieve 1-2mm	09/01/11 12:00	09/02/11	Sediment	Same As Above
H11090040-014	CFR-53C Sediment Sieve <0.065mm	09/01/11 14:30	09/02/11	Sediment	Same As Above
H11090040-015	CFR-53C Sediment Sieve 0.065-1mmmm	09/01/11 14:30	09/02/11	Sediment	Same As Above

ANALYTICAL SUMMARY REPORT

H11090040-016	CFR-53C Sediment Sieve 1-2mm	09/01/11 14:30	09/02/11	Sediment	Same As Above
H11090040-017	CFR-42G Sediment Sieve <0.065mm	09/01/11 16:30	09/02/11	Sediment	Same As Above
H11090040-018	CFR-42G Sediment Sieve 0.065-1mm	09/01/11 16:30	09/02/11	Sediment	Same As Above
H11090040-019	CFR-42G Sediment Sieve 1-2mm	09/01/11 16:30	09/02/11	Sediment	Same As Above
H11090040-020	CFR-27H Sediment Sieve <0.065mm	09/02/11 9:30	09/02/11	Sediment	Same As Above
H11090040-021	CFR-27H Sediment Sieve 0.065-1mm	09/02/11 9:30	09/02/11	Sediment	Same As Above
H11090040-022	CFR-27H Sediment Sieve 1-2mm	09/02/11 9:30	09/02/11	Sediment	Same As Above
H11090040-023	CFR-27H Dupe Sediment Sieve <0.065mm	09/02/11 9:45	09/02/11	Sediment	Same As Above
H11090040-024	CFR-27H Dupe Sediment Sieve 0.065-1mm	09/02/11 9:45	09/02/11	Sediment	Same As Above
H11090040-025	CFR-27H Dupe Sediment Sieve 1-2mm	09/02/11 9:45	09/02/11	Sediment	Same As Above
H11090040-026	SS-25 Sediment Sieve <0.065mm	09/02/11 15:00	09/02/11	Sediment	Same As Above
H11090040-027	SS-25 Sediment Sieve 0.065-1mm	09/02/11 15:00	09/02/11	Sediment	Same As Above
H11090040-028	SS-25 Sediment Sieve 1-2mm	09/02/11 15:00	09/02/11	Sediment	Same As Above
H11090040-029	CFR-03A Sediment Sieve <0.065mm	09/02/11 12:30	09/02/11	Sediment	Same As Above
H11090040-030	CFR-03A Sediment Sieve 0.065-1mm	09/02/11 12:30	09/02/11	Sediment	Same As Above
H11090040-031	CFR-03A Sediment Sieve 1-2mm	09/02/11 12:30	09/02/11	Sediment	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise reported.

Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Sample Delivery Group: H11090040

Report Date: 10/14/11

CASE NARRATIVE

Sample CFR-27H Dupe 006 was re-analyzed past hold time to verify results. No charge for the total N due to analysis was completed past hold time. Wj 10/6/11

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID CFR-116A
Lab ID: H11090040-001
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/01/11 09:00 **DateReceived:** 09/02/11
Report Date: 10/14/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	09/06/11 14:49 / cmm	09/06/11 14:23	J-124 (14410200)_110906B	: 6	13679
INORGANICS											
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	09/09/11 18:16 / cmm		MAN-TECH_110909C	: 34	R74272
Bicarbonate as HCO3	180	mg/L		4		A2320 B	09/09/11 18:16 / cmm		MAN-TECH_110909C	: 34	R74272
Sulfate	39	mg/L		1		E300.0	09/08/11 14:02 / zeg		IC102-H_110908A	: 23	R74237
Hardness as CaCO3	150	mg/L		1		A2340 B	09/13/11 16:07 / sld		WATERCALC_110913B	: 1	R74332
NUTRIENTS											
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/06/11 12:37 / reh		FIA203-HE_110906A	: 50	R74154
Nitrogen, Total	0.14	mg/L		0.05		A4500 N-C	09/14/11 10:40 / reh	09/14/11 08:39	NUTRIENTS_110914A	: 12	13791
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 17:15 / reh		FIA203-HE_110908C	: 86	R74249
Phosphorus, Total as P	0.013	mg/L		0.005		E365.1	09/13/11 15:48 / reh	09/13/11 14:10	FIA202-HE_110913B	: 33	13781
METALS, DISSOLVED											
Arsenic	0.008	mg/L		0.005		E200.8	09/12/11 17:33 / dck		ICPMS204-B_110912A	: 64	R74300
Cadmium	ND	mg/L		0.00008		E200.8	09/12/11 17:33 / dck		ICPMS204-B_110912A	: 64	R74300
Copper	0.003	mg/L		0.001		E200.8	09/12/11 17:33 / dck		ICPMS204-B_110912A	: 64	R74300
Lead	ND	mg/L		0.0005		E200.8	09/12/11 17:33 / dck		ICPMS204-B_110912A	: 64	R74300
Zinc	ND	mg/L		0.01		E200.8	09/12/11 17:33 / dck		ICPMS204-B_110912A	: 64	R74300
METALS, TOTAL RECOVERABLE											
Arsenic	0.008	mg/L		0.005		E200.8	09/12/11 17:46 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 67	13687
Cadmium	ND	mg/L		0.00008		E200.8	09/12/11 17:46 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 67	13687
Calcium	41	mg/L		1		E200.8	09/12/11 17:46 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 67	13687
Copper	0.005	mg/L		0.001		E200.8	09/12/11 17:46 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 67	13687
Lead	ND	mg/L		0.0005		E200.8	09/12/11 17:46 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 67	13687
Magnesium	12	mg/L		1		E200.8	09/12/11 17:46 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 67	13687
Zinc	ND	mg/L		0.01		E200.8	09/12/11 17:46 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 67	13687

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID CFR-84F
Lab ID: H11090040-002
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/01/11 12:00 **DateReceived:** 09/02/11
Report Date: 10/14/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	10	mg/L		1		A2540 D	09/06/11 14:49 / cmm	09/06/11 14:23	J-124 (14410200)_110906B	8	13679
INORGANICS											
Alkalinity, Total as CaCO3	180	mg/L		4		A2320 B	09/09/11 18:22 / cmm		MAN-TECH_110909C	35	R74272
Bicarbonate as HCO3	220	mg/L		4		A2320 B	09/09/11 18:22 / cmm		MAN-TECH_110909C	35	R74272
Sulfate	66	mg/L		1		E300.0	09/08/11 14:13 / zeg		IC102-H_110908A	24	R74237
Hardness as CaCO3	205	mg/L		1		A2340 B	09/13/11 16:07 / sld		WATERCALC_110913B	2	R74332
NUTRIENTS											
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/06/11 12:38 / reh		FIA203-HE_110906A	51	R74154
Nitrogen, Total	0.19	mg/L		0.05		A4500 N-C	09/14/11 10:42 / reh	09/14/11 08:39	NUTRIENTS_110914A	13	13791
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 17:16 / reh		FIA203-HE_110908C	87	R74249
Phosphorus, Total as P	0.030	mg/L		0.005		E365.1	09/13/11 15:49 / reh	09/13/11 14:10	FIA202-HE_110913B	34	13781
METALS, DISSOLVED											
Arsenic	0.013	mg/L		0.005		E200.8	09/12/11 17:51 / dck		ICPMS204-B_110912A	68	R74300
Cadmium	ND	mg/L		0.00008		E200.8	09/12/11 17:51 / dck		ICPMS204-B_110912A	68	R74300
Copper	0.005	mg/L		0.001		E200.8	09/12/11 17:51 / dck		ICPMS204-B_110912A	68	R74300
Lead	ND	mg/L		0.0005		E200.8	09/12/11 17:51 / dck		ICPMS204-B_110912A	68	R74300
Zinc	ND	mg/L		0.01		E200.8	09/12/11 17:51 / dck		ICPMS204-B_110912A	68	R74300
METALS, TOTAL RECOVERABLE											
Arsenic	0.013	mg/L		0.005		E200.8	09/12/11 17:55 / dck	09/07/11 09:52	ICPMS204-B_110912A	69	13687
Cadmium	0.00010	mg/L		0.00008		E200.8	09/12/11 17:55 / dck	09/07/11 09:52	ICPMS204-B_110912A	69	13687
Calcium	57	mg/L		1		E200.8	09/12/11 17:55 / dck	09/07/11 09:52	ICPMS204-B_110912A	69	13687
Copper	0.014	mg/L		0.001		E200.8	09/12/11 17:55 / dck	09/07/11 09:52	ICPMS204-B_110912A	69	13687
Lead	0.0015	mg/L		0.0005		E200.8	09/12/11 17:55 / dck	09/07/11 09:52	ICPMS204-B_110912A	69	13687
Magnesium	15	mg/L		1		E200.8	09/12/11 17:55 / dck	09/07/11 09:52	ICPMS204-B_110912A	69	13687
Zinc	0.02	mg/L		0.01		E200.8	09/12/11 17:55 / dck	09/07/11 09:52	ICPMS204-B_110912A	69	13687

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID CFR-53C
Lab ID: H11090040-003
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/01/11 14:30 **DateReceived:** 09/02/11
Report Date: 10/14/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	6	mg/L		1		A2540 D	09/06/11 14:49 / cmm	09/06/11 14:23	J-124 (14410200)_110906B	9	13679
INORGANICS											
Alkalinity, Total as CaCO3	160	mg/L		4		A2320 B	09/09/11 18:27 / cmm		MAN-TECH_110909C	36	R74272
Bicarbonate as HCO3	190	mg/L		4		A2320 B	09/09/11 18:27 / cmm		MAN-TECH_110909C	36	R74272
Sulfate	47	mg/L		1		E300.0	09/08/11 14:25 / zeg		IC102-H_110908A	25	R74237
Hardness as CaCO3	171	mg/L		1		A2340 B	09/13/11 16:07 / sld		WATERCALC_110913B	3	R74332
NUTRIENTS											
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/06/11 12:39 / reh		FIA203-HE_110906A	52	R74154
Nitrogen, Total	0.19	mg/L		0.05		A4500 N-C	09/14/11 10:44 / reh	09/14/11 08:39	NUTRIENTS_110914A	14	13791
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 17:17 / reh		FIA203-HE_110908C	88	R74249
Phosphorus, Total as P	0.022	mg/L		0.005		E365.1	09/13/11 15:50 / reh	09/13/11 14:10	FIA202-HE_110913B	35	13781
METALS, DISSOLVED											
Arsenic	0.013	mg/L		0.005		E200.8	09/12/11 18:17 / dck		ICPMS204-B_110912A	74	R74300
Cadmium	ND	mg/L		0.00008		E200.8	09/12/11 18:17 / dck		ICPMS204-B_110912A	74	R74300
Copper	0.007	mg/L		0.001		E200.8	09/12/11 18:17 / dck		ICPMS204-B_110912A	74	R74300
Lead	ND	mg/L		0.0005		E200.8	09/12/11 18:17 / dck		ICPMS204-B_110912A	74	R74300
Zinc	ND	mg/L		0.01		E200.8	09/12/11 18:17 / dck		ICPMS204-B_110912A	74	R74300
METALS, TOTAL RECOVERABLE											
Arsenic	0.014	mg/L		0.005		E200.8	09/12/11 18:22 / dck	09/07/11 09:52	ICPMS204-B_110912A	75	13687
Cadmium	0.00009	mg/L		0.00008		E200.8	09/12/11 18:22 / dck	09/07/11 09:52	ICPMS204-B_110912A	75	13687
Calcium	50	mg/L		1		E200.8	09/12/11 18:22 / dck	09/07/11 09:52	ICPMS204-B_110912A	75	13687
Copper	0.014	mg/L		0.001		E200.8	09/12/11 18:22 / dck	09/07/11 09:52	ICPMS204-B_110912A	75	13687
Lead	0.0012	mg/L		0.0005		E200.8	09/12/11 18:22 / dck	09/07/11 09:52	ICPMS204-B_110912A	75	13687
Magnesium	11	mg/L		1		E200.8	09/12/11 18:22 / dck	09/07/11 09:52	ICPMS204-B_110912A	75	13687
Zinc	0.01	mg/L		0.01		E200.8	09/12/11 18:22 / dck	09/07/11 09:52	ICPMS204-B_110912A	75	13687

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID CFR-42G
Lab ID: H11090040-004
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/01/11 16:30 **DateReceived:** 09/02/11
Report Date: 10/14/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	4	mg/L		1		A2540 D	09/06/11 14:50 / cmm	09/06/11 14:23	-124 (14410200)_110906B	: 10	13679
INORGANICS											
Alkalinity, Total as CaCO3	160	mg/L		4		A2320 B	09/09/11 18:42 / cmm		MAN-TECH_110909C	: 39	R74272
Bicarbonate as HCO3	200	mg/L		4		A2320 B	09/09/11 18:42 / cmm		MAN-TECH_110909C	: 39	R74272
Sulfate	55	mg/L		1		E300.0	09/08/11 15:00 / zeg		IC102-H_110908A	: 28	R74237
Hardness as CaCO3	172	mg/L		1		A2340 B	09/13/11 16:07 / sld		WATERCALC_110913B	: 4	R74332
NUTRIENTS											
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/06/11 12:40 / reh		FIA203-HE_110906A	: 53	R74154
Nitrogen, Total	0.22	mg/L		0.05		A4500 N-C	09/14/11 10:46 / reh	09/14/11 08:39	NUTRIENTS_110914A	: 15	13791
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 17:21 / reh		FIA203-HE_110908C	: 91	R74249
Phosphorus, Total as P	0.020	mg/L		0.005		E365.1	09/13/11 15:51 / reh	09/13/11 14:10	FIA202-HE_110913B	: 36	13781
METALS, DISSOLVED											
Arsenic	0.018	mg/L		0.005		E200.8	09/12/11 18:26 / dck		ICPMS204-B_110912A	: 76	R74300
Cadmium	ND	mg/L		0.00008		E200.8	09/12/11 18:26 / dck		ICPMS204-B_110912A	: 76	R74300
Copper	0.009	mg/L		0.001		E200.8	09/12/11 18:26 / dck		ICPMS204-B_110912A	: 76	R74300
Lead	ND	mg/L		0.0005		E200.8	09/12/11 18:26 / dck		ICPMS204-B_110912A	: 76	R74300
Zinc	ND	mg/L		0.01		E200.8	09/12/11 18:26 / dck		ICPMS204-B_110912A	: 76	R74300
METALS, TOTAL RECOVERABLE											
Arsenic	0.018	mg/L		0.005		E200.8	09/12/11 18:30 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 77	13687
Cadmium	0.00013	mg/L		0.00008		E200.8	09/12/11 18:30 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 77	13687
Calcium	49	mg/L		1		E200.8	09/12/11 18:30 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 77	13687
Copper	0.020	mg/L		0.001		E200.8	09/12/11 18:30 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 77	13687
Lead	0.0017	mg/L		0.0005		E200.8	09/12/11 18:30 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 77	13687
Magnesium	12	mg/L		1		E200.8	09/12/11 18:30 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 77	13687
Zinc	0.02	mg/L		0.01		E200.8	09/12/11 18:30 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 77	13687

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID CFR-27H
Lab ID: H11090040-005
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/02/11 09:30 **DateReceived:** 09/02/11
Report Date: 10/14/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	6	mg/L		1		A2540 D	09/06/11 14:50 / cmm	09/06/11 14:23	-124 (14410200)_110906B	: 11	13679
INORGANICS											
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	09/09/11 18:48 / cmm		MAN-TECH_110909C	: 40	R74272
Bicarbonate as HCO3	190	mg/L		4		A2320 B	09/09/11 18:48 / cmm		MAN-TECH_110909C	: 40	R74272
Sulfate	56	mg/L		1		E300.0	09/08/11 15:11 / zeg		IC102-H_110908A	: 29	R74237
Hardness as CaCO3	173	mg/L		1		A2340 B	09/13/11 16:07 / sld		WATERCALC_110913B	: 5	R74332
NUTRIENTS											
Nitrogen, Nitrate+Nitrite as N	0.08	mg/L		0.05		E353.2	09/06/11 12:41 / reh		FIA203-HE_110906A	: 54	R74154
Nitrogen, Total	0.25	mg/L		0.05		A4500 N-C	09/14/11 10:48 / reh	09/14/11 08:39	NUTRIENTS_110914A	: 16	13791
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 17:22 / reh		FIA203-HE_110908C	: 92	R74249
Phosphorus, Total as P	0.017	mg/L		0.005		E365.1	09/13/11 15:52 / reh	09/13/11 14:10	FIA202-HE_110913B	: 37	13781
METALS, DISSOLVED											
Arsenic	0.016	mg/L		0.005		E200.8	09/12/11 18:35 / dck		ICPMS204-B_110912A	: 78	R74300
Cadmium	ND	mg/L		0.00008		E200.8	09/12/11 18:35 / dck		ICPMS204-B_110912A	: 78	R74300
Copper	0.008	mg/L		0.001		E200.8	09/12/11 18:35 / dck		ICPMS204-B_110912A	: 78	R74300
Lead	ND	mg/L		0.0005		E200.8	09/12/11 18:35 / dck		ICPMS204-B_110912A	: 78	R74300
Zinc	0.01	mg/L		0.01		E200.8	09/12/11 18:35 / dck		ICPMS204-B_110912A	: 78	R74300
METALS, TOTAL RECOVERABLE											
Arsenic	0.017	mg/L		0.005		E200.8	09/12/11 18:52 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 82	13687
Cadmium	0.00014	mg/L		0.00008		E200.8	09/12/11 18:52 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 82	13687
Calcium	50	mg/L		1		E200.8	09/12/11 18:52 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 82	13687
Copper	0.019	mg/L		0.001		E200.8	09/12/11 18:52 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 82	13687
Lead	0.0019	mg/L		0.0005		E200.8	09/12/11 18:52 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 82	13687
Magnesium	12	mg/L		1		E200.8	09/12/11 18:52 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 82	13687
Zinc	0.02	mg/L		0.01		E200.8	09/12/11 18:52 / dck	09/07/11 09:52	ICPMS204-B_110912A	: 82	13687

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID CFR-27H Dupe
Lab ID: H11090040-006
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/02/11 09:45 **DateReceived:** 09/02/11
Report Date: 10/14/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	6	mg/L		1		A2540 D	09/06/11 14:50 / cmm	09/06/11 14:23	-124 (14410200)_110906B	12	13679
INORGANICS											
Alkalinity, Total as CaCO3	160	mg/L		4		A2320 B	09/09/11 18:54 / cmm		MAN-TECH_110909C	41	R74272
Bicarbonate as HCO3	190	mg/L		4		A2320 B	09/09/11 18:54 / cmm		MAN-TECH_110909C	41	R74272
Sulfate	56	mg/L		1		E300.0	09/08/11 15:23 / zeg		IC102-H_110908A	30	R74237
Hardness as CaCO3	170	mg/L		1		A2340 B	09/13/11 16:07 / sld		WATERCALC_110913B	6	R74332
NUTRIENTS											
Nitrogen, Nitrate+Nitrite as N	0.08	mg/L		0.05		E353.2	09/06/11 12:43 / reh		FIA203-HE_110906A	55	R74154
Nitrogen, Total	0.22	mg/L	H	0.05		A4500 N-C	10/05/11 15:00 / reh	09/14/11 08:39	NUTRIENTS_111005A	7	14138
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 17:23 / reh		FIA203-HE_110908C	93	R74249
Phosphorus, Total as P	0.018	mg/L		0.005		E365.1	09/13/11 15:53 / reh	09/13/11 14:10	FIA202-HE_110913B	38	13781
METALS, DISSOLVED											
Arsenic	0.016	mg/L		0.005		E200.8	09/12/11 19:14 / dck		ICPMS204-B_110912A	87	R74300
Cadmium	ND	mg/L		0.00008		E200.8	09/12/11 19:14 / dck		ICPMS204-B_110912A	87	R74300
Copper	0.007	mg/L		0.001		E200.8	09/12/11 19:14 / dck		ICPMS204-B_110912A	87	R74300
Lead	ND	mg/L		0.0005		E200.8	09/12/11 19:14 / dck		ICPMS204-B_110912A	87	R74300
Zinc	0.01	mg/L		0.01		E200.8	09/12/11 19:14 / dck		ICPMS204-B_110912A	87	R74300
METALS, TOTAL RECOVERABLE											
Arsenic	0.017	mg/L		0.005		E200.8	09/12/11 19:18 / dck	09/07/11 09:52	ICPMS204-B_110912A	88	13687
Cadmium	0.00013	mg/L		0.00008		E200.8	09/12/11 19:18 / dck	09/07/11 09:52	ICPMS204-B_110912A	88	13687
Calcium	49	mg/L		1		E200.8	09/12/11 19:18 / dck	09/07/11 09:52	ICPMS204-B_110912A	88	13687
Copper	0.019	mg/L		0.001		E200.8	09/12/11 19:18 / dck	09/07/11 09:52	ICPMS204-B_110912A	88	13687
Lead	0.0019	mg/L		0.0005		E200.8	09/12/11 19:18 / dck	09/07/11 09:52	ICPMS204-B_110912A	88	13687
Magnesium	12	mg/L		1		E200.8	09/12/11 19:18 / dck	09/07/11 09:52	ICPMS204-B_110912A	88	13687
Zinc	0.02	mg/L		0.01		E200.8	09/12/11 19:18 / dck	09/07/11 09:52	ICPMS204-B_110912A	88	13687

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID Field Blank
Lab ID: H11090040-007
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/02/11 10:00 **DateReceived:** 09/02/11
Report Date: 10/14/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	09/06/11 14:50 / cmm	09/06/11 14:23	-124 (14410200)_110906B	: 13	13679
INORGANICS											
Alkalinity, Total as CaCO3	ND	mg/L		4		A2320 B	09/09/11 18:58 / cmm		MAN-TECH_110909C	: 42	R74272
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	09/09/11 18:58 / cmm		MAN-TECH_110909C	: 42	R74272
Sulfate	ND	mg/L		1		E300.0	09/08/11 15:34 / zeg		IC102-H_110908A	: 31	R74237
Hardness as CaCO3	ND	mg/L		1		A2340 B	09/13/11 16:07 / sld		WATERCALC_110913B	: 7	R74332
NUTRIENTS											
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/06/11 12:46 / reh		FIA203-HE_110906A	: 58	R74154
Nitrogen, Total	ND	mg/L		0.05		A4500 N-C	09/14/11 10:56 / reh	09/14/11 08:39	NUTRIENTS_110914A	: 20	13791
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 17:24 / reh		FIA203-HE_110908C	: 94	R74249
Phosphorus, Total as P	ND	mg/L		0.005		E365.1	09/13/11 15:54 / reh	09/13/11 14:10	FIA202-HE_110913B	: 39	13781
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	09/12/11 19:23 / dck		ICPMS204-B_110912A	: 89	R74300
Cadmium	ND	mg/L		0.00008		E200.8	09/12/11 19:23 / dck		ICPMS204-B_110912A	: 89	R74300
Copper	ND	mg/L		0.001		E200.8	09/12/11 19:23 / dck		ICPMS204-B_110912A	: 89	R74300
Lead	ND	mg/L		0.0005		E200.8	09/12/11 19:23 / dck		ICPMS204-B_110912A	: 89	R74300
Zinc	0.01	mg/L		0.01		E200.8	09/12/11 19:23 / dck		ICPMS204-B_110912A	: 89	R74300
METALS, TOTAL RECOVERABLE											
Arsenic	ND	mg/L		0.005		E200.8	09/12/11 19:27 / dck		ICPMS204-B_110912A	: 90	R74300
Cadmium	ND	mg/L		0.00008		E200.8	09/12/11 19:27 / dck		ICPMS204-B_110912A	: 90	R74300
Calcium	ND	mg/L		1		E200.8	09/12/11 19:27 / dck		ICPMS204-B_110912A	: 90	R74300
Copper	ND	mg/L		0.001		E200.8	09/12/11 19:27 / dck		ICPMS204-B_110912A	: 90	R74300
Lead	ND	mg/L		0.0005		E200.8	09/12/11 19:27 / dck		ICPMS204-B_110912A	: 90	R74300
Magnesium	ND	mg/L		1		E200.8	09/12/11 19:27 / dck		ICPMS204-B_110912A	: 90	R74300
Zinc	ND	mg/L		0.01		E200.8	09/12/11 19:27 / dck		ICPMS204-B_110912A	: 90	R74300

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-116A Sediment Sieve <0.065mm
Collection Date: 09/01/11 09:00 **DateReceived:** 09/02/11
Lab ID: H11090040-008
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	4.6	wt% passed		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D : 1		R74409
3050 EXTRACTABLE METALS											
Arsenic	23	mg/kg		1		SW6010B	09/15/11 18:37 / sld	09/14/11 08:21	ICP2-HE_110915B : 25		13789
Cadmium	1.7	mg/kg		0.2		SW6010B	09/15/11 18:37 / sld	09/14/11 08:21	ICP2-HE_110915B : 25		13789
Copper	236	mg/kg		5		SW6010B	09/15/11 18:37 / sld	09/14/11 08:21	ICP2-HE_110915B : 25		13789
Lead	93	mg/kg		5		SW6010B	09/21/11 11:29 / sld	09/19/11 08:39	ICP2-HE_110921A : 18		13896
Zinc	435	mg/kg		5		SW6010B	09/15/11 18:37 / sld	09/14/11 08:21	ICP2-HE_110915B : 25		13789

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-116A Sediment Sieve 0.065-1mm
Collection Date: 09/01/11 09:00 **DateReceived:** 09/02/11
Lab ID: H11090040-009
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	94.8	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D : 2		R74409
3050 EXTRACTABLE METALS											
Arsenic	9	mg/kg		1		SW6010B	09/22/11 23:29 / sld	09/19/11 08:39	ICP2-HE_110922A : 106		13896
Cadmium	0.2	mg/kg		0.2		SW6010B	09/15/11 18:40 / sld	09/14/11 08:21	ICP2-HE_110915B : 26		13789
Copper	54	mg/kg		5		SW6010B	09/15/11 18:40 / sld	09/14/11 08:21	ICP2-HE_110915B : 26		13789
Lead	19	mg/kg		5		SW6010B	09/21/11 11:39 / sld	09/19/11 08:39	ICP2-HE_110921A : 21		13896
Zinc	166	mg/kg		5		SW6010B	09/15/11 18:40 / sld	09/14/11 08:21	ICP2-HE_110915B : 26		13789

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID CFR-116A Sediment Sieve 1-2mm
Lab ID: H11090040-010
Matrix: Sediment

Project: CFR Monitoring-474374
Collection Date: 09/01/11 09:00
DateReceived: 09/02/11
Report Date: 10/14/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve	0.6	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	3	R74409
3050 EXTRACTABLE METALS											
Arsenic	14	mg/kg	D	2		SW6010B	09/15/11 18:44 / sld	09/14/11 08:21	ICP2-HE_110915B	27	13789
Cadmium	1.0	mg/kg		0.2		SW6010B	09/15/11 18:44 / sld	09/14/11 08:21	ICP2-HE_110915B	27	13789
Copper	110	mg/kg		5		SW6010B	09/15/11 18:44 / sld	09/14/11 08:21	ICP2-HE_110915B	27	13789
Lead	24	mg/kg	D	6		SW6010B	09/21/11 11:43 / sld	09/19/11 08:39	ICP2-HE_110921A	22	13896
Zinc	310	mg/kg		5		SW6010B	09/15/11 18:44 / sld	09/14/11 08:21	ICP2-HE_110915B	27	13789

Report Definitions:
RL - Analyte reporting limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-84F Sediment Sieve <0.065mm
Collection Date: 09/01/11 12:00 **DateReceived:** 09/02/11
Lab ID: H11090040-011
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	6.0	wt% passed		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	4	R74409
3050 EXTRACTABLE METALS											
Arsenic	36	mg/kg		1		SW6010B	09/15/11 18:48 / sld	09/14/11 08:21	ICP2-HE_110915B	28	13789
Cadmium	3.0	mg/kg		0.2		SW6010B	09/15/11 18:48 / sld	09/14/11 08:21	ICP2-HE_110915B	28	13789
Copper	395	mg/kg		5		SW6010B	09/15/11 18:48 / sld	09/14/11 08:21	ICP2-HE_110915B	28	13789
Lead	80	mg/kg		5		SW6010B	09/21/11 11:47 / sld	09/19/11 08:39	ICP2-HE_110921A	23	13896
Zinc	835	mg/kg		5		SW6010B	09/15/11 18:48 / sld	09/14/11 08:21	ICP2-HE_110915B	28	13789

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-84F Sediment Sieve 0.065-1mm
Collection Date: 09/01/11 12:00 **DateReceived:** 09/02/11
Lab ID: H11090040-012
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	76.6	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	5	R74409
3050 EXTRACTABLE METALS											
Arsenic	12	mg/kg		1		SW6010B	09/15/11 18:51 / sld	09/14/11 08:21	ICP2-HE_110915B	29	13789
Cadmium	0.5	mg/kg		0.2		SW6010B	09/15/11 18:51 / sld	09/14/11 08:21	ICP2-HE_110915B	29	13789
Copper	102	mg/kg		5		SW6010B	09/15/11 18:51 / sld	09/14/11 08:21	ICP2-HE_110915B	29	13789
Lead	23	mg/kg		5		SW6010B	09/21/11 11:50 / sld	09/19/11 08:39	ICP2-HE_110921A	24	13896
Zinc	285	mg/kg		5		SW6010B	09/15/11 18:51 / sld	09/14/11 08:21	ICP2-HE_110915B	29	13789

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-84F Sediment Sieve 1-2mm
Collection Date: 09/01/11 12:00 **DateReceived:** 09/02/11
Lab ID: H11090040-013
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve	14.5	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	6	R74409
3050 EXTRACTABLE METALS											
Arsenic	10	mg/kg		1		SW6010B	09/22/11 23:32 / sld	09/19/11 08:39	ICP2-HE_110922A	107	13896
Cadmium	0.3	mg/kg		0.2		SW6010B	09/15/11 18:55 / sld	09/14/11 08:21	ICP2-HE_110915B	30	13789
Copper	74	mg/kg		5		SW6010B	09/15/11 18:55 / sld	09/14/11 08:21	ICP2-HE_110915B	30	13789
Lead	16	mg/kg		5		SW6010B	09/21/11 11:54 / sld	09/19/11 08:39	ICP2-HE_110921A	25	13896
Zinc	182	mg/kg		5		SW6010B	09/15/11 18:55 / sld	09/14/11 08:21	ICP2-HE_110915B	30	13789

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-53C Sediment Sieve <0.065mm
Collection Date: 09/01/11 14:30 **DateReceived:** 09/02/11
Lab ID: H11090040-014
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	16.4	wt% passed		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D : 7		R74409
3050 EXTRACTABLE METALS											
Arsenic	27	mg/kg		1		SW6010B	09/15/11 19:06 / sld	09/14/11 08:21	ICP2-HE_110915B : 33		13789
Cadmium	1.4	mg/kg		0.2		SW6010B	09/15/11 19:06 / sld	09/14/11 08:21	ICP2-HE_110915B : 33		13789
Copper	333	mg/kg		5		SW6010B	09/15/11 19:06 / sld	09/14/11 08:21	ICP2-HE_110915B : 33		13789
Lead	64	mg/kg		5		SW6010B	09/21/11 11:58 / sld	09/19/11 08:39	ICP2-HE_110921A : 26		13896
Zinc	377	mg/kg		5		SW6010B	09/15/11 19:06 / sld	09/14/11 08:21	ICP2-HE_110915B : 33		13789

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-53C Sediment Sieve 0.065-1mmmm
Collection Date: 09/01/11 14:30 **DateReceived:** 09/02/11
Lab ID: H11090040-015
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	74.0	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D : 8		R74409
3050 EXTRACTABLE METALS											
Arsenic	18	mg/kg		1		SW6010B	09/15/11 19:09 / sld	09/14/11 08:21	ICP2-HE_110915B : 34		13789
Cadmium	0.4	mg/kg		0.2		SW6010B	09/15/11 19:09 / sld	09/14/11 08:21	ICP2-HE_110915B : 34		13789
Copper	172	mg/kg		5		SW6010B	09/15/11 19:09 / sld	09/14/11 08:21	ICP2-HE_110915B : 34		13789
Lead	33	mg/kg		5		SW6010B	09/21/11 12:01 / sld	09/19/11 08:39	ICP2-HE_110921A : 27		13896
Zinc	238	mg/kg		5		SW6010B	09/15/11 19:09 / sld	09/14/11 08:21	ICP2-HE_110915B : 34		13789

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-53C Sediment Sieve 1-2mm
Collection Date: 09/01/11 14:30 **DateReceived:** 09/02/11
Lab ID: H11090040-016
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve	5.2	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	9	R74409
3050 EXTRACTABLE METALS											
Arsenic	14	mg/kg		1		SW6010B	09/15/11 19:13 / sld	09/14/11 08:21	ICP2-HE_110915B	35	13789
Cadmium	0.2	mg/kg		0.2		SW6010B	09/15/11 19:13 / sld	09/14/11 08:21	ICP2-HE_110915B	35	13789
Copper	107	mg/kg		5		SW6010B	09/15/11 19:13 / sld	09/14/11 08:21	ICP2-HE_110915B	35	13789
Lead	20	mg/kg		5		SW6010B	09/21/11 12:05 / sld	09/19/11 08:39	ICP2-HE_110921A	28	13896
Zinc	190	mg/kg		5		SW6010B	09/15/11 19:13 / sld	09/14/11 08:21	ICP2-HE_110915B	35	13789

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-42G Sediment Sieve <0.065mm
Collection Date: 09/01/11 16:30 **DateReceived:** 09/02/11
Lab ID: H11090040-017
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	9.8	wt% passed		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	10	R74409
3050 EXTRACTABLE METALS											
Arsenic	45	mg/kg		1		SW6010B	09/15/11 19:17 / sld	09/14/11 08:21	ICP2-HE_110915B	36	13789
Cadmium	2.1	mg/kg		0.2		SW6010B	09/15/11 19:17 / sld	09/14/11 08:21	ICP2-HE_110915B	36	13789
Copper	528	mg/kg		5		SW6010B	09/15/11 19:17 / sld	09/14/11 08:21	ICP2-HE_110915B	36	13789
Lead	89	mg/kg		5		SW6010B	09/21/11 12:08 / sld	09/19/11 08:39	ICP2-HE_110921A	29	13896
Zinc	537	mg/kg		5		SW6010B	09/15/11 19:17 / sld	09/14/11 08:21	ICP2-HE_110915B	36	13789

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-42G Sediment Sieve 0.065-1mm
Collection Date: 09/01/11 16:30
DateReceived: 09/02/11
Lab ID: H11090040-018
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	88.3	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	11	R74409
3050 EXTRACTABLE METALS											
Arsenic	25	mg/kg		1		SW6010B	09/15/11 19:20 / sld	09/14/11 08:21	ICP2-HE_110915B	37	13789
Cadmium	0.3	mg/kg		0.2		SW6010B	09/15/11 19:20 / sld	09/14/11 08:21	ICP2-HE_110915B	37	13789
Copper	165	mg/kg		5		SW6010B	09/15/11 19:20 / sld	09/14/11 08:21	ICP2-HE_110915B	37	13789
Lead	32	mg/kg		5		SW6010B	09/21/11 12:12 / sld	09/19/11 08:39	ICP2-HE_110921A	30	13896
Zinc	232	mg/kg		5		SW6010B	09/15/11 19:20 / sld	09/14/11 08:21	ICP2-HE_110915B	37	13789

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID CFR-42G Sediment Sieve 1-2mm
Lab ID: H11090040-019
Matrix: Sediment

Project: CFR Monitoring-474374
Collection Date: 09/01/11 16:30
DateReceived: 09/02/11
Report Date: 10/14/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve	1.3	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	12	R74409
3050 EXTRACTABLE METALS											
Arsenic	74	mg/kg		1		SW6010B	09/15/11 19:24 / sld	09/14/11 08:21	ICP2-HE_110915B	38	13789
Cadmium	0.9	mg/kg		0.2		SW6010B	09/15/11 19:24 / sld	09/14/11 08:21	ICP2-HE_110915B	38	13789
Copper	421	mg/kg		5		SW6010B	09/15/11 19:24 / sld	09/14/11 08:21	ICP2-HE_110915B	38	13789
Lead	47	mg/kg	D	6		SW6010B	09/21/11 15:23 / sld	09/19/11 08:39	ICP2-HE_110921B	16	13896
Zinc	317	mg/kg		5		SW6010B	09/15/11 19:24 / sld	09/14/11 08:21	ICP2-HE_110915B	38	13789

Report Definitions:
RL - Analyte reporting limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-27H Sediment Sieve <0.065mm
Collection Date: 09/02/11 09:30 **DateReceived:** 09/02/11
Lab ID: H11090040-020
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	2.0	wt% passed		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	13	R74409
3050 EXTRACTABLE METALS											
Arsenic	49	mg/kg		1		SW6010B	09/15/11 19:27 / sld	09/14/11 08:21	ICP2-HE_110915B	39	13789
Cadmium	1.2	mg/kg		0.2		SW6010B	09/15/11 19:27 / sld	09/14/11 08:21	ICP2-HE_110915B	39	13789
Copper	511	mg/kg		5		SW6010B	09/15/11 19:27 / sld	09/14/11 08:21	ICP2-HE_110915B	39	13789
Lead	77	mg/kg	D	6		SW6010B	09/21/11 15:27 / sld	09/19/11 08:39	ICP2-HE_110921B	17	13896
Zinc	440	mg/kg		5		SW6010B	09/15/11 19:27 / sld	09/14/11 08:21	ICP2-HE_110915B	39	13789

Report Definitions:
RL - Analyte reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-27H Sediment Sieve 0.065-1mm
Collection Date: 09/02/11 09:30
DateReceived: 09/02/11
Lab ID: H11090040-021
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	48.7	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	14	R74409
3050 EXTRACTABLE METALS											
Arsenic	16	mg/kg		1		SW6010B	09/15/11 19:31 / sld	09/14/11 08:21	ICP2-HE_110915B	40	13789
Cadmium	0.3	mg/kg		0.2		SW6010B	09/15/11 19:31 / sld	09/14/11 08:21	ICP2-HE_110915B	40	13789
Copper	119	mg/kg		5		SW6010B	09/15/11 19:31 / sld	09/14/11 08:21	ICP2-HE_110915B	40	13789
Lead	36	mg/kg		5		SW6010B	09/21/11 15:31 / sld	09/19/11 08:39	ICP2-HE_110921B	18	13896
Zinc	211	mg/kg		5		SW6010B	09/15/11 19:31 / sld	09/14/11 08:21	ICP2-HE_110915B	40	13789

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-27H Sediment Sieve 1-2mm
Collection Date: 09/02/11 09:30 **DateReceived:** 09/02/11
Lab ID: H11090040-022
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve	31.2	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	15	R74409
3050 EXTRACTABLE METALS											
Arsenic	13	mg/kg		1		SW6010B	09/15/11 19:35 / sld	09/14/11 08:21	ICP2-HE_110915B	41	13789
Cadmium	ND	mg/kg		0.2		SW6010B	09/15/11 19:35 / sld	09/14/11 08:21	ICP2-HE_110915B	41	13789
Copper	154	mg/kg		5		SW6010B	09/15/11 19:35 / sld	09/14/11 08:21	ICP2-HE_110915B	41	13789
Lead	31	mg/kg		5		SW6010B	09/21/11 15:42 / sld	09/19/11 08:39	ICP2-HE_110921B	21	13896
Zinc	190	mg/kg		5		SW6010B	09/15/11 19:35 / sld	09/14/11 08:21	ICP2-HE_110915B	41	13789

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-27H Dupe Sediment Sieve <0.065mm
Collection Date: 09/02/11 09:45 **DateReceived:** 09/02/11
Lab ID: H11090040-023
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	0.6	wt% passed		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	16	R74409
3050 EXTRACTABLE METALS											
Arsenic	48	mg/kg	D	3		SW6010B	09/20/11 05:33 / sld	09/15/11 13:45	ICP2-HE_110919C	65	13839
Cadmium	1.3	mg/kg		0.2		SW6010B	09/20/11 05:33 / sld	09/15/11 13:45	ICP2-HE_110919C	65	13839
Copper	445	mg/kg		5		SW6010B	09/20/11 05:33 / sld	09/15/11 13:45	ICP2-HE_110919C	65	13839
Lead	95	mg/kg	D	6		SW6010B	09/24/11 00:24 / sld	09/21/11 13:31	ICP2-HE_110923A	39	13962
Zinc	419	mg/kg		5		SW6010B	09/24/11 00:24 / sld	09/21/11 13:31	ICP2-HE_110923A	39	13962

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-27H Dupe Sediment Sieve 0.065-1mm
Collection Date: 09/02/11 09:45 **DateReceived:** 09/02/11
Lab ID: H11090040-024
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	29.6	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	17	R74409
3050 EXTRACTABLE METALS											
Arsenic	15	mg/kg		1		SW6010B	09/20/11 05:36 / sld	09/15/11 13:45	ICP2-HE_110919C	66	13839
Cadmium	0.3	mg/kg		0.2		SW6010B	09/20/11 05:36 / sld	09/15/11 13:45	ICP2-HE_110919C	66	13839
Copper	106	mg/kg		5		SW6010B	09/20/11 05:36 / sld	09/15/11 13:45	ICP2-HE_110919C	66	13839
Lead	43	mg/kg		5		SW6010B	09/24/11 00:28 / sld	09/21/11 13:31	ICP2-HE_110923A	40	13962
Zinc	161	mg/kg		5		SW6010B	09/24/11 00:28 / sld	09/21/11 13:31	ICP2-HE_110923A	40	13962

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-27H Dupe Sediment Sieve 1-2mm
Collection Date: 09/02/11 09:45 **DateReceived:** 09/02/11
Lab ID: H11090040-025
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve	50.5	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	18	R74409
3050 EXTRACTABLE METALS											
Arsenic	11	mg/kg		1		SW6010B	09/20/11 05:40 / sld	09/15/11 13:45	ICP2-HE_110919C	67	13839
Cadmium	0.3	mg/kg		0.2		SW6010B	09/20/11 05:40 / sld	09/15/11 13:45	ICP2-HE_110919C	67	13839
Copper	103	mg/kg		5		SW6010B	09/20/11 05:40 / sld	09/15/11 13:45	ICP2-HE_110919C	67	13839
Lead	54	mg/kg		5		SW6010B	09/24/11 00:32 / sld	09/21/11 13:31	ICP2-HE_110923A	41	13962
Zinc	214	mg/kg		5		SW6010B	09/24/11 00:32 / sld	09/21/11 13:31	ICP2-HE_110923A	41	13962

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID SS-25 Sediment Sieve <0.065mm
Collection Date: 09/02/11 15:00 **DateReceived:** 09/02/11
Lab ID: H11090040-026
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	0.6	wt% passed		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	19	R74409
3050 EXTRACTABLE METALS											
Arsenic	36	mg/kg	D	3		SW6010B	09/20/11 05:44 / sld	09/15/11 13:45	ICP2-HE_110919C	68	13839
Cadmium	2.6	mg/kg		0.2		SW6010B	09/20/11 05:44 / sld	09/15/11 13:45	ICP2-HE_110919C	68	13839
Copper	173	mg/kg		5		SW6010B	09/20/11 05:44 / sld	09/15/11 13:45	ICP2-HE_110919C	68	13839
Lead	70	mg/kg	D	6		SW6010B	09/24/11 00:43 / sld	09/21/11 13:31	ICP2-HE_110923A	44	13962
Zinc	326	mg/kg		5		SW6010B	09/24/11 00:43 / sld	09/21/11 13:31	ICP2-HE_110923A	44	13962

Report Definitions:
RL - Analyte reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID SS-25 Sediment Sieve 0.065-1mm
Collection Date: 09/02/11 15:00 **DateReceived:** 09/02/11
Lab ID: H11090040-027
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	14.8	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	20	R74409
3050 EXTRACTABLE METALS											
Arsenic	15	mg/kg		1		SW6010B	09/20/11 05:47 / sld	09/15/11 13:45	ICP2-HE_110919C	69	13839
Cadmium	0.3	mg/kg		0.2		SW6010B	09/20/11 05:47 / sld	09/15/11 13:45	ICP2-HE_110919C	69	13839
Copper	43	mg/kg		5		SW6010B	09/20/11 05:47 / sld	09/15/11 13:45	ICP2-HE_110919C	69	13839
Lead	21	mg/kg		5		SW6010B	09/24/11 00:46 / sld	09/21/11 13:31	ICP2-HE_110923A	45	13962
Zinc	176	mg/kg		5		SW6010B	09/24/11 00:46 / sld	09/21/11 13:31	ICP2-HE_110923A	45	13962

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID SS-25 Sediment Sieve 1-2mm
Collection Date: 09/02/11 15:00 **DateReceived:** 09/02/11
Lab ID: H11090040-028
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve	7.9	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	21	R74409
3050 EXTRACTABLE METALS											
Arsenic	12	mg/kg		1		SW6010B	09/24/11 00:50 / sld	09/21/11 13:31	ICP2-HE_110923A	46	13962
Cadmium	0.2	mg/kg		0.2		SW6010B	09/20/11 05:58 / sld	09/15/11 13:45	ICP2-HE_110919C	72	13839
Copper	31	mg/kg		5		SW6010B	09/20/11 05:58 / sld	09/15/11 13:45	ICP2-HE_110919C	72	13839
Lead	14	mg/kg		5		SW6010B	09/24/11 00:50 / sld	09/21/11 13:31	ICP2-HE_110923A	46	13962
Zinc	232	mg/kg		5		SW6010B	09/24/11 00:50 / sld	09/21/11 13:31	ICP2-HE_110923A	46	13962

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-03A Sediment Sieve <0.065mm
Collection Date: 09/02/11 12:30 **DateReceived:** 09/02/11
Lab ID: H11090040-029
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	5.4	wt% passed		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	22	R74409
3050 EXTRACTABLE METALS											
Arsenic	52	mg/kg		1		SW6010B	09/20/11 06:02 / sld	09/15/11 13:45	ICP2-HE_110919C	73	13839
Cadmium	2.0	mg/kg		0.2		SW6010B	09/20/11 06:02 / sld	09/15/11 13:45	ICP2-HE_110919C	73	13839
Copper	559	mg/kg		5		SW6010B	09/20/11 06:02 / sld	09/15/11 13:45	ICP2-HE_110919C	73	13839
Lead	74	mg/kg		5		SW6010B	09/24/11 00:54 / sld	09/21/11 13:31	ICP2-HE_110923A	47	13962
Zinc	404	mg/kg		5		SW6010B	09/24/11 00:54 / sld	09/21/11 13:31	ICP2-HE_110923A	47	13962

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-03A Sediment Sieve 0.065-1mm
Collection Date: 09/02/11 12:30 **DateReceived:** 09/02/11
Lab ID: H11090040-030
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	47.0	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	23	R74409
3050 EXTRACTABLE METALS											
Arsenic	31	mg/kg		1		SW6010B	09/20/11 06:06 / sld	09/15/11 13:45	ICP2-HE_110919C	74	13839
Cadmium	0.4	mg/kg		0.2		SW6010B	09/20/11 06:06 / sld	09/15/11 13:45	ICP2-HE_110919C	74	13839
Copper	173	mg/kg		5		SW6010B	09/20/11 06:06 / sld	09/15/11 13:45	ICP2-HE_110919C	74	13839
Lead	39	mg/kg		5		SW6010B	09/24/11 00:58 / sld	09/21/11 13:31	ICP2-HE_110923A	48	13962
Zinc	283	mg/kg		5		SW6010B	09/24/11 00:58 / sld	09/21/11 13:31	ICP2-HE_110923A	48	13962

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Client Sample ID CFR-03A Sediment Sieve 1-2mm
Collection Date: 09/02/11 12:30 **DateReceived:** 09/02/11
Lab ID: H11090040-031
Report Date: 10/14/11
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve	15.4	wt% retained		0.1		ASA15-2	09/15/11 16:32 / wj		MISC SOILS_110915D	24	R74409
3050 EXTRACTABLE METALS											
Arsenic	134	mg/kg		1		SW6010B	09/20/11 06:10 / sld	09/15/11 13:45	ICP2-HE_110919C	75	13839
Cadmium	0.6	mg/kg		0.2		SW6010B	09/20/11 06:10 / sld	09/15/11 13:45	ICP2-HE_110919C	75	13839
Copper	332	mg/kg		5		SW6010B	09/20/11 06:10 / sld	09/15/11 13:45	ICP2-HE_110919C	75	13839
Lead	55	mg/kg		5		SW6010B	09/24/11 01:01 / sld	09/21/11 13:31	ICP2-HE_110923A	49	13962
Zinc	707	mg/kg		5		SW6010B	09/24/11 01:01 / sld	09/21/11 13:31	ICP2-HE_110923A	49	13962

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: 13679

Run ID :Run Order: **ACCU-124 (14410200)_110906B: 1** SampType: **Method Blank** Sample ID: **MB-13679** Method: **A2540 D**

Analysis Date: **09/06/11 14:47** Units: **mg/L** **Prep Info:** Prep Date: **9/6/2011** Prep Method: **A2540 D**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Solids, Total Suspended TSS @ 105 C	ND	3									

Associated samples: **H11090040-001B; H11090040-002B; H11090040-003B; H11090040-004B; H11090040-005B; H11090040-006B; H11090040-007B**

Run ID :Run Order: **ACCU-124 (14410200)_110906B: 2** SampType: **Laboratory Control Sample** Sample ID: **LCS-13679** Method: **A2540 D**

Analysis Date: **09/06/11 14:48** Units: **mg/L** **Prep Info:** Prep Date: **9/6/2011** Prep Method: **A2540 D**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Solids, Total Suspended TSS @ 105 C	1700	10	2000		85	70	130				

Associated samples: **H11090040-001B; H11090040-002B; H11090040-003B; H11090040-004B; H11090040-005B; H11090040-006B; H11090040-007B**

Run ID :Run Order: **ACCU-124 (14410200)_110906B: 7** SampType: **Sample Duplicate** Sample ID: **H11090040-001BDUP** Method: **A2540 D**

Analysis Date: **09/06/11 14:49** Units: **mg/L** **Prep Info:** Prep Date: **9/6/2011** Prep Method: **A2540 D**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Solids, Total Suspended TSS @ 105 C	ND	10								5	

Associated samples: **H11090040-001B; H11090040-002B; H11090040-003B; H11090040-004B; H11090040-005B; H11090040-006B; H11090040-007B**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: 13687

Run ID :Run Order: **ICPMS204-B_110909A: 99** SampType: **Method Blank** Sample ID: **MB-13687** Method: **E200.8**
Analysis Date: **09/09/11 23:46** Units: **mg/L** **Prep Info:** Prep Date: **9/7/2011** Prep Method: **E200.2**

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	5E-05									
Cadmium	ND	2E-05									
Calcium	ND	0.04									
Copper	ND	0.0004									
Lead	2E-05	2E-05									
Magnesium	ND	0.003									
Zinc	0.002	0.0003									

Associated samples: **H11090040-001D; H11090040-002D; H11090040-003D; H11090040-004D; H11090040-005D; H11090040-006D**

Run ID :Run Order: **ICPMS204-B_110909A: 100** SampType: **Laboratory Control Sample** Sample ID: **LCS-13687** Method: **E200.8**
Analysis Date: **09/09/11 23:51** Units: **mg/L** **Prep Info:** Prep Date: **9/7/2011** Prep Method: **E200.2**

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.503	0.0050	0.5		101	85	115				
Cadmium	0.260	0.0010	0.25		104	85	115				
Calcium	26.0	1.0	25		104	85	115				
Copper	0.508	0.010	0.5		102	85	115				
Lead	0.511	0.010	0.5	0.0000207	102	85	115				
Magnesium	24.7	1.0	25		99	85	115				
Zinc	0.502	0.010	0.5	0.001677	100	85	115				

Associated samples: **H11090040-001D; H11090040-002D; H11090040-003D; H11090040-004D; H11090040-005D; H11090040-006D**

Run ID :Run Order: **ICPMS204-B_110909A: 103** SampType: **Sample Matrix Spike** Sample ID: **H11080476-011CMS3** Method: **E200.8**
Analysis Date: **09/10/11 00:03** Units: **mg/L** **Prep Info:** Prep Date: **9/7/2011** Prep Method: **E200.2**

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.968	0.0050	1	0.003294	97	70	130				
Cadmium	0.451	0.0010	0.5	0.0001142	90	70	130				
Calcium	212	1.0	50	164.1	96	70	130				
Copper	0.978	0.010	1	0.01457	96	70	130				
Lead	1.01	0.010	1	0.007026	101	70	130				
Magnesium	118	1.0	50	69.66	97	70	130				
Zinc	0.937	0.010	1	0.03002	91	70	130				

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: 13687

Run ID :Run Order: **ICPMS204-B_110909A: 103** SampType: **Sample Matrix Spike** Sample ID: **H11080476-011CMS3** Method: **E200.8**
Analysis Date: **09/10/11 00:03** Units: **mg/L** **Prep Info:** Prep Date: **9/7/2011** Prep Method: **E200.2**

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Associated samples: **H11090040-001D; H11090040-002D; H11090040-003D; H11090040-004D; H11090040-005D; H11090040-006D**

Run ID :Run Order: **ICPMS204-B_110909A: 104** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11080476-011CMSD3** Method: **E200.8**
Analysis Date: **09/10/11 00:07** Units: **mg/L** **Prep Info:** Prep Date: **9/7/2011** Prep Method: **E200.2**

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.982	0.0050	1	0.003294	98	70	130	0.9684	1.4	20	
Cadmium	0.457	0.0010	0.5	0.0001142	91	70	130	0.4514	1.3	20	
Calcium	219	1.0	50	164.1	109	70	130	212	3.2	20	
Copper	0.985	0.010	1	0.01457	97	70	130	0.9776	0.8	20	
Lead	1.01	0.010	1	0.007026	100	70	130	1.014	0.4	20	
Magnesium	124	1.0	50	69.66	109	70	130	117.9	5.2	20	
Zinc	0.949	0.010	1	0.03002	92	70	130	0.9368	1.3	20	

Associated samples: **H11090040-001D; H11090040-002D; H11090040-003D; H11090040-004D; H11090040-005D; H11090040-006D**

Run ID :Run Order: **ICPMS204-B_110912A: 66** SampType: **Method Blank** Sample ID: **MB-13687** Method: **E200.8**
Analysis Date: **09/12/11 17:42** Units: **mg/L** **Prep Info:** Prep Date: **9/7/2011** Prep Method: **E200.2**

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	5E-05									
Cadmium	ND	2E-05									
Calcium	ND	0.04									
Copper	ND	0.0004									
Lead	3E-05	2E-05									
Magnesium	ND	0.003									
Zinc	0.002	0.0003									

Associated samples: **H11090040-001D; H11090040-002D; H11090040-003D; H11090040-004D; H11090040-005D; H11090040-006D**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: 13781

Run ID :Run Order: **FIA202-HE_110913B: 9** SampType: **Laboratory Control Sample** Sample ID: **LCS-13781** Method: **E365.1**
Analysis Date: **09/13/11 15:23** Units: **mg/L** **Prep Info:** Prep Date: **9/13/2011** Prep Method: **E365.1**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phosphorus, Total as P	8.09	0.025	8.36		97	90	110				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA202-HE_110913B: 14** SampType: **Method Blank** Sample ID: **MB-13781** Method: **E365.1**
Analysis Date: **09/13/11 15:28** Units: **mg/L** **Prep Info:** Prep Date: **9/13/2011** Prep Method: **E365.1**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phosphorus, Total as P	ND	0.0009									

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA202-HE_110913B: 40** SampType: **Sample Matrix Spike** Sample ID: **H11090040-007EMS** Method: **E365.1**
Analysis Date: **09/13/11 15:55** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phosphorus, Total as P	0.194	0.010	0.2		97	90	110				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA202-HE_110913B: 41** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11090040-007EMSD** Method: **E365.1**
Analysis Date: **09/13/11 15:56** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phosphorus, Total as P	0.195	0.010	0.2		98	90	110	0.1944	0.5	20	

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: 13789

Run ID :Run Order: **ICP2-HE_110915B: 15** SampType: **Method Blank** Sample ID: **MB-13789** Method: **SW6010B**
Analysis Date: **09/15/11 18:01** Units: **mg/kg** **Prep Info:** Prep Date: **9/14/2011** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.3									
Cadmium	ND	0.02									
Copper	ND	0.1									
Zinc	0.1	0.07									

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110915B: 16** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-13789** Method: **SW6010B**
Analysis Date: **09/15/11 18:05** Units: **mg/kg** **Prep Info:** Prep Date: **9/14/2011** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	44.5	5.0	50		89	80	120				
Cadmium	22.2	1.0	25		89	80	120				
Copper	46.1	5.0	50		92	80	120				
Zinc	44.6	5.0	50	0.116	89	80	120				

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110915B: 17** SampType: **Laboratory Control Sample** Sample ID: **LCS-13789** Method: **SW6010B**
Analysis Date: **09/15/11 18:08** Units: **mg/kg** **Prep Info:** Prep Date: **9/14/2011** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	279	5.0	339.6		82	72.3	106.4				
Cadmium	121	1.0	135.6		89	73	105.1				
Copper	252	5.0	277.2		91	77.5	109.6				
Zinc	190	5.0	210.9	0.116	90	74.2	109.9				

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110915B: 23** SampType: **Sample Matrix Spike** Sample ID: **H11090003-001AMS** Method: **SW6010B**
Analysis Date: **09/15/11 18:30** Units: **mg/kg** **Prep Info:** Prep Date: **9/14/2011** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	47.4	5.0	49.02		97	75	125				
Cadmium	23.7	1.0	24.51		97	75	125				
Copper	78.4	5.0	49.02	34.15	90	75	125				

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: 13789

Run ID :Run Order: **ICP2-HE_110915B: 23** SampType: **Sample Matrix Spike** Sample ID: **H11090003-001AMS** Method: **SW6010B**

Analysis Date: **09/15/11 18:30** Units: **mg/kg** **Prep Info:** Prep Date: **9/14/2011** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Zinc	150	5.0	49.02	94.65	112	75	125				

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110915B: 24** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11090003-001AMSD** Method: **SW6010B**

Analysis Date: **09/15/11 18:33** Units: **mg/kg** **Prep Info:** Prep Date: **9/14/2011** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	49.8	5.0	49.02		102	75	125	47.43	4.8	20	
Cadmium	23.7	1.0	24.51		97	75	125	23.68	0.2	20	
Copper	86.2	5.0	49.02	34.15	106	75	125	78.43	9.4	20	
Zinc	135	5.0	49.02	94.65	82	75	125	149.8	11	20	

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110915B: 46** SampType: **Sample Matrix Spike** Sample ID: **H11090040-022AMS** Method: **SW6010B**

Analysis Date: **09/15/11 19:53** Units: **mg/kg** **Prep Info:** Prep Date: **9/14/2011** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	38.1	5.0	24.75	13.41	100	75	125				
Cadmium	11.7	1.0	12.38	0.1374	93	75	125				
Copper	134	5.0	24.75	154		75	125				A
Zinc	137	5.0	24.75	190.3		75	125				A

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110915B: 47** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11090040-022AMSD** Method: **SW6010B**

Analysis Date: **09/15/11 19:56** Units: **mg/kg** **Prep Info:** Prep Date: **9/14/2011** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	33.4	5.0	24.75	13.41	81	75	125	38.12	13	20	
Cadmium	11.5	1.0	12.38	0.1374	92	75	125	11.7	1.4	20	
Copper	122	5.0	24.75	154		75	125	134.4	9.6	20	A
Zinc	142	5.0	24.75	190.3		75	125	136.6	3.7	20	A

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: 13791

Run ID :Run Order: **NUTRIENTS_110914A: 1** SampType: **Laboratory Control Sample** Sample ID: **LCS-2** Method: **A4500 N-C**
Analysis Date: **09/14/11 10:08** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	30.8	1.0	30.1		102	90	110				

Associated samples: **H11090040-001A; H11090040-002A; H11090040-003A; H11090040-004A; H11090040-005A; H11090040-007A**

Run ID :Run Order: **NUTRIENTS_110914A: 5** SampType: **Method Blank** Sample ID: **MBLK-6** Method: **A4500 N-C**
Analysis Date: **09/14/11 10:26** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	ND	0.02									

Associated samples: **H11090040-001A; H11090040-002A; H11090040-003A; H11090040-004A; H11090040-005A; H11090040-007A**

Run ID :Run Order: **NUTRIENTS_110914A: 10** SampType: **Sample Matrix Spike** Sample ID: **H11090037-025BMS** Method: **A4500 N-C**
Analysis Date: **09/14/11 10:36** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	1.03	0.10	1		103	90	110				

Associated samples: **H11090040-001A; H11090040-002A; H11090040-003A; H11090040-004A; H11090040-005A; H11090040-007A**

Run ID :Run Order: **NUTRIENTS_110914A: 11** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11090037-025BMSD** Method: **A4500 N-C**
Analysis Date: **09/14/11 10:38** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	1.05	0.10	1		105	90	110	1.03	1.9	20	

Associated samples: **H11090040-001A; H11090040-002A; H11090040-003A; H11090040-004A; H11090040-005A; H11090040-007A**

Run ID :Run Order: **NUTRIENTS_110914A: 29** SampType: **Sample Matrix Spike** Sample ID: **H11090040-007AMS** Method: **A4500 N-C**
Analysis Date: **09/14/11 11:18** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	1.00	0.10	1		100	90	110				

Associated samples: **H11090040-001A; H11090040-002A; H11090040-003A; H11090040-004A; H11090040-005A; H11090040-007A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: 13791

Date: *14-Oct-11*

Run ID :Run Order: **NUTRIENTS_110914A: 30** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11090040-007AMSD** Method: **A4500 N-C**

Analysis Date: **09/14/11 11:20** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	0.990	0.10	1		99	90	110	1	1.0	20	

Associated samples: **H11090040-001A; H11090040-002A; H11090040-003A; H11090040-004A; H11090040-005A; H11090040-007A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: 13839

Run ID :Run Order: **ICP2-HE_110919C: 62** SampType: **Method Blank** Sample ID: **MB-13839** Method: **SW6010B**
Analysis Date: **09/20/11 05:22** Units: **mg/kg** **Prep Info:** Prep Date: **9/15/2011** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.3									
Cadmium	0.02	0.02									
Copper	ND	0.1									

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Run ID :Run Order: **ICP2-HE_110919C: 63** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-13839** Method: **SW6010B**
Analysis Date: **09/20/11 05:26** Units: **mg/kg** **Prep Info:** Prep Date: **9/15/2011** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	46.0	5.0	50		92	80	120				
Cadmium	22.9	1.0	25	0.0205	91	80	120				
Copper	45.8	5.0	50		92	80	120				

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Run ID :Run Order: **ICP2-HE_110919C: 64** SampType: **Laboratory Control Sample** Sample ID: **LCS-13839** Method: **SW6010B**
Analysis Date: **09/20/11 05:29** Units: **mg/kg** **Prep Info:** Prep Date: **9/15/2011** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	265	5.0	339.6		78	72.3	106.4				
Cadmium	115	1.0	135.6	0.0205	85	73	105.1				
Copper	234	5.0	277.2		84	77.5	109.6				

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Run ID :Run Order: **ICP2-HE_110919C: 78** SampType: **Sample Matrix Spike** Sample ID: **H11090040-031AMS** Method: **SW6010B**
Analysis Date: **09/20/11 06:20** Units: **mg/kg** **Prep Info:** Prep Date: **9/15/2011** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	78.6	5.0	24.63	133.7		75	125				A
Cadmium	12.1	1.0	12.32	0.5766	94	75	125				
Copper	196	5.0	24.63	331.6		75	125				A

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: 13839

Run ID :Run Order: **ICP2-HE_110919C: 79** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11090040-031AMSD** Method: **SW6010B**

Analysis Date: **09/20/11 06:24** Units: **mg/kg** **Prep Info:** Prep Date: **9/15/2011** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	78.4	5.0	24.63	133.7		75	125	78.56	0.3	20	A
Cadmium	11.7	1.0	12.32	0.5766	90	75	125	12.1	3.5	20	
Copper	200	5.0	24.63	331.6		75	125	196.4	1.9	20	A

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: 13896

Run ID :Run Order: **ICP2-HE_110921A: 15** SampType: **Method Blank** Sample ID: **MB-13896** Method: **SW6010B**
Analysis Date: **09/21/11 11:18** Units: **mg/kg** **Prep Info:** Prep Date: **9/19/2011** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.3									
Lead	ND	0.6									

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110921A: 16** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-13896** Method: **SW6010B**
Analysis Date: **09/21/11 11:22** Units: **mg/kg** **Prep Info:** Prep Date: **9/19/2011** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	46.8	5.0	50		94	80	120				
Lead	46.0	5.0	50		92	80	120				

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110921A: 17** SampType: **Laboratory Control Sample** Sample ID: **LCS-13896** Method: **SW6010B**
Analysis Date: **09/21/11 11:25** Units: **mg/kg** **Prep Info:** Prep Date: **9/19/2011** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	277	5.0	343		81	72.3	106.4				
Lead	174	5.0	187		93	75.9	108.6				

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110921B: 15** SampType: **Method Blank** Sample ID: **MB-13896** Method: **SW6010B**
Analysis Date: **09/21/11 15:20** Units: **mg/kg** **Prep Info:** Prep Date: **9/19/2011** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.3									
Lead	ND	0.6									

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110921B: 24** SampType: **Sample Matrix Spike** Sample ID: **H11090040-022AMS** Method: **SW6010B**
Analysis Date: **09/21/11 15:52** Units: **mg/kg** **Prep Info:** Prep Date: **9/19/2011** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	34.2	5.0	24.88	10.82	94	75	125				

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: 13896

Run ID :Run Order: **ICP2-HE_110921B: 24** SampType: **Sample Matrix Spike** Sample ID: **H11090040-022AMS** Method: **SW6010B**

Analysis Date: **09/21/11 15:52** Units: **mg/kg** **Prep Info:** Prep Date: **9/19/2011** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	64.6	5.0	24.88	31.4	133	75	125				S

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110921B: 25** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11090040-022AMSD** Method: **SW6010B**

Analysis Date: **09/21/11 15:56** Units: **mg/kg** **Prep Info:** Prep Date: **9/19/2011** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	34.5	5.0	24.88	10.82	95	75	125	34.23	0.7	20	
Lead	56.0	5.0	24.88	31.4	99	75	125	64.56	14	20	

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110922A: 105** SampType: **Method Blank** Sample ID: **MB-13896** Method: **SW6010B**

Analysis Date: **09/22/11 23:25** Units: **mg/kg** **Prep Info:** Prep Date: **9/19/2011** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.3									
Lead	ND	0.6									

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: 13962

Run ID :Run Order: **ICP2-HE_110923A: 36** SampType: **Method Blank** Sample ID: **MB-13962** Method: **SW6010B**
Analysis Date: **09/24/11 00:14** Units: **mg/kg** **Prep Info:** Prep Date: **9/21/2011** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.3									
Lead	0.6	0.6									
Zinc	0.2	0.07									

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Run ID :Run Order: **ICP2-HE_110923A: 37** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-13962** Method: **SW6010B**
Analysis Date: **09/24/11 00:18** Units: **mg/kg** **Prep Info:** Prep Date: **9/21/2011** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	45.7	5.0	50		91	80	120				
Lead	44.7	5.0	50	0.62	88	80	120				
Zinc	45.7	5.0	50	0.156	91	80	120				

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Run ID :Run Order: **ICP2-HE_110923A: 38** SampType: **Laboratory Control Sample** Sample ID: **LCS-13962** Method: **SW6010B**
Analysis Date: **09/24/11 00:21** Units: **mg/kg** **Prep Info:** Prep Date: **9/21/2011** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	260	5.0	339.6		76	72.3	106.4				
Lead	163	5.0	185.1	0.62	87	75.9	108.6				
Zinc	176	5.0	210.9	0.156	83	74.2	109.9				

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Run ID :Run Order: **ICP2-HE_110923A: 52** SampType: **Sample Matrix Spike** Sample ID: **H11090040-031AMS** Method: **SW6010B**
Analysis Date: **09/24/11 01:12** Units: **mg/kg** **Prep Info:** Prep Date: **9/21/2011** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	57.7	5.0	25	174.1		75	125				A
Lead	58.8	5.0	25	55.1	15	75	125				S
Zinc	471	5.0	25	706.9		75	125				A

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: 13962

Run ID :Run Order: **ICP2-HE_110923A: 53** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11090040-031AMSD** Method: **SW6010B**

Analysis Date: **09/24/11 01:15** Units: **mg/kg** **Prep Info:** Prep Date: **9/21/2011** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	61.6	5.0	25	174.1		75	125	57.66	6.5	20	A
Lead	57.8	5.0	25	55.1	11	75	125	58.85	1.9	20	S
Zinc	486	5.0	25	706.9		75	125	471.4	3.1	20	A

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: 14138

Run ID :Run Order: **NUTRIENTS_111005A: 2** SampType: **Laboratory Control Sample** Sample ID: **LCS-2** Method: **A4500 N-C**
Analysis Date: **10/05/11 14:50** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	30.0	1.0	30.1		100	90	110				

Associated samples: **H11090040-006A**

Run ID :Run Order: **NUTRIENTS_111005A: 6** SampType: **Method Blank** Sample ID: **MBLK-6** Method: **A4500 N-C**
Analysis Date: **10/05/11 14:58** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	ND	0.02									

Associated samples: **H11090040-006A**

Run ID :Run Order: **NUTRIENTS_111005A: 15** SampType: **Sample Matrix Spike** Sample ID: **H11090338-001AMS** Method: **A4500 N-C**
Analysis Date: **10/05/11 15:16** Units: **mg/L** **Prep Info:** Prep Date: **10/4/2011** Prep Method: **A4500 N-C**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	1.02	0.10	1		102	90	110				

Associated samples: **H11090040-006A**

Run ID :Run Order: **NUTRIENTS_111005A: 16** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11090338-001AMSD** Method: **A4500 N-C**
Analysis Date: **10/05/11 15:18** Units: **mg/L** **Prep Info:** Prep Date: **10/4/2011** Prep Method: **A4500 N-C**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	1.03	0.10	1		103	90	110	1.02	1.0	20	

Associated samples: **H11090040-006A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: A2011-09-14_5_TOT_01

Run ID :Run Order: **NUTRIENTS_110914A: 3** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV-4** Method: **A4500 N-C**

Analysis Date: **09/14/11 10:22** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	0.500	0.10	0.5		100	90	110				

Associated samples: **H11090040-001A; H11090040-002A; H11090040-003A; H11090040-004A; H11090040-005A**

Run ID :Run Order: **NUTRIENTS_110914A: 4** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **A4500 N-C**

Analysis Date: **09/14/11 10:24** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	-0.0100	0.10				0	0				

Associated samples: **H11090040-001A; H11090040-002A; H11090040-003A; H11090040-004A; H11090040-005A; H11090040-007A**

Run ID :Run Order: **NUTRIENTS_110914A: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV-7** Method: **A4500 N-C**

Analysis Date: **09/14/11 10:28** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	0.980	0.10	1		98	90	110				

Associated samples: **H11090040-001A; H11090040-002A; H11090040-003A; H11090040-004A; H11090040-005A; H11090040-007A**

Run ID :Run Order: **NUTRIENTS_110914A: 19** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV-20** Method: **A4500 N-C**

Analysis Date: **09/14/11 10:54** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	0.470	0.10	0.5		94	90	110				

Associated samples: **H11090040-007A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: A2011-10-05_5_TOT_02

Run ID :Run Order: **NUTRIENTS_111005A: 1** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV-1** Method: **A4500 N-C**

Analysis Date: **10/05/11 14:48** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	0.970	0.10	1		97	90	110				

Associated samples: **H11090040-006A**

Run ID :Run Order: **NUTRIENTS_111005A: 4** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV-4** Method: **A4500 N-C**

Analysis Date: **10/05/11 14:54** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Total	0.490	0.10	0.5		98	90	110				

Associated samples: **H11090040-006A**

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74154

Run ID :Run Order: **FIA203-HE_110906A: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E353.2**
Analysis Date: **09/06/11 11:46** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Nitrate+Nitrite as N	1.02	0.050	1		102	90	110				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA203-HE_110906A: 9** SampType: **Laboratory Control Sample** Sample ID: **LCS** Method: **E353.2**
Analysis Date: **09/06/11 11:48** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Nitrate+Nitrite as N	23.9	0.20	24.2		99	90	110				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA203-HE_110906A: 10** SampType: **Laboratory Fortified Blank** Sample ID: **LFB** Method: **E353.2**
Analysis Date: **09/06/11 11:49** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Nitrate+Nitrite as N	0.990	0.050	1		99	90	110				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA203-HE_110906A: 13** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **E353.2**
Analysis Date: **09/06/11 11:53** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Nitrate+Nitrite as N	-0.00306	0.050				0	0				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA203-HE_110906A: 14** SampType: **Method Blank** Sample ID: **MBLK** Method: **E353.2**
Analysis Date: **09/06/11 11:54** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Nitrate+Nitrite as N	ND	0.0009									

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74154

Run ID :Run Order: **FIA203-HE_110906A: 43** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E353.2**
Analysis Date: **09/06/11 12:28** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Nitrate+Nitrite as N	0.492	0.050	0.5		98	90	110				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E**

Run ID :Run Order: **FIA203-HE_110906A: 45** SampType: **Sample Matrix Spike** Sample ID: **H11090037-022CMS** Method: **E353.2**
Analysis Date: **09/06/11 12:31** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Nitrate+Nitrite as N	0.954	0.050	1	0.004784	95	90	110				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA203-HE_110906A: 46** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11090037-022CMSD** Method: **E353.2**
Analysis Date: **09/06/11 12:32** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Nitrate+Nitrite as N	0.978	0.050	1	0.004784	97	90	110	0.9545	2.4	20	

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA203-HE_110906A: 57** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E353.2**
Analysis Date: **09/06/11 12:45** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Nitrate+Nitrite as N	0.489	0.050	0.5		98	90	110				

Associated samples: **H11090040-007E**

Run ID :Run Order: **FIA203-HE_110906A: 59** SampType: **Sample Matrix Spike** Sample ID: **H11090040-007EMS** Method: **E353.2**
Analysis Date: **09/06/11 12:47** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Nitrate+Nitrite as N	0.935	0.050	1		93	90	110				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74154

Run ID :Run Order: **FIA203-HE_110906A: 60** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11090040-007EMSD** Method: **E353.2**

Analysis Date: **09/06/11 12:49** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Nitrate+Nitrite as N	0.958	0.050	1		96	90	110	0.9346	2.4	20	

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74237

Run ID :Run Order: **IC102-H_110908A: 15** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV090811-12** Method: **E300.0**
Analysis Date: **09/08/11 12:29** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	410	1.0	400		103	90	110				

Associated samples: **H11090040-001B; H11090040-002B; H11090040-003B; H11090040-004B; H11090040-005B; H11090040-006B; H11090040-007B**

Run ID :Run Order: **IC102-H_110908A: 16** SampType: **Method Blank** Sample ID: **ICB090811-13** Method: **E300.0**
Analysis Date: **09/08/11 12:40** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	0.02	0.02									

Associated samples: **H11090040-001B; H11090040-002B; H11090040-003B; H11090040-004B; H11090040-005B; H11090040-006B; H11090040-007B**

Run ID :Run Order: **IC102-H_110908A: 17** SampType: **Laboratory Fortified Blank** Sample ID: **LFB090811-14** Method: **E300.0**
Analysis Date: **09/08/11 12:52** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	190	1.1	200	0.017	95	90	110				

Associated samples: **H11090040-001B; H11090040-002B; H11090040-003B; H11090040-004B; H11090040-005B; H11090040-006B; H11090040-007B**

Run ID :Run Order: **IC102-H_110908A: 18** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV090811-15** Method: **E300.0**
Analysis Date: **09/08/11 13:04** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	410	1.0	400		101	90	110				

Associated samples: **H11090040-001B; H11090040-002B; H11090040-003B; H11090040-004B; H11090040-005B; H11090040-006B; H11090040-007B**

Run ID :Run Order: **IC102-H_110908A: 26** SampType: **Sample Matrix Spike** Sample ID: **H11090040-003BMS** Method: **E300.0**
Analysis Date: **09/08/11 14:36** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	270	1.1	200	47.17	110	90	110				

Associated samples: **H11090040-001B; H11090040-002B; H11090040-003B; H11090040-004B; H11090040-005B; H11090040-006B; H11090040-007B**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74237

Run ID :Run Order: **IC102-H_110908A: 27** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11090040-003BMSD** Method: **E300.0**

Analysis Date: **09/08/11 14:48** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	270	1.1	200	47.17	111	90	110	268.1	0.2	20	S

Associated samples: **H11090040-001B; H11090040-002B; H11090040-003B; H11090040-004B; H11090040-005B; H11090040-006B; H11090040-007B**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74249

Run ID :Run Order: **FIA203-HE_110908C: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E350.1**
Analysis Date: **09/08/11 15:42** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia as N	1.09	0.10	1		109	90	110				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA203-HE_110908C: 10** SampType: **Laboratory Fortified Blank** Sample ID: **LFB** Method: **E350.1**
Analysis Date: **09/08/11 15:44** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia as N	1.01	0.10	1		101	90	110				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA203-HE_110908C: 12** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **E350.1**
Analysis Date: **09/08/11 15:46** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia as N	-0.0256	0.10				0	0				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA203-HE_110908C: 13** SampType: **Method Blank** Sample ID: **MBLK** Method: **E350.1**
Analysis Date: **09/08/11 15:48** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia as N	ND	0.002									

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA203-HE_110908C: 17** SampType: **Laboratory Control Sample** Sample ID: **LCS** Method: **E350.1**
Analysis Date: **09/08/11 15:52** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia as N	15.1	0.50	15.7		96	90	110				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74249

Run ID :Run Order: **FIA203-HE_110908C: 79** SampType: **Sample Matrix Spike** Sample ID: **H11080566-011EMS** Method: **E350.1**
Analysis Date: **09/08/11 17:06** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia as N	0.937	0.10	1		94	80	120				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA203-HE_110908C: 80** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11080566-011EMSD** Method: **E350.1**
Analysis Date: **09/08/11 17:07** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia as N	0.945	0.10	1		95	80	120	0.9372	0.9	10	

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA203-HE_110908C: 95** SampType: **Sample Matrix Spike** Sample ID: **H11090040-007EMS** Method: **E350.1**
Analysis Date: **09/08/11 17:25** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia as N	0.989	0.10	1		99	80	120				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA203-HE_110908C: 96** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11090040-007EMSD** Method: **E350.1**
Analysis Date: **09/08/11 17:27** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia as N	0.975	0.10	1		98	80	120	0.989	1.4	10	

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74272

Run ID :Run Order: **MAN-TECH_110909C: 8** SampType: **Method Blank** Sample ID: **MBLK** Method: **A2320 B**
Analysis Date: **09/09/11 16:37** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total as CaCO3	ND	2									

Associated samples: **H11090040-001B; H11090040-002B; H11090040-003B; H11090040-004B; H11090040-005B; H11090040-006B; H11090040-007B**

Run ID :Run Order: **MAN-TECH_110909C: 10** SampType: **Laboratory Control Sample** Sample ID: **LCS-09012011** Method: **A2320 B**
Analysis Date: **09/09/11 16:45** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total as CaCO3	620	4.0	600		103	90	110				

Associated samples: **H11090040-001B; H11090040-002B; H11090040-003B; H11090040-004B; H11090040-005B; H11090040-006B; H11090040-007B**

Run ID :Run Order: **MAN-TECH_110909C: 14** SampType: **Sample Duplicate** Sample ID: **H11090052-001ADUP** Method: **A2320 B**
Analysis Date: **09/09/11 16:56** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total as CaCO3	130	4.0						119.7	6.4	10	
Bicarbonate as HCO3	160	4.0						146.1	6.4	10	

Associated samples: **H11090040-001B; H11090040-002B; H11090040-003B; H11090040-004B; H11090040-005B; H11090040-006B; H11090040-007B**

Run ID :Run Order: **MAN-TECH_110909C: 37** SampType: **Sample Matrix Spike** Sample ID: **H11090040-003BMS** Method: **A2320 B**
Analysis Date: **09/09/11 18:36** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total as CaCO3	740	4.0	600	158.1	96	80	120				

Associated samples: **H11090040-001B; H11090040-002B; H11090040-003B; H11090040-004B; H11090040-005B; H11090040-006B; H11090040-007B**

Run ID :Run Order: **MAN-TECH_110909C: 45** SampType: **Sample Duplicate** Sample ID: **H11090046-001ADUP** Method: **A2320 B**
Analysis Date: **09/09/11 19:10** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total as CaCO3	170	4.0						160.1	4.2	10	
Bicarbonate as HCO3	200	4.0						195.3	4.2	10	

Associated samples: **H11090040-001B; H11090040-002B; H11090040-003B; H11090040-004B; H11090040-005B; H11090040-006B; H11090040-007B**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74300

Run ID :Run Order: **ICPMS204-B_110912A: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **E200.8**

Analysis Date: **09/12/11 11:04** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0517	0.0050	0.05		103	90	110				
Cadmium	0.0262	0.0010	0.025		105	90	110				
Calcium	2.62	0.50	2.5		105	90	110				
Copper	0.0489	0.010	0.05		98	90	110				
Lead	0.0511	0.010	0.05		102	90	110				
Magnesium	2.63	0.50	2.5		105	90	110				
Zinc	0.0532	0.010	0.05		106	90	110				

Associated samples: **H11090040-001C; H11090040-001D; H11090040-002C; H11090040-002D; H11090040-003C; H11090040-003D; H11090040-004C; H11090040-004D; H11090040-005C; H11090040-005D; H11090040-006C; H11090040-006D; H11090040-007C; H11090040-007D**

Run ID :Run Order: **ICPMS204-B_110912A: 9** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.8**

Analysis Date: **09/12/11 11:09** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.000155	0.0050									
Cadmium	0.000495	0.0010									
Calcium	114	0.50	120		95	70	130				
Copper	0.000386	0.010									
Lead	0.000157	0.010									
Magnesium	43.1	0.50	40		108	70	130				
Zinc	0.00123	0.010									

Associated samples: **H11090040-001C; H11090040-001D; H11090040-002C; H11090040-002D; H11090040-003C; H11090040-003D; H11090040-004C; H11090040-004D; H11090040-005C; H11090040-005D; H11090040-006C; H11090040-006D; H11090040-007C; H11090040-007D**

Run ID :Run Order: **ICPMS204-B_110912A: 10** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**

Analysis Date: **09/12/11 11:13** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0105	0.0050	0.01		105	70	130				
Cadmium	0.0108	0.0010	0.01		108	70	130				
Calcium	113	0.50	120		95	70	130				
Copper	0.0186	0.010	0.02		93	70	130				
Lead	0.000121	0.010				0	0				
Magnesium	43.8	0.50	40		110	70	130				
Zinc	0.0110	0.010	0.01		109	70	130				

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74300

Run ID :Run Order: **ICPMS204-B_110912A: 10** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**
Analysis Date: **09/12/11 11:13** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Associated samples: **H11090040-001C; H11090040-001D; H11090040-002C; H11090040-002D; H11090040-003C; H11090040-003D; H11090040-004C; H11090040-004D; H11090040-005C; H11090040-005D; H11090040-006C; H11090040-006D; H11090040-007C; H11090040-007D**

Run ID :Run Order: **ICPMS204-B_110912A: 53** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **E200.8**
Analysis Date: **09/12/11 16:45** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0505	0.0050	0.05		101	90	110				
Cadmium	0.0268	0.0010	0.025		107	90	110				
Calcium	2.57	0.50	2.5		103	90	110				
Copper	0.0487	0.010	0.05		97	90	110				
Lead	0.0502	0.010	0.05		100	90	110				
Magnesium	2.55	0.50	2.5		102	90	110				
Zinc	0.0509	0.010	0.05		102	90	110				

Associated samples: **H11090040-001C; H11090040-001D; H11090040-002C; H11090040-002D; H11090040-003C; H11090040-003D; H11090040-004C; H11090040-004D; H11090040-005C; H11090040-005D; H11090040-006C; H11090040-006D; H11090040-007C; H11090040-007D**

Run ID :Run Order: **ICPMS204-B_110912A: 54** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.8**
Analysis Date: **09/12/11 16:49** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.000170	0.0050									
Cadmium	0.000388	0.0010									
Calcium	112	0.50	120		93	70	130				
Copper	0.000331	0.010									
Lead	0.000141	0.010									
Magnesium	40.9	0.50	40		102	70	130				
Zinc	0.00111	0.010									

Associated samples: **H11090040-001C; H11090040-001D; H11090040-002C; H11090040-002D; H11090040-003C; H11090040-003D; H11090040-004C; H11090040-004D; H11090040-005C; H11090040-005D; H11090040-006C; H11090040-006D; H11090040-007C; H11090040-007D**

Run ID :Run Order: **ICPMS204-B_110912A: 55** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**
Analysis Date: **09/12/11 16:53** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0105	0.0050	0.01		105	70	130				

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74300

Run ID :Run Order: **ICPMS204-B_110912A: 55** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**

Analysis Date: **09/12/11 16:53** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	0.0106	0.0010	0.01		106	70	130				
Calcium	114	0.50	120		95	70	130				
Copper	0.0192	0.010	0.02		96	70	130				
Lead	0.000118	0.010				0	0				
Magnesium	42.5	0.50	40		106	70	130				
Zinc	0.0106	0.010	0.01		106	70	130				

Associated samples: **H11090040-001C; H11090040-001D; H11090040-002C; H11090040-002D; H11090040-003C; H11090040-003D; H11090040-004C; H11090040-004D; H11090040-005C; H11090040-005D; H11090040-006C; H11090040-006D; H11090040-007C; H11090040-007D**

Run ID :Run Order: **ICPMS204-B_110912A: 61** SampType: **Method Blank** Sample ID: **ICB** Method: **E200.8**

Analysis Date: **09/12/11 17:20** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	3E-05									
Cadmium	ND	1E-05									
Calcium	0.004	0.003									
Copper	ND	3E-05									
Lead	ND	1.0E-05									
Magnesium	ND	0.0007									
Zinc	0.0005	0.0003									

Associated samples: **H11090040-001C; H11090040-002C; H11090040-003C; H11090040-004C; H11090040-005C; H11090040-006C; H11090040-007C; H11090040-007D**

Run ID :Run Order: **ICPMS204-B_110912A: 62** SampType: **Laboratory Fortified Blank** Sample ID: **LFB** Method: **E200.8**

Analysis Date: **09/12/11 17:24** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0490	0.0050	0.05		98	85	115				
Cadmium	0.0481	0.0010	0.05		96	85	115				
Calcium	45.1	0.50	50	0.003562	90	85	115				
Copper	0.0447	0.010	0.05		89	85	115				
Lead	0.0502	0.010	0.05		100	85	115				
Magnesium	48.2	0.50	50		96	85	115				
Zinc	0.0490	0.010	0.05	0.000499	97	85	115				

Associated samples: **H11090040-001C; H11090040-002C; H11090040-003C; H11090040-004C; H11090040-005C; H11090040-006C; H11090040-007C; H11090040-007D**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74300

Run ID :Run Order: **ICPMS204-B_110912A: 79** SampType: **Sample Matrix Spike** Sample ID: **H11090040-005CMS** Method: **E200.8**

Analysis Date: **09/12/11 18:39** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0661	0.0050	0.05	0.01596	100	70	130				
Cadmium	0.0501	0.0010	0.05	0.0000777	100	70	130				
Calcium	91.8	1.0	50	48.26	87	70	130				
Copper	0.0509	0.010	0.05	0.007906	86	70	130				
Lead	0.0504	0.010	0.05	0.0001709	100	70	130				
Magnesium	59.6	1.0	50	11.68	96	70	130				
Zinc	0.0622	0.010	0.05	0.01445	95	70	130				

Associated samples: **H11090040-001C; H11090040-002C; H11090040-003C; H11090040-004C; H11090040-005C; H11090040-006C; H11090040-007C; H11090040-007D**

Run ID :Run Order: **ICPMS204-B_110912A: 80** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H11090040-005CMSD** Method: **E200.8**

Analysis Date: **09/12/11 18:43** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 7	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0645	0.0050	0.05	0.01596	97	70	130	0.06613	2.5	20	
Cadmium	0.0493	0.0010	0.05	0.0000777	98	70	130	0.05008	1.5	20	
Calcium	90.2	1.0	50	48.26	84	70	130	91.77	1.7	20	
Copper	0.0498	0.010	0.05	0.007906	84	70	130	0.05088	2.1	20	
Lead	0.0500	0.010	0.05	0.0001709	100	70	130	0.0504	0.9	20	
Magnesium	57.4	1.0	50	11.68	91	70	130	59.55	3.6	20	
Zinc	0.0603	0.010	0.05	0.01445	92	70	130	0.06218	3.0	20	

Associated samples: **H11090040-001C; H11090040-002C; H11090040-003C; H11090040-004C; H11090040-005C; H11090040-006C; H11090040-007C; H11090040-007D**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74337

Run ID :Run Order: **FIA202-HE_110913B: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E365.1**
Analysis Date: **09/13/11 15:22** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phosphorus, Total as P	7.97	0.025	8.36		95	90	110				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA202-HE_110913B: 13** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **E365.1**
Analysis Date: **09/13/11 15:27** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phosphorus, Total as P	-0.00192	0.010				0	0				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA202-HE_110913B: 28** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E365.1**
Analysis Date: **09/13/11 15:42** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phosphorus, Total as P	0.241	0.010	0.25		96	90	110				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Run ID :Run Order: **FIA202-HE_110913B: 29** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV1** Method: **E365.1**
Analysis Date: **09/13/11 15:43** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phosphorus, Total as P	0.00924	0.010	0.01		92	50	150				

Associated samples: **H11090040-001E; H11090040-002E; H11090040-003E; H11090040-004E; H11090040-005E; H11090040-006E; H11090040-007E**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74415

Run ID :Run Order: **ICP2-HE_110915B: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**

Analysis Date: **09/15/11 17:27** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.754	0.0074	0.8		94	90	110				
Cadmium	0.376	0.0010	0.4		94	90	110				
Copper	0.776	0.010	0.8		97	90	110				
Zinc	0.749	0.010	0.8		94	90	110				

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110915B: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**

Analysis Date: **09/15/11 17:42** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	-0.0142	0.0074				0	0				
Cadmium	-0.00342	0.0010				0	0				
Copper	0.00478	0.010				0	0				
Zinc	0.00327	0.010				0	0				

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110915B: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**

Analysis Date: **09/15/11 17:46** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.992	0.0074	1		99	80	120				
Cadmium	0.878	0.0010	1		88	80	120				
Copper	0.497	0.010	0.5		99	80	120				
Zinc	0.940	0.010	1		94	80	120				

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A; H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74557

Run ID :Run Order: **ICP2-HE_110919C: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**

Analysis Date: **09/19/11 11:42** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.795	0.0074	0.8		99	90	110				
Cadmium	0.394	0.0010	0.4		99	90	110				
Copper	0.792	0.010	0.8		99	90	110				

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Run ID :Run Order: **ICP2-HE_110919C: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**

Analysis Date: **09/19/11 11:57** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	-0.0128	0.0074				0	0				
Cadmium	-0.00349	0.0010				0	0				
Copper	0.00229	0.010				0	0				

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Run ID :Run Order: **ICP2-HE_110919C: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**

Analysis Date: **09/19/11 12:01** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	1.04	0.0074	1		104	80	120				
Cadmium	0.900	0.0010	1		90	80	120				
Copper	0.506	0.010	0.5		101	80	120				

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74603

Run ID :Run Order: **ICP2-HE_110921A: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**

Analysis Date: **09/21/11 10:44** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.789	0.013	0.8		99	90	110				

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A**

Run ID :Run Order: **ICP2-HE_110921A: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**

Analysis Date: **09/21/11 10:59** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.0228	0.013				0	0				

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A**

Run ID :Run Order: **ICP2-HE_110921A: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**

Analysis Date: **09/21/11 11:03** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.941	0.013	1		94	80	120				

Associated samples: **H11090040-008A; H11090040-009A; H11090040-010A; H11090040-011A; H11090040-012A; H11090040-013A; H11090040-014A; H11090040-015A; H11090040-016A; H11090040-017A; H11090040-018A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74605

Run ID :Run Order: **ICP2-HE_110921B: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**

Analysis Date: **09/21/11 14:46** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.781	0.013	0.8		98	90	110				

Associated samples: **H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110921B: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**

Analysis Date: **09/21/11 15:01** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.0231	0.013				0	0				

Associated samples: **H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Run ID :Run Order: **ICP2-HE_110921B: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**

Analysis Date: **09/21/11 15:05** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	0.931	0.013	1		93	80	120				

Associated samples: **H11090040-019A; H11090040-020A; H11090040-021A; H11090040-022A**

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: R74652

Date: *14-Oct-11*

Run ID :Run Order: **ICP2-HE_110922A: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**
Analysis Date: **09/22/11 17:16** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.766	0.0074	0.8		96	90	110				

Associated samples: **H11090040-009A; H11090040-013A**

Run ID :Run Order: **ICP2-HE_110922A: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**
Analysis Date: **09/22/11 17:31** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.00177	0.0074				0	0				

Associated samples: **H11090040-009A; H11090040-013A**

Run ID :Run Order: **ICP2-HE_110922A: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**
Analysis Date: **09/22/11 17:35** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.964	0.0074	1		96	80	120				

Associated samples: **H11090040-009A; H11090040-013A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H11090040
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *14-Oct-11*

BatchID: R74663

Run ID :Run Order: **ICP2-HE_110923A: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**

Analysis Date: **09/23/11 11:16** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.785	0.0074	0.8		98	90	110				
Lead	0.777	0.013	0.8		97	90	110				
Zinc	0.782	0.010	0.8		98	90	110				

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Run ID :Run Order: **ICP2-HE_110923A: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**

Analysis Date: **09/23/11 11:30** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.00674	0.0074				0	0				
Lead	0.0313	0.013				0	0				
Zinc	0.00440	0.010				0	0				

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Run ID :Run Order: **ICP2-HE_110923A: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**

Analysis Date: **09/23/11 11:35** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	1.04	0.0074	1		104	80	120				
Lead	0.944	0.013	1		94	80	120				
Zinc	0.973	0.010	1		97	80	120				

Associated samples: **H11090040-023A; H11090040-024A; H11090040-025A; H11090040-026A; H11090040-027A; H11090040-028A; H11090040-029A; H11090040-030A; H11090040-031A**

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
N - Analyte concentration was not sufficiently high to calculate RPD
A - Analyte concentration greater than three times the spike amount

Workorder Receipt Checklist

MT DEQ-Federal Superfund

H11090040

Login completed by: Tracy L. Lorash
Date Received: 9/2/2011
Reviewed by: BL2000\kwiegand
Received by: abb
Reviewed Date: 9/7/2011
Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☐	No ☑	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Container/Temp Blank temperature:	2.9°C On Ice		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	Not Applicable ☐

Contact and Corrective Action Comments:

All sediment sample jars have different collection times than the COC and other sample bottles. Per Gary Ingman, we are to use the same collection times as the COC and other sample bottles for the sediment samples. Sample ID on COC is CFR-23H and CFR-23H Dupe - sample containers have ID as CFR-27H and CFR-27H Dupe. Per Gary Ingman, the sample containers have the correct sample ID. We received two sediment sample jars, SS-25 collected on 9/2/11 @15:00 and CFR-03A collected on 9/2/11@12:30, that are not on the COC. Per Gary Ingman, we are to analyze the two samples the same as the other sediment samples. TI 9/6/11.

Chain of Custody and Analytical Request Record

Page 1 of 1

PLEASE PRINT (Provide as much information as possible.)

Company Name: MT DEQ	Project Name, PWS, Permit, Etc.: CFR Monitoring #74374	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: P.O. Box 200901 Helena MT 59620-0901	Contact Name: Phone/Fax: Brian Bartkowiak 461-3070 Gary Ingman 495-1377	Email:	Sampler: (Please Print) J. DeArment E. Weber
Invoice Address: above	Invoice Contact & Phone: Brian Bartkowiak 461-3070	Purchase Order:	Quote/Bottle Order: 624/8179

Special Report/Formats:

☐ DW ☐ POTW/WWTP ☐ State: _____ ☐ Other: _____

☐ EDD/EDT (Electronic Data) Format: _____ ☐ LEVEL IV ☐ NELAC

Number of Containers
Sample Type: A Water S Soils/Solids V Vegetation B Bioassay O Other D DW - Drinking Water

ANALYSIS REQUESTED

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	TR As, Cd, Cu, Pb, Zn	Diss As, Cd, Cu, Pb, Zn	TPN	NO_{3+2}, NH_3, TP	TSS, Tot. Alk., SO_4	Hardness (CTR Ca, Mg)	Total As, Cd, Cu, Pb, Zn Sediment, sieved to 3 size fractions	SEE ATTACHED	
1 CFR-116A	9-1-11	9:00	SW, IS	X	X	X	X	X	X	X		
2 CFR-84F	9-1-11	12:00	SW, IS									
3 CFR-53C	9-1-11	14:30	SW, IS									
4 CFR-42G	9-1-11	16:30	SW, IS									
5 CFR-23H	9-2-11	9:30	SW, IS									
6 CFR-23H dupe	9-2-11	9:45	SW, IS							X		
7 Field Blank	9-2-11	10:00	SW	X	X	X	X	X	X			
8												
9												
10												

Standard Turnaround (TAT)

RUSH

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments: Sediment size fractions same as historical, please reference last year.

Shipped by: hand del.
Cooler ID(s): 4C
Receipt Temp: 2.9 °C
On Ice: (Y) N
Custody Seal: On Bottle Y (N) / On Cooler Y (N)
Intact: Y N
Signature Match: Y N

LABORATORY USE ONLY H11090040

Custody Record MUST be Signed

Relinquished by (print): Erich Weber	Date/Time: 9/2/2011 18:00	Signature:	Received by (print):	Date/Time: / Signature:
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time: / Signature:
Sample Disposal: Return to Client: _____ Lab Disposal: _____			Received by Laboratory: Amanda Blackburn	Date/Time: 9/2/11 18:00 / Signature: Amanda Blackburn

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.
This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

Appendix B4

4th Quarter Surface Water Reports

ANALYTICAL SUMMARY REPORT

December 22, 2011

MT DEQ-Federal Superfund
PO Box 200901
Helena, MT 59620-0901

Workorder No.: H11120043 Quote ID: H624

Project Name: CFR Monitoring-474374

Energy Laboratories Inc Helena MT received the following 9 samples for MT DEQ-Federal Superfund on 12/2/2011 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H11120043-001	CFR-116A	12/01/11 10:00	12/02/11	Surface Water	Metals by ICP/ICPMS, Dissolved Metals by ICP/ICPMS, Tot. Rec. Alkalinity Conductivity Hardness as CaCO3 Anions by Ion Chromatography Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite Nitrogen, Total Persulfate Metals Digestion by EPA 200.2 Digestion, Total P Water Nitrogen, Total Persulfate Preparation for TSS Phosphorus, Total Solids, Total Suspended
H11120043-002	CFR-84F	12/01/11 11:45	12/02/11	Surface Water	Same As Above
H11120043-003	CFR-53C	12/01/11 13:45	12/02/11	Surface Water	Same As Above
H11120043-004	CFR-42G	12/01/11 15:00	12/02/11	Surface Water	Same As Above
H11120043-005	CFR-27H	12/02/11 9:30	12/02/11	Surface Water	Same As Above
H11120043-006	CFR-27H Dupe	12/02/11 9:30	12/02/11	Surface Water	Same As Above
H11120043-007	Field Blank	12/02/11 9:00	12/02/11	Surface Water	Same As Above
H11120043-008	CFR-03A	12/02/11 11:15	12/02/11	Surface Water	Same As Above
H11120043-009	SS-25	12/02/11 12:00	12/02/11	Surface Water	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise reported.

Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11120043-001
Client Sample ID CFR-116A

Report Date: 12/22/11
Collection Date: 12/01/11 10:00
DateReceived: 12/02/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	12/05/11 13:00 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	140	mg/L		4		A2320 B	12/05/11 17:08 / cmm
Bicarbonate as HCO3	170	mg/L		4		A2320 B	12/05/11 17:08 / cmm
Sulfate	44	mg/L		1		E300.0	12/05/11 18:30 / zeg
Hardness as CaCO3	174	mg/L		1		A2340 B	12/08/11 09:33 / wjj
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	12/05/11 15:13 / reh
Nitrogen, Total	0.15	mg/L		0.05		A4500 N-C	12/09/11 11:19 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/11 09:59 / reh
Phosphorus, Total as P	0.006	mg/L		0.005		E365.1	12/15/11 16:03 / reh
METALS, DISSOLVED							
Arsenic	0.006	mg/L		0.005		E200.8	12/07/11 07:46 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/07/11 07:46 / dck
Copper	0.003	mg/L		0.001		E200.8	12/07/11 07:46 / dck
Lead	ND	mg/L		0.0005		E200.8	12/07/11 07:46 / dck
Zinc	ND	mg/L		0.01		E200.8	12/07/11 07:46 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.006	mg/L		0.005		E200.8	12/07/11 07:53 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/07/11 07:53 / dck
Calcium	48	mg/L		1		E200.8	12/07/11 07:53 / dck
Copper	0.008	mg/L		0.001		E200.8	12/07/11 07:53 / dck
Lead	0.0009	mg/L		0.0005		E200.8	12/07/11 07:53 / dck
Magnesium	13	mg/L		1		E200.8	12/07/11 07:53 / dck
Zinc	0.01	mg/L		0.01		E200.8	12/07/11 07:53 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11120043-002
Client Sample ID CFR-84F

Report Date: 12/22/11
Collection Date: 12/01/11 11:45
DateReceived: 12/02/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	6	mg/L		1		A2540 D	12/05/11 13:00 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	160	mg/L		4		A2320 B	12/05/11 17:15 / cmm
Bicarbonate as HCO3	190	mg/L		4		A2320 B	12/05/11 17:15 / cmm
Sulfate	61	mg/L		1		E300.0	12/05/11 18:43 / zeg
Hardness as CaCO3	204	mg/L		1		A2340 B	12/08/11 09:33 / wjj
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.07	mg/L		0.05		E353.2	12/05/11 15:17 / reh
Nitrogen, Total	0.12	mg/L		0.05		A4500 N-C	12/09/11 11:25 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/11 10:01 / reh
Phosphorus, Total as P	0.009	mg/L		0.005		E365.1	12/15/11 16:04 / reh
METALS, DISSOLVED							
Arsenic	0.007	mg/L		0.005		E200.8	12/07/11 07:59 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/07/11 07:59 / dck
Copper	0.004	mg/L		0.001		E200.8	12/07/11 07:59 / dck
Lead	ND	mg/L		0.0005		E200.8	12/07/11 07:59 / dck
Zinc	ND	mg/L		0.01		E200.8	12/07/11 07:59 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.008	mg/L		0.005		E200.8	12/07/11 08:06 / dck
Cadmium	0.00009	mg/L		0.00008		E200.8	12/07/11 08:06 / dck
Calcium	57	mg/L		1		E200.8	12/07/11 08:06 / dck
Copper	0.011	mg/L		0.001		E200.8	12/07/11 08:06 / dck
Lead	0.0014	mg/L		0.0005		E200.8	12/07/11 08:06 / dck
Magnesium	15	mg/L		1		E200.8	12/07/11 08:06 / dck
Zinc	0.02	mg/L		0.01		E200.8	12/07/11 08:06 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11120043-003
Client Sample ID CFR-53C

Report Date: 12/22/11
Collection Date: 12/01/11 13:45
DateReceived: 12/02/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	4	mg/L		1		A2540 D	12/05/11 13:01 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	12/05/11 17:22 / cmm
Bicarbonate as HCO3	170	mg/L		4		A2320 B	12/05/11 17:22 / cmm
Sulfate	58	mg/L		1		E300.0	12/05/11 18:57 / zeg
Hardness as CaCO3	194	mg/L		1		A2340 B	12/08/11 09:33 / wjj
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.12	mg/L		0.05		E353.2	12/05/11 15:18 / reh
Nitrogen, Total	1.11	mg/L		0.05		A4500 N-C	12/09/11 11:27 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/11 10:02 / reh
Phosphorus, Total as P	0.014	mg/L		0.005		E365.1	12/15/11 16:05 / reh
METALS, DISSOLVED							
Arsenic	0.008	mg/L		0.005		E200.8	12/07/11 08:12 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/07/11 08:12 / dck
Copper	0.005	mg/L		0.001		E200.8	12/07/11 08:12 / dck
Lead	ND	mg/L		0.0005		E200.8	12/07/11 08:12 / dck
Zinc	ND	mg/L		0.01		E200.8	12/07/11 08:12 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.009	mg/L		0.005		E200.8	12/07/11 08:19 / dck
Cadmium	0.00012	mg/L		0.00008		E200.8	12/07/11 08:19 / dck
Calcium	56	mg/L		1		E200.8	12/07/11 08:19 / dck
Copper	0.017	mg/L		0.001		E200.8	12/07/11 08:19 / dck
Lead	0.0018	mg/L		0.0005		E200.8	12/07/11 08:19 / dck
Magnesium	13	mg/L		1		E200.8	12/07/11 08:19 / dck
Zinc	0.02	mg/L		0.01		E200.8	12/07/11 08:19 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11120043-004
Client Sample ID CFR-42G

Report Date: 12/22/11
Collection Date: 12/01/11 15:00
DateReceived: 12/02/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	10	mg/L		1		A2540 D	12/05/11 13:01 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	160	mg/L		4		A2320 B	12/05/11 17:29 / cmm
Bicarbonate as HCO3	180	mg/L		4		A2320 B	12/05/11 17:29 / cmm
Sulfate	67	mg/L		1		E300.0	12/05/11 19:10 / zeg
Hardness as CaCO3	210	mg/L		1		A2340 B	12/08/11 09:33 / wjj
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.22	mg/L		0.05		E353.2	12/05/11 15:19 / reh
Nitrogen, Total	0.7	mg/L	D	0.2		A4500 N-C	12/19/11 11:57 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/11 10:03 / reh
Phosphorus, Total as P	0.021	mg/L		0.005		E365.1	12/15/11 16:06 / reh
METALS, DISSOLVED							
Arsenic	0.010	mg/L		0.005		E200.8	12/07/11 08:25 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/07/11 08:25 / dck
Copper	0.006	mg/L		0.001		E200.8	12/07/11 08:25 / dck
Lead	ND	mg/L		0.0005		E200.8	12/07/11 08:25 / dck
Zinc	ND	mg/L		0.01		E200.8	12/07/11 12:52 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.013	mg/L		0.005		E200.8	12/07/11 08:58 / dck
Cadmium	0.00019	mg/L		0.00008		E200.8	12/07/11 08:58 / dck
Calcium	60	mg/L		1		E200.8	12/07/11 08:58 / dck
Copper	0.031	mg/L		0.001		E200.8	12/07/11 08:58 / dck
Lead	0.0034	mg/L		0.0005		E200.8	12/07/11 08:58 / dck
Magnesium	14	mg/L		1		E200.8	12/07/11 08:58 / dck
Zinc	0.03	mg/L		0.01		E200.8	12/07/11 08:58 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11120043-005
Client Sample ID CFR-27H

Report Date: 12/22/11
Collection Date: 12/02/11 09:30
DateReceived: 12/02/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	12/05/11 13:01 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	12/05/11 17:36 / cmm
Bicarbonate as HCO3	180	mg/L		4		A2320 B	12/05/11 17:36 / cmm
Sulfate	70	mg/L		1		E300.0	12/05/11 19:24 / zeg
Hardness as CaCO3	214	mg/L		1		A2340 B	12/08/11 09:33 / wjj
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.27	mg/L		0.05		E353.2	12/05/11 15:20 / reh
Nitrogen, Total	0.39	mg/L		0.05		A4500 N-C	12/09/11 11:31 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/11 10:04 / reh
Phosphorus, Total as P	0.013	mg/L		0.005		E365.1	12/15/11 16:07 / reh
METALS, DISSOLVED							
Arsenic	0.010	mg/L		0.005		E200.8	12/07/11 09:04 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/07/11 09:04 / dck
Copper	0.005	mg/L		0.001		E200.8	12/07/11 09:04 / dck
Lead	ND	mg/L		0.0005		E200.8	12/07/11 09:04 / dck
Zinc	0.01	mg/L		0.01		E200.8	12/07/11 09:04 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.011	mg/L		0.005		E200.8	12/07/11 09:11 / dck
Cadmium	0.00013	mg/L		0.00008		E200.8	12/07/11 09:11 / dck
Calcium	62	mg/L		1		E200.8	12/07/11 09:11 / dck
Copper	0.013	mg/L		0.001		E200.8	12/07/11 09:11 / dck
Lead	0.0013	mg/L		0.0005		E200.8	12/07/11 09:11 / dck
Magnesium	14	mg/L		1		E200.8	12/07/11 09:11 / dck
Zinc	0.02	mg/L		0.01		E200.8	12/07/11 09:11 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11120043-006
Client Sample ID CFR-27H Dupe

Report Date: 12/22/11
Collection Date: 12/02/11 09:30
DateReceived: 12/02/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	8	mg/L		1		A2540 D	12/05/11 13:01 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	160	mg/L		4		A2320 B	12/05/11 17:50 / cmm
Bicarbonate as HCO3	190	mg/L		4		A2320 B	12/05/11 17:50 / cmm
Sulfate	70	mg/L		1		E300.0	12/05/11 20:05 / zeg
Hardness as CaCO3	214	mg/L		1		A2340 B	12/08/11 09:33 / wjj
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.27	mg/L		0.05		E353.2	12/05/11 15:22 / reh
Nitrogen, Total	0.42	mg/L		0.05		A4500 N-C	12/09/11 11:33 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/11 10:05 / reh
Phosphorus, Total as P	0.013	mg/L		0.005		E365.1	12/15/11 16:08 / reh
METALS, DISSOLVED							
Arsenic	0.010	mg/L		0.005		E200.8	12/07/11 09:17 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/07/11 09:17 / dck
Copper	0.005	mg/L		0.001		E200.8	12/07/11 09:17 / dck
Lead	ND	mg/L		0.0005		E200.8	12/07/11 09:17 / dck
Zinc	0.01	mg/L		0.01		E200.8	12/07/11 09:17 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.011	mg/L		0.005		E200.8	12/07/11 09:24 / dck
Cadmium	0.00013	mg/L		0.00008		E200.8	12/07/11 09:24 / dck
Calcium	62	mg/L		1		E200.8	12/07/11 09:24 / dck
Copper	0.014	mg/L		0.001		E200.8	12/07/11 09:24 / dck
Lead	0.0014	mg/L		0.0005		E200.8	12/07/11 09:24 / dck
Magnesium	14	mg/L		1		E200.8	12/07/11 09:24 / dck
Zinc	0.02	mg/L		0.01		E200.8	12/07/11 09:24 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11120043-007
Client Sample ID Field Blank

Report Date: 12/22/11
Collection Date: 12/02/11 09:00
DateReceived: 12/02/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	12/05/11 13:02 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	ND	mg/L		4		A2320 B	12/05/11 17:55 / cmm
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	12/05/11 17:55 / cmm
Sulfate	ND	mg/L		1		E300.0	12/05/11 20:18 / zeg
Hardness as CaCO3	ND	mg/L		1		A2340 B	12/08/11 09:33 / wjj
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	12/05/11 15:23 / reh
Nitrogen, Total	ND	mg/L		0.05		A4500 N-C	12/09/11 11:35 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/11 10:07 / reh
Phosphorus, Total as P	ND	mg/L		0.005		E365.1	12/15/11 16:12 / reh
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	12/07/11 09:30 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/07/11 09:30 / dck
Copper	ND	mg/L		0.001		E200.8	12/07/11 09:30 / dck
Lead	ND	mg/L		0.0005		E200.8	12/07/11 09:30 / dck
Zinc	ND	mg/L		0.01		E200.8	12/07/11 09:30 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	ND	mg/L		0.005		E200.8	12/07/11 09:36 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/07/11 09:36 / dck
Calcium	ND	mg/L		1		E200.8	12/07/11 09:36 / dck
Copper	ND	mg/L		0.001		E200.8	12/07/11 09:36 / dck
Lead	ND	mg/L		0.0005		E200.8	12/07/11 09:36 / dck
Magnesium	ND	mg/L		1		E200.8	12/07/11 09:36 / dck
Zinc	ND	mg/L		0.01		E200.8	12/07/11 09:36 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11120043-008
Client Sample ID CFR-03A

Report Date: 12/22/11
Collection Date: 12/02/11 11:15
DateReceived: 12/02/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	12/05/11 13:02 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	130	mg/L		4		A2320 B	12/05/11 18:02 / cmm
Bicarbonate as HCO3	160	mg/L		4		A2320 B	12/05/11 18:02 / cmm
Sulfate	72	mg/L		1		E300.0	12/05/11 20:32 / zeg
Hardness as CaCO3	197	mg/L		1		A2340 B	12/08/11 09:33 / wjj
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.07	mg/L		0.05		E353.2	12/05/11 15:26 / reh
Nitrogen, Total	0.25	mg/L		0.05		A4500 N-C	12/09/11 11:37 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/11 10:10 / reh
Phosphorus, Total as P	0.020	mg/L		0.005		E365.1	12/15/11 16:15 / reh
METALS, DISSOLVED							
Arsenic	0.010	mg/L		0.005		E200.8	12/07/11 09:43 / dck
Cadmium	0.00008	mg/L		0.00008		E200.8	12/07/11 09:43 / dck
Copper	0.004	mg/L		0.001		E200.8	12/07/11 09:43 / dck
Lead	ND	mg/L		0.0005		E200.8	12/07/11 09:43 / dck
Zinc	ND	mg/L		0.01		E200.8	12/07/11 09:43 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.012	mg/L		0.005		E200.8	12/07/11 10:35 / dck
Cadmium	0.00015	mg/L		0.00008		E200.8	12/07/11 10:35 / dck
Calcium	57	mg/L		1		E200.8	12/07/11 10:35 / dck
Copper	0.010	mg/L		0.001		E200.8	12/07/11 10:35 / dck
Lead	0.0013	mg/L		0.0005		E200.8	12/07/11 10:35 / dck
Magnesium	13	mg/L		1		E200.8	12/07/11 10:35 / dck
Zinc	0.01	mg/L		0.01		E200.8	12/07/11 10:35 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H11120043-009
Client Sample ID SS-25

Report Date: 12/22/11
Collection Date: 12/02/11 12:00
DateReceived: 12/02/11
Matrix: Surface Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	12/05/11 13:02 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	12/05/11 18:10 / cmm
Bicarbonate as HCO3	150	mg/L		4		A2320 B	12/05/11 18:10 / cmm
Sulfate	130	mg/L		1		E300.0	12/05/11 20:46 / zeg
Hardness as CaCO3	231	mg/L		1		A2340 B	12/08/11 09:33 / wjj
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	12/05/11 15:28 / reh
Nitrogen, Total	0.54	mg/L		0.05		A4500 N-C	12/09/11 11:39 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/11 10:11 / reh
Phosphorus, Total as P	0.047	mg/L		0.005		E365.1	12/15/11 16:16 / reh
METALS, DISSOLVED							
Arsenic	0.018	mg/L		0.005		E200.8	12/07/11 10:41 / dck
Cadmium	0.00010	mg/L		0.00008		E200.8	12/07/11 10:41 / dck
Copper	0.006	mg/L		0.001		E200.8	12/07/11 10:41 / dck
Lead	ND	mg/L		0.0005		E200.8	12/07/11 10:41 / dck
Zinc	ND	mg/L		0.01		E200.8	12/07/11 10:41 / dck
METALS, TOTAL RECOVERABLE							
Arsenic	0.021	mg/L		0.005		E200.8	12/07/11 10:48 / dck
Cadmium	0.00018	mg/L		0.00008		E200.8	12/07/11 10:48 / dck
Calcium	66	mg/L		1		E200.8	12/07/11 10:48 / dck
Copper	0.011	mg/L		0.001		E200.8	12/07/11 10:48 / dck
Lead	0.0019	mg/L		0.0005		E200.8	12/07/11 10:48 / dck
Magnesium	16	mg/L		1		E200.8	12/07/11 10:48 / dck
Zinc	0.02	mg/L		0.01		E200.8	12/07/11 10:48 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 12/22/11
Project: CFR Monitoring-474374
Work Order: H11120043

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R76539
Sample ID: MB		Method Blank				Run: MAN-TECH_111205B			12/05/11 15:54	
Alkalinity, Total as CaCO3		2	mg/L	2						
Sample ID: LCS-11282011		Laboratory Control Sample				Run: MAN-TECH_111205B			12/05/11 16:02	
Alkalinity, Total as CaCO3		620	mg/L	4.0	102	90	110			
Sample ID: H11120032-001ADUP	2	Sample Duplicate				Run: MAN-TECH_111205B			12/05/11 16:24	
Alkalinity, Total as CaCO3		220	mg/L	4.0				0.3	10	
Bicarbonate as HCO3		270	mg/L	4.0				0.3	10	
Sample ID: H11120032-003AMS		Sample Matrix Spike				Run: MAN-TECH_111205B			12/05/11 16:47	
Alkalinity, Total as CaCO3		790	mg/L	4.0	94	80	120			
Sample ID: H11120043-005BDUP	2	Sample Duplicate				Run: MAN-TECH_111205B			12/05/11 17:43	
Alkalinity, Total as CaCO3		160	mg/L	4.0				2.5	10	
Bicarbonate as HCO3		190	mg/L	4.0				2.3	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 12/22/11
Project: CFR Monitoring-474374
Work Order: H11120043

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 D										Batch: 14983
Sample ID: MB-14983		Method Blank				Run: ACCU-124 (14410200)_111205			12/05/11 12:59	
Solids, Total Suspended TSS @ 105 C		ND	mg/L	3						
Sample ID: LCS-14983		Laboratory Control Sample				Run: ACCU-124 (14410200)_111205			12/05/11 12:59	
Solids, Total Suspended TSS @ 105 C		2040	mg/L	10	102	70	130			
Sample ID: H11120042-001BDUP		Sample Duplicate				Run: ACCU-124 (14410200)_111205			12/05/11 13:00	
Solids, Total Suspended TSS @ 105 C		42.0	mg/L	10				15	5	R
Sample ID: H11120043-009BDUP		Sample Duplicate				Run: ACCU-124 (14410200)_111205			12/05/11 13:02	
Solids, Total Suspended TSS @ 105 C		4.00	mg/L	10					5	

Qualifiers:

RL - Analyte reporting limit.
ND - Not detected at the reporting limit.
R - RPD exceeds advisory limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 12/22/11
Project: CFR Monitoring-474374
Work Order: H11120043

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500 N-C									Analytical Run: NUTRIENTS_111209A	
Sample ID: ICV-1		Initial Calibration Verification Standard							12/09/11 10:03	
Nitrogen, Total		1.05	mg/L	0.10	105	90	110			
Sample ID: CCV-32		Continuing Calibration Verification Standard							12/09/11 11:17	
Nitrogen, Total		0.450	mg/L	0.10	90	90	110			
Method: A4500 N-C									Batch: 15056	
Sample ID: H11120043-001AMS		Sample Matrix Spike				Run: NUTRIENTS_111209A			12/09/11 11:21	
Nitrogen, Total		1.15	mg/L	0.10	100	90	110			
Sample ID: H11120043-001AMSD		Sample Matrix Spike Duplicate				Run: NUTRIENTS_111209A			12/09/11 11:23	
Nitrogen, Total		1.09	mg/L	0.10	94	90	110	5.4	20	
Sample ID: MBLK-54		Method Blank				Run: NUTRIENTS_111209A			12/09/11 12:01	
Nitrogen, Total		ND	mg/L	0.02						
Sample ID: LCS-55		Laboratory Control Sample				Run: NUTRIENTS_111209A			12/09/11 12:03	
Nitrogen, Total		31.0	mg/L	1.0	103	90	110			
Method: A4500 N-C									Analytical Run: NUTRIENTS_111219A	
Sample ID: ICV-1		Initial Calibration Verification Standard							12/19/11 11:23	
Nitrogen, Total		1.09	mg/L	0.10	109	90	110			
Sample ID: CCV-4		Continuing Calibration Verification Standard							12/19/11 11:29	
Nitrogen, Total		0.540	mg/L	0.10	108	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 12/22/11

Project: CFR Monitoring-474374 **Work Order:** H11120043

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_111205B		
Sample ID: ICV STD	7	Initial Calibration Verification Standard							12/06/11 10:00	
Arsenic		0.0498	mg/L	0.0050	100	90	110			
Cadmium		0.0266	mg/L	0.0010	106	90	110			
Calcium		2.59	mg/L	0.50	104	90	110			
Copper		0.0510	mg/L	0.010	102	90	110			
Lead		0.0503	mg/L	0.010	101	90	110			
Magnesium		2.54	mg/L	0.50	102	90	110			
Zinc		0.0516	mg/L	0.010	103	90	110			
Sample ID: ICSA	7	Interference Check Sample A							12/06/11 10:06	
Arsenic		6.20E-05	mg/L	0.0050						
Cadmium		0.000792	mg/L	0.0010						
Calcium		129	mg/L	0.50	108	70	130			
Copper		0.000222	mg/L	0.010						
Lead		0.000153	mg/L	0.010						
Magnesium		44.3	mg/L	0.50	111	70	130			
Zinc		0.00113	mg/L	0.010						
Sample ID: ICSAB	7	Interference Check Sample AB							12/06/11 10:13	
Arsenic		0.0114	mg/L	0.0050	114	70	130			
Cadmium		0.0110	mg/L	0.0010	110	70	130			
Calcium		131	mg/L	0.50	109	70	130			
Copper		0.0218	mg/L	0.010	109	70	130			
Lead		0.000134	mg/L	0.010		0	0			
Magnesium		45.6	mg/L	0.50	114	70	130			
Zinc		0.0119	mg/L	0.010	119	70	130			
Sample ID: ICV STD	7	Initial Calibration Verification Standard							12/06/11 22:15	
Arsenic		0.0500	mg/L	0.0050	100	90	110			
Cadmium		0.0265	mg/L	0.0010	106	90	110			
Calcium		2.60	mg/L	0.50	104	90	110			
Copper		0.0513	mg/L	0.010	103	90	110			
Lead		0.0502	mg/L	0.010	100	90	110			
Magnesium		2.49	mg/L	0.50	100	90	110			
Zinc		0.0530	mg/L	0.010	106	90	110			
Sample ID: ICSA	7	Interference Check Sample A							12/06/11 22:22	
Arsenic		7.40E-05	mg/L	0.0050						
Cadmium		0.000817	mg/L	0.0010						
Calcium		130	mg/L	0.50	109	70	130			
Copper		0.000243	mg/L	0.010						
Lead		0.000161	mg/L	0.010						
Magnesium		43.6	mg/L	0.50	109	70	130			
Zinc		0.00124	mg/L	0.010						
Sample ID: ICSAB	7	Interference Check Sample AB							12/06/11 22:28	
Arsenic		0.0114	mg/L	0.0050	114	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 12/22/11

Project: CFR Monitoring-474374 **Work Order:** H11120043

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_111205B		
Sample ID: ICSAB	7	Interference Check Sample AB							12/06/11 22:28	
Cadmium		0.0111	mg/L	0.0010	111	70	130			
Calcium		132	mg/L	0.50	110	70	130			
Copper		0.0219	mg/L	0.010	109	70	130			
Lead		0.000146	mg/L	0.010		0	0			
Magnesium		44.9	mg/L	0.50	112	70	130			
Zinc		0.0123	mg/L	0.010	123	70	130			
Method: E200.8									Batch: 14993	
Sample ID: MB-14993	7	Method Blank				Run: ICPMS204-B_111205B			12/07/11 06:09	
Arsenic		ND	mg/L	5E-05						
Cadmium		ND	mg/L	2E-05						
Calcium		ND	mg/L	0.04						
Copper		ND	mg/L	0.0004						
Lead		ND	mg/L	2E-05						
Magnesium		ND	mg/L	0.003						
Zinc		0.001	mg/L	0.0003						
Sample ID: LCS-14993	7	Laboratory Control Sample				Run: ICPMS204-B_111205B			12/07/11 06:16	
Arsenic		0.505	mg/L	0.0050	101	85	115			
Cadmium		0.266	mg/L	0.0010	106	85	115			
Calcium		25.8	mg/L	1.0	103	85	115			
Copper		0.511	mg/L	0.010	102	85	115			
Lead		0.551	mg/L	0.010	110	85	115			
Magnesium		25.0	mg/L	1.0	100	85	115			
Zinc		0.514	mg/L	0.010	103	85	115			
Sample ID: H11120042-001DMS3	7	Sample Matrix Spike				Run: ICPMS204-B_111205B			12/07/11 06:42	
Arsenic		0.496	mg/L	0.0050	99	70	130			
Cadmium		0.250	mg/L	0.0010	100	70	130			
Calcium		155	mg/L	1.0		70	130			A
Copper		0.508	mg/L	0.010	100	70	130			
Lead		0.550	mg/L	0.010	110	70	130			
Magnesium		69.8	mg/L	1.0	97	70	130			
Zinc		0.718	mg/L	0.010	95	70	130			
Sample ID: H11120042-001DMSD3	7	Sample Matrix Spike Duplicate				Run: ICPMS204-B_111205B			12/07/11 06:48	
Arsenic		0.500	mg/L	0.0050	100	70	130	0.8	20	
Cadmium		0.255	mg/L	0.0010	102	70	130	2.1	20	
Calcium		156	mg/L	1.0		70	130	0.8	20	A
Copper		0.512	mg/L	0.010	101	70	130	0.8	20	
Lead		0.554	mg/L	0.010	111	70	130	0.6	20	
Magnesium		70.2	mg/L	1.0	99	70	130	0.5	20	
Zinc		0.721	mg/L	0.010	95	70	130	0.5	20	
Method: E200.8									Batch: R76555	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 12/22/11

Project: CFR Monitoring-474374 **Work Order:** H11120043

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R76555
Sample ID: ICB	7	Method Blank				Run: ICPMS204-B_111205B				12/06/11 10:52
Arsenic		ND	mg/L	3E-05						
Cadmium		ND	mg/L	1E-05						
Calcium		ND	mg/L	0.003						
Copper		ND	mg/L	3E-05						
Lead		ND	mg/L	1.0E-05						
Magnesium		ND	mg/L	0.0007						
Zinc		0.0004	mg/L	0.0003						
Sample ID: LFB	7	Laboratory Fortified Blank				Run: ICPMS204-B_111205B				12/06/11 10:58
Arsenic		0.0503	mg/L	0.0050	101	85	115			
Cadmium		0.0488	mg/L	0.0010	98	85	115			
Calcium		48.8	mg/L	0.50	98	85	115			
Copper		0.0493	mg/L	0.010	99	85	115			
Lead		0.0512	mg/L	0.010	102	85	115			
Magnesium		48.1	mg/L	0.50	96	85	115			
Zinc		0.0503	mg/L	0.010	100	85	115			
Sample ID: H11120043-008CMS	7	Sample Matrix Spike				Run: ICPMS204-B_111205B				12/07/11 09:49
Arsenic		0.0602	mg/L	0.0050	99	70	130			
Cadmium		0.0481	mg/L	0.0010	96	70	130			
Calcium		98.5	mg/L	1.0	89	70	130			
Copper		0.0522	mg/L	0.010	96	70	130			
Lead		0.0497	mg/L	0.010	99	70	130			
Magnesium		59.5	mg/L	1.0	93	70	130			
Zinc		0.0564	mg/L	0.010	97	70	130			
Sample ID: H11120043-008CMSD	7	Sample Matrix Spike Duplicate				Run: ICPMS204-B_111205B				12/07/11 10:22
Arsenic		0.0604	mg/L	0.0050	100	70	130	0.3	20	
Cadmium		0.0481	mg/L	0.0010	96	70	130	0.1	20	
Calcium		99.3	mg/L	1.0	90	70	130	0.8	20	
Copper		0.0525	mg/L	0.010	97	70	130	0.6	20	
Lead		0.0496	mg/L	0.010	99	70	130	0.1	20	
Magnesium		59.2	mg/L	1.0	93	70	130	0.4	20	
Zinc		0.0560	mg/L	0.010	96	70	130	0.6	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 12/22/11

Project: CFR Monitoring-474374 **Work Order:** H11120043

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC102-H_111205A	
Sample ID: ICV120511-12		Initial Calibration Verification Standard							12/05/11 16:54	
Sulfate		410	mg/L	1.0	101	90	110			
Sample ID: CCV120511-15		Continuing Calibration Verification Standard							12/05/11 17:35	
Sulfate		400	mg/L	1.0	100	90	110			
Method: E300.0									Batch: R76544	
Sample ID: ICB120511-13		Method Blank				Run: IC102-H_111205A			12/05/11 17:08	
Sulfate		ND	mg/L	0.02						
Sample ID: LFB120511-14		Laboratory Fortified Blank				Run: IC102-H_111205A			12/05/11 17:22	
Sulfate		200	mg/L	1.1	99	90	110			
Sample ID: H11120043-005BMS		Sample Matrix Spike				Run: IC102-H_111205A			12/05/11 19:38	
Sulfate		270	mg/L	1.1	101	90	110			
Sample ID: H11120043-005BMSD		Sample Matrix Spike Duplicate				Run: IC102-H_111205A			12/05/11 19:51	
Sulfate		270	mg/L	1.1	101	90	110	0.4	20	
Sample ID: H11120051-001AMS		Sample Matrix Spike				Run: IC102-H_111205A			12/05/11 21:54	
Sulfate		250	mg/L	1.1	102	90	110			
Sample ID: H11120051-001AMSD		Sample Matrix Spike Duplicate				Run: IC102-H_111205A			12/05/11 22:07	
Sulfate		250	mg/L	1.1	100	90	110	1.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 12/22/11
Project: CFR Monitoring-474374
Work Order: H11120043

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E350.1									Analytical Run: FIA203-HE_111207A	
Sample ID: ICV	Initial Calibration Verification Standard								12/07/11 09:51	
Nitrogen, Ammonia as N		1.02	mg/L	0.050	102	90	110			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								12/07/11 09:56	
Nitrogen, Ammonia as N		-0.0105	mg/L	0.050		0	0			
Method: E350.1									Batch: R76582	
Sample ID: LCS	Laboratory Control Sample					Run: FIA203-HE_111207A			12/07/11 09:52	
Nitrogen, Ammonia as N		17.1	mg/L	0.50	109	90	110			
Sample ID: LFB	Laboratory Fortified Blank					Run: FIA203-HE_111207A			12/07/11 09:53	
Nitrogen, Ammonia as N		1.04	mg/L	0.050	104	90	110			
Sample ID: MBLK	Method Blank					Run: FIA203-HE_111207A			12/07/11 09:57	
Nitrogen, Ammonia as N		ND	mg/L	0.002						
Sample ID: H11120043-007EMS	Sample Matrix Spike					Run: FIA203-HE_111207A			12/07/11 10:08	
Nitrogen, Ammonia as N		1.02	mg/L	0.050	102	80	120			
Sample ID: H11120043-007EMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_111207A			12/07/11 10:09	
Nitrogen, Ammonia as N		1.04	mg/L	0.050	104	80	120	2.1	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 12/22/11
Project: CFR Monitoring-474374
Work Order: H11120043

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2									Analytical Run: FIA203-HE_111205A	
Sample ID: ICV	Initial Calibration Verification Standard								12/05/11 14:17	
Nitrogen, Nitrate+Nitrite as N		0.980	mg/L	0.010	98	90	110			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								12/05/11 14:23	
Nitrogen, Nitrate+Nitrite as N		-0.00236	mg/L	0.010		0	0			
Sample ID: CCV	Continuing Calibration Verification Standard								12/05/11 14:59	
Nitrogen, Nitrate+Nitrite as N		0.468	mg/L	0.010	94	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								12/05/11 15:16	
Nitrogen, Nitrate+Nitrite as N		0.463	mg/L	0.010	93	90	110			
Method: E353.2									Batch: R76533	
Sample ID: LCS	Laboratory Control Sample				Run: FIA203-HE_111205A				12/05/11 14:18	
Nitrogen, Nitrate+Nitrite as N		24.1	mg/L	0.20	100	90	110			
Sample ID: LFB	Laboratory Fortified Blank				Run: FIA203-HE_111205A				12/05/11 14:20	
Nitrogen, Nitrate+Nitrite as N		0.966	mg/L	0.010	97	90	110			
Sample ID: MBLK	Method Blank				Run: FIA203-HE_111205A				12/05/11 14:24	
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.0009						
Sample ID: H11120029-002AMS	Sample Matrix Spike				Run: FIA203-HE_111205A				12/05/11 15:03	
Nitrogen, Nitrate+Nitrite as N		0.712	mg/L	0.010	69	90	110			S
Sample ID: H11120029-002AMSD	Sample Matrix Spike Duplicate				Run: FIA203-HE_111205A				12/05/11 15:04	
Nitrogen, Nitrate+Nitrite as N		0.717	mg/L	0.010	70	90	110	0.7	20	S
Sample ID: H11120043-007EMS	Sample Matrix Spike				Run: FIA203-HE_111205A				12/05/11 15:24	
Nitrogen, Nitrate+Nitrite as N		0.870	mg/L	0.010	87	90	110			S
Sample ID: H11120043-007EMSD	Sample Matrix Spike Duplicate				Run: FIA203-HE_111205A				12/05/11 15:25	
Nitrogen, Nitrate+Nitrite as N		0.879	mg/L	0.010	88	90	110	1.1	20	S

Qualifiers:

RL - Analyte reporting limit.
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 12/22/11
Project: CFR Monitoring-474374
Work Order: H11120043

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E365.1									Analytical Run: FIA202-HE_111215A	
Sample ID: ICV	Initial Calibration Verification Standard								12/15/11 15:50	
Phosphorus, Total as P		0.240	mg/L	0.010	96	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								12/15/11 15:53	
Phosphorus, Total as P		0.245	mg/L	0.010	98	90	110			
Sample ID: CCV1	Continuing Calibration Verification Standard								12/15/11 15:54	
Phosphorus, Total as P		0.00621	mg/L	0.010	62	50	150			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								12/15/11 15:55	
Phosphorus, Total as P		0.000260	mg/L	0.010		0	0			
Sample ID: CCV	Continuing Calibration Verification Standard								12/15/11 16:10	
Phosphorus, Total as P		0.239	mg/L	0.010	96	90	110			
Sample ID: CCV1	Continuing Calibration Verification Standard								12/15/11 16:11	
Phosphorus, Total as P		0.00627	mg/L	0.010	63	50	150			
Method: E365.1									Batch: 15133	
Sample ID: LCS-15133	Laboratory Control Sample					Run: FIA202-HE_111215A			12/15/11 15:51	
Phosphorus, Total as P		8.19	mg/L	0.025	98	90	110			
Sample ID: MB-15133	Method Blank					Run: FIA202-HE_111215A			12/15/11 15:56	
Phosphorus, Total as P		ND	mg/L	0.0009						
Sample ID: H11120028-008EMS	Sample Matrix Spike					Run: FIA202-HE_111215A			12/15/11 15:58	
Phosphorus, Total as P		0.469	mg/L	0.010	101	90	110			
Sample ID: H11120028-008EMSD	Sample Matrix Spike Duplicate					Run: FIA202-HE_111215A			12/15/11 15:59	
Phosphorus, Total as P		0.473	mg/L	0.010	103	90	110	1.0	20	
Sample ID: H11120043-007EMS	Sample Matrix Spike					Run: FIA202-HE_111215A			12/15/11 16:13	
Phosphorus, Total as P		0.182	mg/L	0.010	91	90	110			
Sample ID: H11120043-007EMSD	Sample Matrix Spike Duplicate					Run: FIA202-HE_111215A			12/15/11 16:14	
Phosphorus, Total as P		0.187	mg/L	0.010	94	90	110	2.6	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Workorder Receipt Checklist

MT DEQ-Federal Superfund

H11120043

Login completed by: Tracy L. Lorash
Date Received: 12/2/2011

Reviewed by: BL2000\ablackburn
Received by: elm

Reviewed Date: 12/5/2011
Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Container/Temp Blank temperature:	2.2°C On Ice		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	Not Applicable ☐

Contact and Corrective Action Comments:

None

Chain of Custody and Analytical Request Record

Page 1 of 1

PLEASE PRINT (Provide as much information as possible.)

Company Name: MT DEQ	Project Name, PWS, Permit, Etc.: CFR Monitoring 4744374	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: P.O. Box 200901 Helena, MT 59620-0901	Contact Name: Phone/Fax: Brian Bartkowiak 461-3070 (DEQ) Erich Weber 439-0563 (Atkins)	Email: erich.weber@atkinsglobal.com	Sampler: (Please Print) J. Bertrand E. Weber
Invoice Address: above	Invoice Contact & Phone: Brian Bartkowiak 461-3070	Purchase Order:	Quote/Bottle Order: 624/8732

Special Report/Formats:

☐ DW ☐ EDD/EDT (Electronic Data)
☐ POTW/WWTP Format: _____
☐ State: _____ ☐ LEVEL IV
☐ Other: _____ ☐ NELAC

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids Vegetation Bioassay Other
DW - Drinking Water

ANALYSIS REQUESTED

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	TR As, Cd, Cu, Pb, Zn	Diss As, Cd, Cu, Pb, Zn	TPN	NO_{3+2}, NH_3, TP	TSS, Tot. Alk., $SO_4^{=}$	Hardness (TR Ca & Mg)	SEE ATTACHED	Standard Turnaround (TAT)
1 CFR-116A	12/1/2011	10:00	SW	x	x	x	x	x	x		
2 CFR-84F	12/1/2011	11:45	SW								
3 CFR-53C	12/1/2011	13:45	SW								
4 CFR-42G	12/1/2011	15:00	SW								
5 CFR-27H	12/2/2011	9:30	SW								
6 CFR-27H dupe	12/2/2011	9:30	SW								
7 Field Blank	12/2/2011	9:00	SW								
8 CFR-03A	12/2/2011	11:15	SW								
9 SS-25	12/2/2011	12:00	SW								
10											

R U S H

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments: ~~Hardness~~ from TR Ca & Mg.

Shipped by: Hand
Cooler ID(s): 24
Receipt Temp: 2.2 °C
On Ice: (Y) N
Custody Seal On Bottle Y N On Cooler Y N
Intact Y N
Signature Match Y N

LABORATORY USE ONLY H11120043

Custody Record MUST be Signed

Relinquished by (print): Erich Weber	Date/Time: 12/2/2011 16:13	Signature:	Received by (print):
Relinquished by (print):	Date/Time:	Signature:	Received by (print):
Sample Disposal: Return to Client: _____	Lab Disposal: _____		Received by Laboratory: Esther Herrett 12-2-11 16:13

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.
This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

Appendix B5

4th Quarter Groundwater Reports

ANALYTICAL SUMMARY REPORT

December 07, 2011

MT DEQ-Federal Superfund
PO Box 200901
Helena, MT 59620-0901

Workorder No.: H11110203 Quote ID: H624 - CFR Monitoring-474374

Project Name: Clark Fork River Groundwater 2011

Energy Laboratories Inc Helena MT received the following 15 samples for MT DEQ-Federal Superfund on 11/10/2011 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H11110203-001	Blank	11/10/11 14:00	11/10/11	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Conductivity Hardness as CaCO3 Anions by Ion Chromatography Preparation, Dissolved Filtration
H11110203-002	LM-1	11/10/11 13:30	11/10/11	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Conductivity Hardness as CaCO3 Anions by Ion Chromatography pH Preparation, Dissolved Filtration
H11110203-003	LM-2	11/10/11 13:15	11/10/11	Aqueous	Same As Above
H11110203-004	CFR-4	11/10/11 12:15	11/10/11	Aqueous	Same As Above
H11110203-005	CFR-5	11/10/11 11:45	11/10/11	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Conductivity Hardness as CaCO3 Anions by Ion Chromatography Preparation, Dissolved Filtration
H11110203-006	CFR-5 DUP	11/10/11 11:45	11/10/11	Aqueous	Same As Above
H11110203-007	CFR-2	11/09/11 14:00	11/10/11	Aqueous	Same As Above
H11110203-008	ML-3	11/09/11 11:00	11/10/11	Aqueous	Same As Above
H11110203-009	ML-2	11/09/11 10:40	11/10/11	Aqueous	Same As Above
H11110203-010	ML-1	11/09/11 10:20	11/10/11	Aqueous	Same As Above
H11110203-011	WST-01	11/09/11 14:15	11/10/11	Aqueous	Same As Above
H11110203-012	WST-02	11/09/11 14:25	11/10/11	Aqueous	Same As Above
H11110203-013	WST-03	11/09/11 14:40	11/10/11	Aqueous	Same As Above
H11110203-014	WST-04	11/09/11 14:50	11/10/11	Aqueous	Same As Above
H11110203-015	CFR-3	11/09/11 13:00	11/10/11	Aqueous	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise reported.

Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

ANALYTICAL SUMMARY REPORT

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID Blank
Lab ID: H11110203-001
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/10/11 14:00 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
INORGANICS											
Alkalinity, Total as CaCO3	ND	mg/L		4		A2320 B	11/11/11 16:53 / cmm		MAN-TECH_111111B	30	R76069
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	11/11/11 16:53 / cmm		MAN-TECH_111111B	30	R76069
Chloride	ND	mg/L		1		E300.0	11/17/11 20:02 / zeg		IC101-H_111117A	39	R76202
Sulfate	ND	mg/L		1		E300.0	11/16/11 17:09 / zeg		IC101-H_111116B	39	R76168
Hardness as CaCO3	ND	mg/L		1		A2340 B	11/22/11 09:10 / sld		WATERCALC_111122A	12	R76274
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	11/19/11 19:48 / dck	11/11/11 08:45	ICPMS204-B_111117A	280	R76189
Cadmium	ND	mg/L		0.00008		E200.8	11/19/11 19:48 / dck	11/11/11 08:45	ICPMS204-B_111117A	280	R76189
Calcium	ND	mg/L		1		E200.8	11/19/11 19:48 / dck	11/11/11 08:45	ICPMS204-B_111117A	280	R76189
Copper	ND	mg/L		0.001		E200.8	11/19/11 19:48 / dck	11/11/11 08:45	ICPMS204-B_111117A	280	R76189
Lead	ND	mg/L		0.0005		E200.8	11/19/11 19:48 / dck	11/11/11 08:45	ICPMS204-B_111117A	280	R76189
Magnesium	ND	mg/L		1		E200.8	11/19/11 19:48 / dck	11/11/11 08:45	ICPMS204-B_111117A	280	R76189
Potassium	ND	mg/L		1		E200.8	11/19/11 19:48 / dck	11/11/11 08:45	ICPMS204-B_111117A	280	R76189
Sodium	ND	mg/L		1		E200.8	11/19/11 19:48 / dck	11/11/11 08:45	ICPMS204-B_111117A	280	R76189
Zinc	ND	mg/L		0.01		E200.8	11/19/11 19:48 / dck	11/11/11 08:45	ICPMS204-B_111117A	280	R76189

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID LM-1
Lab ID: H11110203-002
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/10/11 13:30 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
pH	7.3	s.u.		0.1		A4500-H B	11/11/11 10:49 / cmm		PH2_111111A	6	111111A-PH-W
Conductivity	858	umhos/cm		1		A2510 B	11/11/11 10:24 / cmm		COND_111111A	1	1111111A-COND-PROBI
INORGANICS											
Alkalinity, Total as CaCO3	230	mg/L		4		A2320 B	11/11/11 17:05 / cmm		MAN-TECH_111111B	33	R76069
Bicarbonate as HCO3	280	mg/L		4		A2320 B	11/11/11 17:05 / cmm		MAN-TECH_111111B	33	R76069
Chloride	12	mg/L		1		E300.0	11/17/11 20:16 / zeg		IC101-H_111117A	40	R76202
Sulfate	270	mg/L		1		E300.0	11/16/11 17:23 / zeg		IC101-H_111116B	40	R76168
Hardness as CaCO3	435	mg/L		1		A2340 B	11/22/11 09:10 / sld		WATERCALC_111122A	13	R76274
METALS, DISSOLVED											
Arsenic	0.036	mg/L		0.005		E200.8	11/19/11 20:14 / dck	11/11/11 08:45	ICPMS204-B_111117A	284	R76189
Cadmium	0.00260	mg/L		0.00008		E200.8	11/19/11 20:14 / dck	11/11/11 08:45	ICPMS204-B_111117A	284	R76189
Calcium	117	mg/L		1		E200.8	11/19/11 20:14 / dck	11/11/11 08:45	ICPMS204-B_111117A	284	R76189
Copper	0.294	mg/L		0.001		E200.8	11/19/11 20:14 / dck	11/11/11 08:45	ICPMS204-B_111117A	284	R76189
Lead	0.0080	mg/L		0.0005		E200.8	11/19/11 20:14 / dck	11/11/11 08:45	ICPMS204-B_111117A	284	R76189
Magnesium	35	mg/L		1		E200.8	11/19/11 20:14 / dck	11/11/11 08:45	ICPMS204-B_111117A	284	R76189
Potassium	7	mg/L		1		E200.8	11/19/11 20:14 / dck	11/11/11 08:45	ICPMS204-B_111117A	284	R76189
Sodium	30	mg/L		1		E200.8	11/19/11 20:14 / dck	11/11/11 08:45	ICPMS204-B_111117A	284	R76189
Zinc	1.13	mg/L		0.01		E200.8	11/19/11 20:14 / dck	11/11/11 08:45	ICPMS204-B_111117A	284	R76189

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID LM-2
Lab ID: H11110203-003
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/10/11 13:15 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
pH	6.5	s.u.		0.1		A4500-H B	11/11/11 10:54 / cmm		PH2_111111A : 8		111111A-PH-W
Conductivity	1070	umhos/cm		1		A2510 B	11/11/11 10:25 / cmm		COND_111111A : 1211111A-COND-PROBI		
INORGANICS											
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	11/11/11 17:20 / cmm		MAN-TECH_111111B : 37		R76069
Bicarbonate as HCO3	140	mg/L		4		A2320 B	11/11/11 17:20 / cmm		MAN-TECH_111111B : 37		R76069
Chloride	17	mg/L		1		E300.0	11/17/11 20:29 / zeg		IC101-H_111117A : 41		R76202
Sulfate	500	mg/L	D	2		E300.0	11/16/11 17:37 / zeg		IC101-H_111116B : 41		R76168
Hardness as CaCO3	469	mg/L		1		A2340 B	11/29/11 11:14 / sld		WATERCALC_111129A : 1		R76383
METALS, DISSOLVED											
Arsenic	0.023	mg/L		0.005		E200.8	11/19/11 20:20 / dck	11/11/11 08:45	ICPMS204-B_111117A : 285		R76189
Cadmium	0.0296	mg/L		0.00008		E200.8	11/19/11 20:20 / dck	11/11/11 08:45	ICPMS204-B_111117A : 285		R76189
Calcium	98	mg/L		1		E200.8	11/28/11 14:15 / dck	11/11/11 08:45	ICPMS204-B_111128A : 36		R76381
Copper	1.96	mg/L		0.001		E200.8	11/19/11 20:20 / dck	11/11/11 08:45	ICPMS204-B_111117A : 285		R76189
Lead	0.0030	mg/L		0.0005		E200.8	11/19/11 20:20 / dck	11/11/11 08:45	ICPMS204-B_111117A : 285		R76189
Magnesium	58	mg/L		1		E200.8	11/19/11 20:20 / dck	11/11/11 08:45	ICPMS204-B_111117A : 285		R76189
Potassium	9	mg/L		1		E200.8	11/19/11 20:20 / dck	11/11/11 08:45	ICPMS204-B_111117A : 285		R76189
Sodium	53	mg/L		1		E200.8	11/19/11 20:20 / dck	11/11/11 08:45	ICPMS204-B_111117A : 285		R76189
Zinc	16.2	mg/L		0.01		E200.8	11/28/11 14:15 / dck	11/11/11 08:45	ICPMS204-B_111128A : 36		R76381

Report Definitions:
RL - Analyte reporting limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID CFR-4
Lab ID: H11110203-004
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/10/11 12:15 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
pH	7.2	s.u.		0.1		A4500-H B	11/11/11 10:59 / cmm		PH2_111111A	9	111111A-PH-W
Conductivity	730	umhos/cm		1		A2510 B	11/11/11 10:25 / cmm		COND_111111A	1311111A	111111A-COND-PROBI
INORGANICS											
Alkalinity, Total as CaCO3	230	mg/L		4		A2320 B	11/11/11 17:34 / cmm		MAN-TECH_111111B	41	R76069
Bicarbonate as HCO3	280	mg/L		4		A2320 B	11/11/11 17:34 / cmm		MAN-TECH_111111B	41	R76069
Chloride	17	mg/L		1		E300.0	11/17/11 20:43 / zeg		IC101-H_111117A	42	R76202
Sulfate	170	mg/L		1		E300.0	11/16/11 17:51 / zeg		IC101-H_111116B	42	R76168
Hardness as CaCO3	374	mg/L		1		A2340 B	11/22/11 09:10 / sld		WATERCALC_111122A	14	R76274
METALS, DISSOLVED											
Arsenic	0.122	mg/L		0.005		E200.8	11/19/11 20:27 / dck	11/11/11 08:45	ICPMS204-B_111117A	286	R76189
Cadmium	0.00290	mg/L		0.00008		E200.8	11/19/11 20:27 / dck	11/11/11 08:45	ICPMS204-B_111117A	286	R76189
Calcium	100	mg/L		1		E200.8	11/19/11 20:27 / dck	11/11/11 08:45	ICPMS204-B_111117A	286	R76189
Copper	0.501	mg/L		0.001		E200.8	11/19/11 20:27 / dck	11/11/11 08:45	ICPMS204-B_111117A	286	R76189
Lead	0.0006	mg/L		0.0005		E200.8	11/19/11 20:27 / dck	11/11/11 08:45	ICPMS204-B_111117A	286	R76189
Magnesium	30	mg/L		1		E200.8	11/19/11 20:27 / dck	11/11/11 08:45	ICPMS204-B_111117A	286	R76189
Potassium	4	mg/L		1		E200.8	11/19/11 20:27 / dck	11/11/11 08:45	ICPMS204-B_111117A	286	R76189
Sodium	29	mg/L		1		E200.8	11/19/11 20:27 / dck	11/11/11 08:45	ICPMS204-B_111117A	286	R76189
Zinc	0.71	mg/L		0.01		E200.8	11/19/11 20:27 / dck	11/11/11 08:45	ICPMS204-B_111117A	286	R76189

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID CFR-5
Lab ID: H11110203-005
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/10/11 11:45 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
INORGANICS											
Alkalinity, Total as CaCO3	130	mg/L		4		A2320 B	11/11/11 17:41 / cmm		MAN-TECH_111111B	43	R76069
Bicarbonate as HCO3	160	mg/L		4		A2320 B	11/11/11 17:41 / cmm		MAN-TECH_111111B	43	R76069
Chloride	10	mg/L		1		E300.0	11/17/11 20:57 / zeg		IC101-H_111117A	43	R76202
Sulfate	180	mg/L		1		E300.0	11/16/11 18:05 / zeg		IC101-H_111116B	43	R76168
Hardness as CaCO3	269	mg/L		1		A2340 B	11/22/11 09:10 / sld		WATERCALC_111122A	15	R76274
METALS, DISSOLVED											
Arsenic	0.016	mg/L		0.005		E200.8	11/19/11 20:33 / dck	11/11/11 08:45	ICPMS204-B_111117A	287	R76189
Cadmium	0.00233	mg/L		0.00008		E200.8	11/19/11 20:33 / dck	11/11/11 08:45	ICPMS204-B_111117A	287	R76189
Calcium	79	mg/L		1		E200.8	11/19/11 20:33 / dck	11/11/11 08:45	ICPMS204-B_111117A	287	R76189
Copper	0.134	mg/L		0.001		E200.8	11/19/11 20:33 / dck	11/11/11 08:45	ICPMS204-B_111117A	287	R76189
Lead	ND	mg/L		0.0005		E200.8	11/19/11 20:33 / dck	11/11/11 08:45	ICPMS204-B_111117A	287	R76189
Magnesium	17	mg/L		1		E200.8	11/19/11 20:33 / dck	11/11/11 08:45	ICPMS204-B_111117A	287	R76189
Potassium	5	mg/L		1		E200.8	11/19/11 20:33 / dck	11/11/11 08:45	ICPMS204-B_111117A	287	R76189
Sodium	18	mg/L		1		E200.8	11/19/11 20:33 / dck	11/11/11 08:45	ICPMS204-B_111117A	287	R76189
Zinc	0.60	mg/L		0.01		E200.8	11/19/11 20:33 / dck	11/11/11 08:45	ICPMS204-B_111117A	287	R76189

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID CFR-5 DUP
Lab ID: H11110203-006
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/10/11 11:45 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
INORGANICS											
Alkalinity, Total as CaCO3	130	mg/L		4		A2320 B	11/11/11 17:49 / cmm		MAN-TECH_111111B	44	R76069
Bicarbonate as HCO3	160	mg/L		4		A2320 B	11/11/11 17:49 / cmm		MAN-TECH_111111B	44	R76069
Chloride	9	mg/L		1		E300.0	11/17/11 21:39 / zeg		IC101-H_111117A	46	R76202
Sulfate	180	mg/L		1		E300.0	11/16/11 18:46 / zeg		IC101-H_111116B	46	R76168
Hardness as CaCO3	297	mg/L		1		A2340 B	11/22/11 09:10 / sld		WATERCALC_111122A	16	R76274
METALS, DISSOLVED											
Arsenic	0.022	mg/L		0.005		E200.8	11/19/11 21:05 / dck	11/11/11 08:45	ICPMS204-B_111117A	292	R76189
Cadmium	0.00310	mg/L		0.00008		E200.8	11/19/11 21:05 / dck	11/11/11 08:45	ICPMS204-B_111117A	292	R76189
Calcium	88	mg/L		1		E200.8	11/19/11 21:05 / dck	11/11/11 08:45	ICPMS204-B_111117A	292	R76189
Copper	0.239	mg/L		0.001		E200.8	11/19/11 21:05 / dck	11/11/11 08:45	ICPMS204-B_111117A	292	R76189
Lead	ND	mg/L		0.0005		E200.8	11/19/11 21:05 / dck	11/11/11 08:45	ICPMS204-B_111117A	292	R76189
Magnesium	19	mg/L		1		E200.8	11/19/11 21:05 / dck	11/11/11 08:45	ICPMS204-B_111117A	292	R76189
Potassium	6	mg/L		1		E200.8	11/19/11 21:05 / dck	11/11/11 08:45	ICPMS204-B_111117A	292	R76189
Sodium	19	mg/L		1		E200.8	11/19/11 21:05 / dck	11/11/11 08:45	ICPMS204-B_111117A	292	R76189
Zinc	0.87	mg/L		0.01		E200.8	11/19/11 21:05 / dck	11/11/11 08:45	ICPMS204-B_111117A	292	R76189

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID CFR-2
Lab ID: H11110203-007
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/09/11 14:00 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
INORGANICS											
Alkalinity, Total as CaCO3	170	mg/L		4		A2320 B	11/11/11 17:56 / cmm		MAN-TECH_111111B	45	R76069
Bicarbonate as HCO3	210	mg/L		4		A2320 B	11/11/11 17:56 / cmm		MAN-TECH_111111B	45	R76069
Chloride	5	mg/L		1		E300.0	11/17/11 21:53 / zeg		IC101-H_111117A	47	R76202
Sulfate	38	mg/L		1		E300.0	11/16/11 19:00 / zeg		IC101-H_111116B	47	R76168
Hardness as CaCO3	187	mg/L		1		A2340 B	11/22/11 09:10 / sld		WATERCALC_111122A	17	R76274
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	11/19/11 21:12 / dck	11/11/11 08:45	ICPMS204-B_111117A	293	R76189
Cadmium	ND	mg/L		0.00008		E200.8	11/19/11 21:12 / dck	11/11/11 08:45	ICPMS204-B_111117A	293	R76189
Calcium	55	mg/L		1		E200.8	11/19/11 21:12 / dck	11/11/11 08:45	ICPMS204-B_111117A	293	R76189
Copper	ND	mg/L		0.001		E200.8	11/19/11 21:12 / dck	11/11/11 08:45	ICPMS204-B_111117A	293	R76189
Lead	ND	mg/L		0.0005		E200.8	11/19/11 21:12 / dck	11/11/11 08:45	ICPMS204-B_111117A	293	R76189
Magnesium	12	mg/L		1		E200.8	11/19/11 21:12 / dck	11/11/11 08:45	ICPMS204-B_111117A	293	R76189
Potassium	4	mg/L		1		E200.8	11/19/11 21:12 / dck	11/11/11 08:45	ICPMS204-B_111117A	293	R76189
Sodium	15	mg/L		1		E200.8	11/19/11 21:12 / dck	11/11/11 08:45	ICPMS204-B_111117A	293	R76189
Zinc	ND	mg/L		0.01		E200.8	11/19/11 21:12 / dck	11/11/11 08:45	ICPMS204-B_111117A	293	R76189

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID ML-3
Lab ID: H11110203-008
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/09/11 11:00 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
INORGANICS											
Alkalinity, Total as CaCO3	240	mg/L		4		A2320 B	11/11/11 18:03 / cmm		MAN-TECH_111111B	46	R76069
Bicarbonate as HCO3	290	mg/L		4		A2320 B	11/11/11 18:03 / cmm		MAN-TECH_111111B	46	R76069
Chloride	53	mg/L		1		E300.0	11/17/11 22:35 / zeg		IC101-H_111117A	50	R76202
Sulfate	430	mg/L	D	2		E300.0	11/16/11 19:42 / zeg		IC101-H_111116B	50	R76168
Hardness as CaCO3	586	mg/L		1		A2340 B	11/22/11 09:10 / sld		WATERCALC_111122A	18	R76274
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	11/19/11 21:18 / dck	11/11/11 08:45	ICPMS204-B_111117A	294	R76189
Cadmium	ND	mg/L		0.00008		E200.8	11/19/11 21:18 / dck	11/11/11 08:45	ICPMS204-B_111117A	294	R76189
Calcium	181	mg/L		1		E200.8	11/19/11 21:18 / dck	11/11/11 08:45	ICPMS204-B_111117A	294	R76189
Copper	0.015	mg/L		0.001		E200.8	11/19/11 21:18 / dck	11/11/11 08:45	ICPMS204-B_111117A	294	R76189
Lead	0.0015	mg/L		0.0005		E200.8	11/19/11 21:18 / dck	11/11/11 08:45	ICPMS204-B_111117A	294	R76189
Magnesium	32	mg/L		1		E200.8	11/19/11 21:18 / dck	11/11/11 08:45	ICPMS204-B_111117A	294	R76189
Potassium	8	mg/L		1		E200.8	11/19/11 21:18 / dck	11/11/11 08:45	ICPMS204-B_111117A	294	R76189
Sodium	68	mg/L		1		E200.8	11/19/11 21:18 / dck	11/11/11 08:45	ICPMS204-B_111117A	294	R76189
Zinc	0.20	mg/L		0.01		E200.8	11/19/11 21:18 / dck	11/11/11 08:45	ICPMS204-B_111117A	294	R76189

Report Definitions:
RL - Analyte reporting limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID ML-2
Lab ID: H11110203-009
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/09/11 10:40 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
INORGANICS											
Alkalinity, Total as CaCO3	250	mg/L		4		A2320 B	11/11/11 18:10 / cmm		MAN-TECH_111111B	47	R76069
Bicarbonate as HCO3	300	mg/L		4		A2320 B	11/11/11 18:10 / cmm		MAN-TECH_111111B	47	R76069
Chloride	64	mg/L		1		E300.0	11/17/11 22:49 / zeg		IC101-H_111117A	51	R76202
Sulfate	490	mg/L	D	2		E300.0	11/16/11 19:56 / zeg		IC101-H_111116B	51	R76168
Hardness as CaCO3	647	mg/L		1		A2340 B	11/22/11 09:10 / sld		WATERCALC_111122A	19	R76274
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	11/19/11 21:25 / dck	11/11/11 08:45	ICPMS204-B_111117A	295	R76189
Cadmium	ND	mg/L		0.00008		E200.8	11/19/11 21:25 / dck	11/11/11 08:45	ICPMS204-B_111117A	295	R76189
Calcium	200	mg/L		1		E200.8	11/19/11 21:25 / dck	11/11/11 08:45	ICPMS204-B_111117A	295	R76189
Copper	ND	mg/L		0.001		E200.8	11/19/11 21:25 / dck	11/11/11 08:45	ICPMS204-B_111117A	295	R76189
Lead	ND	mg/L		0.0005		E200.8	11/19/11 21:25 / dck	11/11/11 08:45	ICPMS204-B_111117A	295	R76189
Magnesium	36	mg/L		1		E200.8	11/19/11 21:25 / dck	11/11/11 08:45	ICPMS204-B_111117A	295	R76189
Potassium	8	mg/L		1		E200.8	11/19/11 21:25 / dck	11/11/11 08:45	ICPMS204-B_111117A	295	R76189
Sodium	64	mg/L		1		E200.8	11/19/11 21:25 / dck	11/11/11 08:45	ICPMS204-B_111117A	295	R76189
Zinc	ND	mg/L		0.01		E200.8	11/19/11 21:25 / dck	11/11/11 08:45	ICPMS204-B_111117A	295	R76189

Report Definitions:
RL - Analyte reporting limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID ML-1
Lab ID: H11110203-010
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/09/11 10:20 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
INORGANICS											
Alkalinity, Total as CaCO3	370	mg/L		4		A2320 B	11/11/11 18:18 / cmm		MAN-TECH_111111B	48	R76069
Bicarbonate as HCO3	450	mg/L		4		A2320 B	11/11/11 18:18 / cmm		MAN-TECH_111111B	48	R76069
Chloride	170	mg/L		1		E300.0	11/17/11 23:03 / zeg		IC101-H_111117A	52	R76202
Sulfate	1000	mg/L	D	5		E300.0	11/16/11 20:10 / zeg		IC101-H_111116B	52	R76168
Hardness as CaCO3	1190	mg/L		1		A2340 B	11/22/11 09:10 / sld		WATERCALC_111122A	20	R76274
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	11/19/11 21:31 / dck	11/11/11 08:45	ICPMS204-B_111117A	296	R76189
Cadmium	0.00059	mg/L		0.00008		E200.8	11/19/11 21:31 / dck	11/11/11 08:45	ICPMS204-B_111117A	296	R76189
Calcium	369	mg/L		1		E200.8	11/19/11 21:31 / dck	11/11/11 08:45	ICPMS204-B_111117A	296	R76189
Copper	0.757	mg/L		0.001		E200.8	11/19/11 21:31 / dck	11/11/11 08:45	ICPMS204-B_111117A	296	R76189
Lead	0.0005	mg/L		0.0005		E200.8	11/19/11 21:31 / dck	11/11/11 08:45	ICPMS204-B_111117A	296	R76189
Magnesium	66	mg/L		1		E200.8	11/19/11 21:31 / dck	11/11/11 08:45	ICPMS204-B_111117A	296	R76189
Potassium	15	mg/L		1		E200.8	11/19/11 21:31 / dck	11/11/11 08:45	ICPMS204-B_111117A	296	R76189
Sodium	233	mg/L		1		E200.8	11/19/11 21:31 / dck	11/11/11 08:45	ICPMS204-B_111117A	296	R76189
Zinc	0.08	mg/L		0.01		E200.8	11/19/11 21:31 / dck	11/11/11 08:45	ICPMS204-B_111117A	296	R76189

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID WST-01
Lab ID: H11110203-011
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/09/11 14:15 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
INORGANICS											
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	11/11/11 18:25 / cmm		MAN-TECH_111111B	49	R76069
Bicarbonate as HCO3	180	mg/L		4		A2320 B	11/11/11 18:25 / cmm		MAN-TECH_111111B	49	R76069
Chloride	8	mg/L		1		E300.0	11/17/11 23:17 / zeg		IC101-H_111117A	53	R76202
Sulfate	75	mg/L		1		E300.0	11/16/11 20:24 / zeg		IC101-H_111116B	53	R76168
Hardness as CaCO3	205	mg/L		1		A2340 B	11/22/11 09:10 / sld		WATERCALC_111122A	21	R76274
METALS, DISSOLVED											
Arsenic	0.043	mg/L		0.005		E200.8	11/19/11 21:38 / dck	11/11/11 08:45	ICPMS204-B_111117A	297	R76189
Cadmium	0.00015	mg/L		0.00008		E200.8	11/19/11 21:38 / dck	11/11/11 08:45	ICPMS204-B_111117A	297	R76189
Calcium	61	mg/L		1		E200.8	11/19/11 21:38 / dck	11/11/11 08:45	ICPMS204-B_111117A	297	R76189
Copper	0.062	mg/L		0.001		E200.8	11/19/11 21:38 / dck	11/11/11 08:45	ICPMS204-B_111117A	297	R76189
Lead	0.0064	mg/L		0.0005		E200.8	11/19/11 21:38 / dck	11/11/11 08:45	ICPMS204-B_111117A	297	R76189
Magnesium	13	mg/L		1		E200.8	11/19/11 21:38 / dck	11/11/11 08:45	ICPMS204-B_111117A	297	R76189
Potassium	4	mg/L		1		E200.8	11/19/11 21:38 / dck	11/11/11 08:45	ICPMS204-B_111117A	297	R76189
Sodium	18	mg/L		1		E200.8	11/19/11 21:38 / dck	11/11/11 08:45	ICPMS204-B_111117A	297	R76189
Zinc	0.13	mg/L		0.01		E200.8	11/19/11 21:38 / dck	11/11/11 08:45	ICPMS204-B_111117A	297	R76189

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID WST-02
Lab ID: H11110203-012
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/09/11 14:25 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
INORGANICS											
Alkalinity, Total as CaCO3	170	mg/L		4		A2320 B	11/11/11 18:33 / cmm		MAN-TECH_111111B	50	R76069
Bicarbonate as HCO3	210	mg/L		4		A2320 B	11/11/11 18:33 / cmm		MAN-TECH_111111B	50	R76069
Chloride	22	mg/L		1		E300.0	11/17/11 23:30 / zeg		IC101-H_111117A	54	R76202
Sulfate	140	mg/L		1		E300.0	11/16/11 20:38 / zeg		IC101-H_111116B	54	R76168
Hardness as CaCO3	284	mg/L		1		A2340 B	11/22/11 09:10 / sld		WATERCALC_111122A	22	R76274
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	11/19/11 22:30 / dck	11/11/11 08:45	ICPMS204-B_111117A	305	R76189
Cadmium	0.00015	mg/L		0.00008		E200.8	11/19/11 22:30 / dck	11/11/11 08:45	ICPMS204-B_111117A	305	R76189
Calcium	83	mg/L		1		E200.8	11/19/11 22:30 / dck	11/11/11 08:45	ICPMS204-B_111117A	305	R76189
Copper	0.006	mg/L		0.001		E200.8	11/19/11 22:30 / dck	11/11/11 08:45	ICPMS204-B_111117A	305	R76189
Lead	ND	mg/L		0.0005		E200.8	11/19/11 22:30 / dck	11/11/11 08:45	ICPMS204-B_111117A	305	R76189
Magnesium	19	mg/L		1		E200.8	11/19/11 22:30 / dck	11/11/11 08:45	ICPMS204-B_111117A	305	R76189
Potassium	4	mg/L		1		E200.8	11/19/11 22:30 / dck	11/11/11 08:45	ICPMS204-B_111117A	305	R76189
Sodium	30	mg/L		1		E200.8	11/19/11 22:30 / dck	11/11/11 08:45	ICPMS204-B_111117A	305	R76189
Zinc	ND	mg/L		0.01		E200.8	11/19/11 22:30 / dck	11/11/11 08:45	ICPMS204-B_111117A	305	R76189

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID WST-03
Lab ID: H11110203-013
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/09/11 14:40 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
INORGANICS											
Alkalinity, Total as CaCO3	170	mg/L		4		A2320 B	11/11/11 18:57 / cmm		MAN-TECH_111111B	56	R76069
Bicarbonate as HCO3	210	mg/L		4		A2320 B	11/11/11 18:57 / cmm		MAN-TECH_111111B	56	R76069
Chloride	22	mg/L		1		E300.0	11/17/11 23:44 / zeg		IC101-H_111117A	55	R76202
Sulfate	140	mg/L		1		E300.0	11/16/11 20:52 / zeg		IC101-H_111116B	55	R76168
Hardness as CaCO3	306	mg/L		1		A2340 B	11/22/11 09:10 / sld		WATERCALC_111122A	23	R76274
METALS, DISSOLVED											
Arsenic	0.018	mg/L		0.005		E200.8	11/19/11 22:36 / dck	11/11/11 08:45	ICPMS204-B_111117A	306	R76189
Cadmium	0.00024	mg/L		0.00008		E200.8	11/19/11 22:36 / dck	11/11/11 08:45	ICPMS204-B_111117A	306	R76189
Calcium	91	mg/L		1		E200.8	11/19/11 22:36 / dck	11/11/11 08:45	ICPMS204-B_111117A	306	R76189
Copper	0.013	mg/L		0.001		E200.8	11/19/11 22:36 / dck	11/11/11 08:45	ICPMS204-B_111117A	306	R76189
Lead	ND	mg/L		0.0005		E200.8	11/19/11 22:36 / dck	11/11/11 08:45	ICPMS204-B_111117A	306	R76189
Magnesium	19	mg/L		1		E200.8	11/19/11 22:36 / dck	11/11/11 08:45	ICPMS204-B_111117A	306	R76189
Potassium	5	mg/L		1		E200.8	11/19/11 22:36 / dck	11/11/11 08:45	ICPMS204-B_111117A	306	R76189
Sodium	30	mg/L		1		E200.8	11/19/11 22:36 / dck	11/11/11 08:45	ICPMS204-B_111117A	306	R76189
Zinc	0.04	mg/L		0.01		E200.8	11/19/11 22:36 / dck	11/11/11 08:45	ICPMS204-B_111117A	306	R76189

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID WST-04
Lab ID: H11110203-014
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/09/11 14:50 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
INORGANICS											
Alkalinity, Total as CaCO3	180	mg/L		4		A2320 B	11/11/11 19:11 / cmm		MAN-TECH_111111B	59	R76069
Bicarbonate as HCO3	210	mg/L		4		A2320 B	11/11/11 19:11 / cmm		MAN-TECH_111111B	59	R76069
Chloride	23	mg/L		1		E300.0	11/18/11 00:26 / zeg		IC101-H_111117A	58	R76202
Sulfate	150	mg/L		1		E300.0	11/16/11 21:33 / zeg		IC101-H_111116B	58	R76168
Hardness as CaCO3	309	mg/L		1		A2340 B	11/22/11 09:10 / sld		WATERCALC_111122A	24	R76274
METALS, DISSOLVED											
Arsenic	0.022	mg/L		0.005		E200.8	11/19/11 22:43 / dck	11/11/11 08:45	ICPMS204-B_111117A	307	R76189
Cadmium	0.00016	mg/L		0.00008		E200.8	11/19/11 22:43 / dck	11/11/11 08:45	ICPMS204-B_111117A	307	R76189
Calcium	91	mg/L		1		E200.8	11/19/11 22:43 / dck	11/11/11 08:45	ICPMS204-B_111117A	307	R76189
Copper	0.086	mg/L		0.001		E200.8	11/19/11 22:43 / dck	11/11/11 08:45	ICPMS204-B_111117A	307	R76189
Lead	0.0064	mg/L		0.0005		E200.8	11/19/11 22:43 / dck	11/11/11 08:45	ICPMS204-B_111117A	307	R76189
Magnesium	20	mg/L		1		E200.8	11/19/11 22:43 / dck	11/11/11 08:45	ICPMS204-B_111117A	307	R76189
Potassium	5	mg/L		1		E200.8	11/19/11 22:43 / dck	11/11/11 08:45	ICPMS204-B_111117A	307	R76189
Sodium	32	mg/L		1		E200.8	11/19/11 22:43 / dck	11/11/11 08:45	ICPMS204-B_111117A	307	R76189
Zinc	0.04	mg/L		0.01		E200.8	11/19/11 22:43 / dck	11/11/11 08:45	ICPMS204-B_111117A	307	R76189

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID CFR-3
Lab ID: H11110203-015
Matrix: Aqueous

Project: Clark Fork River Groundwater 2011
Collection Date: 11/09/11 13:00 **DateReceived:** 11/10/11
Report Date: 12/07/11

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
INORGANICS											
Alkalinity, Total as CaCO3	220	mg/L		4		A2320 B	11/11/11 19:27 / cmm		MAN-TECH_111111B	62	R76069
Bicarbonate as HCO3	270	mg/L		4		A2320 B	11/11/11 19:27 / cmm		MAN-TECH_111111B	62	R76069
Chloride	33	mg/L		1		E300.0	11/18/11 00:40 / zeg		IC101-H_111117A	59	R76202
Sulfate	220	mg/L		1		E300.0	11/16/11 21:47 / zeg		IC101-H_111116B	59	R76168
Hardness as CaCO3	420	mg/L		1		A2340 B	11/22/11 09:10 / sld		WATERCALC_111122A	25	R76274
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	11/19/11 22:49 / dck	11/11/11 08:45	ICPMS204-B_111117A	308	R76189
Cadmium	0.00260	mg/L		0.00008		E200.8	11/19/11 22:49 / dck	11/11/11 08:45	ICPMS204-B_111117A	308	R76189
Calcium	123	mg/L		1		E200.8	11/19/11 22:49 / dck	11/11/11 08:45	ICPMS204-B_111117A	308	R76189
Copper	0.184	mg/L		0.001		E200.8	11/19/11 22:49 / dck	11/11/11 08:45	ICPMS204-B_111117A	308	R76189
Lead	0.0006	mg/L		0.0005		E200.8	11/19/11 22:49 / dck	11/11/11 08:45	ICPMS204-B_111117A	308	R76189
Magnesium	28	mg/L		1		E200.8	11/19/11 22:49 / dck	11/11/11 08:45	ICPMS204-B_111117A	308	R76189
Potassium	5	mg/L		1		E200.8	11/19/11 22:49 / dck	11/11/11 08:45	ICPMS204-B_111117A	308	R76189
Sodium	33	mg/L		1		E200.8	11/19/11 22:49 / dck	11/11/11 08:45	ICPMS204-B_111117A	308	R76189
Zinc	0.31	mg/L		0.01		E200.8	11/19/11 22:49 / dck	11/11/11 08:45	ICPMS204-B_111117A	308	R76189

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level. ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 12/10/11

Project: Clark Fork River Groundwater 2011 **Work Order:** H11110203

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R76069
Sample ID: MBLK		Method Blank				Run: MAN-TECH_111111B				11/11/11 15:22
Alkalinity, Total as CaCO3		ND	mg/L	2						
Sample ID: LCS-11072011		Laboratory Control Sample				Run: MAN-TECH_111111B				11/11/11 15:30
Alkalinity, Total as CaCO3		610	mg/L	4.0	101	90	110			
Sample ID: H11110203-001BDUP	2	Sample Duplicate				Run: MAN-TECH_111111B				11/11/11 16:58
Alkalinity, Total as CaCO3		ND	mg/L	4.0					10	
Bicarbonate as HCO3		1.5	mg/L	4.0					10	
Sample ID: H11110203-002BMS		Sample Matrix Spike				Run: MAN-TECH_111111B				11/11/11 17:14
Alkalinity, Total as CaCO3		780	mg/L	4.0	91	80	120			
Sample ID: H11110203-003BDUP	2	Sample Duplicate				Run: MAN-TECH_111111B				11/11/11 17:27
Alkalinity, Total as CaCO3		120	mg/L	4.0				0.3	10	
Bicarbonate as HCO3		140	mg/L	4.0				0.3	10	
Sample ID: H11110203-013BDUP	2	Sample Duplicate				Run: MAN-TECH_111111B				11/11/11 19:04
Alkalinity, Total as CaCO3		170	mg/L	4.0				0.9	10	
Bicarbonate as HCO3		210	mg/L	4.0				0.9	10	
Sample ID: H11110203-014BMS		Sample Matrix Spike				Run: MAN-TECH_111111B				11/11/11 19:20
Alkalinity, Total as CaCO3		730	mg/L	4.0	93	80	120			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 12/10/11

Project: Clark Fork River Groundwater 2011 **Work Order:** H11110203

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B									Analytical Run: COND_111111A	
Sample ID: ICV1_111111A	Initial Calibration Verification Standard								11/11/11 10:21	
Conductivity		1000	umhos/cm	1.0	100	90	110			
Method: A2510 B									Batch: 111111A-COND-PROBE-W	
Sample ID: H11110203-001BDUP	Sample Duplicate					Run: COND_111111A			11/11/11 10:24	
Conductivity		2.04	umhos/cm	1.0				3.6	10	
Sample ID: H11110203-010BDUP	Sample Duplicate					Run: COND_111111A			11/11/11 10:29	
Conductivity		2440	umhos/cm	1.0				0.3	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 12/10/11

Project: Clark Fork River Groundwater 2011 **Work Order:** H11110203

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B									Analytical Run: PH2_111111A	
Sample ID: CCV1_111111A		Continuing Calibration Verification Standard							11/11/11 10:41	
pH		4.00	s.u.	0.10	100	97	103			
Sample ID: CCV2_111111A		Continuing Calibration Verification Standard							11/11/11 10:42	
pH		7.02	s.u.	0.10	100	98	102			
Sample ID: ICV1_111111A		Initial Calibration Verification Standard							11/11/11 10:43	
pH		7.03	s.u.	0.10	100	98	102			
Method: A4500-H B									Batch: 111111A-PH-W	
Sample ID: CCV3_111111A		Continuing Calibration Verification Standard				Run: PH2_111111A			11/11/11 10:40	
pH		10.1	s.u.	0.10	101	99	101			
Sample ID: H11110203-002BDUP		Sample Duplicate				Run: PH2_111111A			11/11/11 10:52	
pH		7.32	s.u.	0.10				0.3	3	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 12/10/11

Project: Clark Fork River Groundwater 2011 **Work Order:** H11110203

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_111117A		
Sample ID: ICV STD	9	Initial Calibration Verification Standard							11/19/11 18:50	
Arsenic		0.0506	mg/L	0.0050	101	90	110			
Cadmium		0.0264	mg/L	0.0010	105	90	110			
Calcium		2.65	mg/L	0.50	106	90	110			
Copper		0.0517	mg/L	0.010	103	90	110			
Lead		0.0494	mg/L	0.010	99	90	110			
Magnesium		2.59	mg/L	0.50	104	90	110			
Potassium		2.57	mg/L	0.50	103	90	110			
Sodium		2.59	mg/L	0.50	103	90	110			
Zinc		0.0523	mg/L	0.010	105	90	110			
Sample ID: ICSA	9	Interference Check Sample A							11/19/11 18:56	
Arsenic		0.000111	mg/L	0.0050						
Cadmium		0.000371	mg/L	0.0010						
Calcium		123	mg/L	0.50	103	70	130			
Copper		0.000430	mg/L	0.010						
Lead		5.80E-05	mg/L	0.010						
Magnesium		40.4	mg/L	0.50	101	70	130			
Potassium		40.2	mg/L	0.50	100	70	130			
Sodium		101	mg/L	0.50	101	70	130			
Zinc		0.00104	mg/L	0.010						
Sample ID: ICSAB	9	Interference Check Sample AB							11/19/11 19:03	
Arsenic		0.0100	mg/L	0.0050	100	70	130			
Cadmium		0.00952	mg/L	0.0010	95	70	130			
Calcium		124	mg/L	0.50	103	70	130			
Copper		0.0196	mg/L	0.010	98	70	130			
Lead		5.20E-05	mg/L	0.010		0	0			
Magnesium		41.0	mg/L	0.50	103	70	130			
Potassium		39.9	mg/L	0.50	100	70	130			
Sodium		102	mg/L	0.50	102	70	130			
Zinc		0.0105	mg/L	0.010	105	70	130			
Method: E200.8										Batch: R76189
Sample ID: ICB	9	Method Blank				Run: ICPMS204-B_111117A			11/17/11 11:51	
Arsenic		ND	mg/L	3E-05						
Cadmium		ND	mg/L	1E-05						
Calcium		ND	mg/L	0.003						
Copper		ND	mg/L	3E-05						
Lead		ND	mg/L	1.0E-05						
Magnesium		ND	mg/L	0.0007						
Potassium		0.01	mg/L	0.010						
Sodium		0.004	mg/L	0.003						
Zinc		0.0004	mg/L	0.0003						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 12/10/11

Project: Clark Fork River Groundwater 2011 **Work Order:** H11110203

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R76189
Sample ID: LFB	9	Laboratory Fortified Blank				Run: ICPMS204-B_111117A				11/17/11 11:57
Arsenic		0.0476	mg/L	0.0050	95	85	115			
Cadmium		0.0475	mg/L	0.0010	95	85	115			
Calcium		49.6	mg/L	0.50	99	85	115			
Copper		0.0468	mg/L	0.010	94	85	115			
Lead		0.0490	mg/L	0.010	98	85	115			
Magnesium		49.3	mg/L	0.50	99	85	115			
Potassium		49.9	mg/L	0.50	100	85	115			
Sodium		49.7	mg/L	0.50	99	85	115			
Zinc		0.0474	mg/L	0.010	94	85	115			
Sample ID: H11110203-001AMS	9	Sample Matrix Spike				Run: ICPMS204-B_111117A				11/19/11 19:55
Arsenic		0.0478	mg/L	0.0050	96	70	130			
Cadmium		0.0452	mg/L	0.0010	90	70	130			
Calcium		49.9	mg/L	1.0	100	70	130			
Copper		0.0475	mg/L	0.010	95	70	130			
Lead		0.0473	mg/L	0.010	95	70	130			
Magnesium		47.8	mg/L	1.0	96	70	130			
Potassium		48.7	mg/L	1.0	97	70	130			
Sodium		48.0	mg/L	1.0	96	70	130			
Zinc		0.0557	mg/L	0.010	105	70	130			
Sample ID: H11110203-001AMSD	9	Sample Matrix Spike Duplicate				Run: ICPMS204-B_111117A				11/19/11 20:01
Arsenic		0.0481	mg/L	0.0050	96	70	130	0.6	20	
Cadmium		0.0454	mg/L	0.0010	91	70	130	0.6	20	
Calcium		49.7	mg/L	1.0	99	70	130	0.4	20	
Copper		0.0477	mg/L	0.010	95	70	130	0.4	20	
Lead		0.0475	mg/L	0.010	95	70	130	0.4	20	
Magnesium		47.2	mg/L	1.0	94	70	130	1.3	20	
Potassium		48.2	mg/L	1.0	96	70	130	1.2	20	
Sodium		47.4	mg/L	1.0	95	70	130	1.4	20	
Zinc		0.0504	mg/L	0.010	94	70	130	9.9	20	
Sample ID: H11110203-011AMS	9	Sample Matrix Spike				Run: ICPMS204-B_111117A				11/19/11 21:44
Arsenic		0.0905	mg/L	0.0050	96	70	130			
Cadmium		0.0445	mg/L	0.0010	89	70	130			
Calcium		114	mg/L	1.0	105	70	130			
Copper		0.110	mg/L	0.010	95	70	130			
Lead		0.0534	mg/L	0.010	94	70	130			
Magnesium		60.2	mg/L	1.0	95	70	130			
Potassium		54.5	mg/L	1.0	101	70	130			
Sodium		66.4	mg/L	1.0	97	70	130			
Zinc		0.166	mg/L	0.010	79	70	130			
Sample ID: H11110203-011AMSD	9	Sample Matrix Spike Duplicate				Run: ICPMS204-B_111117A				11/19/11 21:50
Arsenic		0.0903	mg/L	0.0050	95	70	130	0.2	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 12/10/11

Project: Clark Fork River Groundwater 2011 **Work Order:** H11110203

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R76189
Sample ID: H11110203-011AMSD	9	Sample Matrix Spike Duplicate				Run: ICPMS204-B_111117A				11/19/11 21:50
Cadmium		0.0440	mg/L	0.0010	88	70	130	1.1	20	
Calcium		113	mg/L	1.0	104	70	130	0.5	20	
Copper		0.110	mg/L	0.010	96	70	130	0.1	20	
Lead		0.0541	mg/L	0.010	95	70	130	1.3	20	
Magnesium		60.0	mg/L	1.0	95	70	130	0.3	20	
Potassium		54.8	mg/L	1.0	101	70	130	0.4	20	
Sodium		65.3	mg/L	1.0	95	70	130	1.7	20	
Zinc		0.166	mg/L	0.010	81	70	130	0.5	20	
Method: E200.8										Analytical Run: ICPMS204-B_111128A
Sample ID: ICV STD	2	Initial Calibration Verification Standard								11/28/11 11:05
Calcium		2.63	mg/L	0.50	105	90	110			
Zinc		0.0511	mg/L	0.010	102	90	110			
Sample ID: ICSA	2	Interference Check Sample A								11/28/11 11:12
Calcium		141	mg/L	0.50	117	70	130			
Zinc		0.00141	mg/L	0.010						
Sample ID: ICSAB	2	Interference Check Sample AB								11/28/11 11:39
Calcium		128	mg/L	0.50	106	70	130			
Zinc		0.0108	mg/L	0.010	108	70	130			
Method: E200.8										Batch: R76381
Sample ID: ICB	2	Method Blank				Run: ICPMS204-B_111128A				11/28/11 12:18
Calcium		ND	mg/L	0.003						
Zinc		0.002	mg/L	0.0003						
Sample ID: LFB	2	Laboratory Fortified Blank				Run: ICPMS204-B_111128A				11/28/11 12:24
Calcium		48.7	mg/L	0.50	97	85	115			
Zinc		0.0501	mg/L	0.010	96	85	115			
Sample ID: H11110313-001BMS	2	Sample Matrix Spike				Run: ICPMS204-B_111128A				11/28/11 15:07
Calcium		120	mg/L	1.0	97	70	130			
Zinc		0.0490	mg/L	0.010	95	70	130			
Sample ID: H11110313-001BMSD	2	Sample Matrix Spike Duplicate				Run: ICPMS204-B_111128A				11/28/11 15:13
Calcium		121	mg/L	1.0	99	70	130	0.7	20	
Zinc		0.0497	mg/L	0.010	96	70	130	1.5	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 12/10/11

Project: Clark Fork River Groundwater 2011 **Work Order:** H11110203

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC101-H_111116B	
Sample ID: ICV111611-12		Initial Calibration Verification Standard							11/16/11 11:35	
Sulfate		390	mg/L	1.0	99	90	110			
Sample ID: CCV111611-30		Continuing Calibration Verification Standard							11/16/11 15:59	
Sulfate		400	mg/L	1.0	101	90	110			
Sample ID: CCV111611-44		Continuing Calibration Verification Standard							11/16/11 19:14	
Sulfate		410	mg/L	1.0	102	90	110			
Method: E300.0									Batch: R76168	
Sample ID: ICB111611-13		Method Blank				Run: IC101-H_111116B			11/16/11 11:49	
Sulfate		ND	mg/L	0.1						
Sample ID: LFB111611-14		Laboratory Fortified Blank				Run: IC101-H_111116B			11/16/11 12:03	
Sulfate		180	mg/L	1.1	90	90	110			
Sample ID: LFBD111611-14		Laboratory Fortified Blank				Run: IC101-H_111116B			11/16/11 12:17	
Sulfate		180	mg/L	1.1	92	90	110			
Sample ID: H11110203-005BMS		Sample Matrix Spike				Run: IC101-H_111116B			11/16/11 18:19	
Sulfate		390	mg/L	1.1	106	90	110			
Sample ID: H11110203-005BMSD		Sample Matrix Spike Duplicate				Run: IC101-H_111116B			11/16/11 18:33	
Sulfate		390	mg/L	1.1	106	90	110	0.1	20	
Sample ID: H11110203-013BMS		Sample Matrix Spike				Run: IC101-H_111116B			11/16/11 21:06	
Sulfate		360	mg/L	1.1	106	90	110			
Sample ID: H11110203-013BMSD		Sample Matrix Spike Duplicate				Run: IC101-H_111116B			11/16/11 21:20	
Sulfate		360	mg/L	1.1	107	90	110	0.4	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 12/10/11

Project: Clark Fork River Groundwater 2011 **Work Order:** H11110203

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC101-H_111117A	
Sample ID: ICV111611-12		Initial Calibration Verification Standard							11/17/11 14:28	
Chloride		99	mg/L	1.0	99	90	110			
Sample ID: CCV111611-30		Continuing Calibration Verification Standard							11/17/11 18:52	
Chloride		100	mg/L	1.0	101	90	110			
Sample ID: CCV111611-44		Continuing Calibration Verification Standard							11/17/11 22:07	
Chloride		100	mg/L	1.0	101	90	110			
Method: E300.0									Batch: R76202	
Sample ID: ICB111611-13		Method Blank				Run: IC101-H_111117A			11/17/11 14:42	
Chloride		ND	mg/L	0.07						
Sample ID: LFB111611-14		Laboratory Fortified Blank				Run: IC101-H_111117A			11/17/11 14:55	
Chloride		47	mg/L	1.0	95	90	110			
Sample ID: LFBD111611-14		Laboratory Fortified Blank				Run: IC101-H_111117A			11/17/11 15:09	
Chloride		47	mg/L	1.0	94	90	110			
Sample ID: H11110203-005BMS		Sample Matrix Spike				Run: IC101-H_111117A			11/17/11 21:11	
Chloride		60	mg/L	1.0	100	90	110			
Sample ID: H11110203-005BMSD		Sample Matrix Spike Duplicate				Run: IC101-H_111117A			11/17/11 21:25	
Chloride		60	mg/L	1.0	100	90	110	0.1	20	
Sample ID: H11110203-013BMS		Sample Matrix Spike				Run: IC101-H_111117A			11/17/11 23:58	
Chloride		74	mg/L	1.0	103	90	110			
Sample ID: H11110203-013BMSD		Sample Matrix Spike Duplicate				Run: IC101-H_111117A			11/18/11 00:12	
Chloride		74	mg/L	1.0	103	90	110	0.1	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Workorder Receipt Checklist

MT DEQ-Federal Superfund

H11110203

Login completed by: Tracy L. Lorash
Date Received: 11/10/2011

Reviewed by: BL2000\sdull
Received by: elm

Reviewed Date: 11/23/2011
Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Container/Temp Blank temperature:	3.6°C On Ice		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☑	Not Applicable ☐

Contact and Corrective Action Comments:

Samples for Dissolved Metals were subsampled, filtered, and preserved to pH <2 with 2 mL of nitric acid per 250 mL in the laboratory. According to 40CFR136, samples for Dissolved Metals should be filtered and preserved within 15 minutes of collection. TI 11/11/11.

Chain of Custody and Analytical Request Record

Page 1 of 2

PLEASE PRINT (Provide as much information as possible.)

Company Name: MT DEQ	Project Name, PWS, Permit, Etc.: Clark Fork River Groundwater 2011	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: PO Box 200901 Helena MT 59620	Contact Name: Brian Bartkowiak Phone/Fax: 461-3070	Email:	Sampler: (Please Print) John DeArment Atkins
Invoice Address: SAME	Invoice Contact & Phone: 11 11	Purchase Order:	Quote/Bottle Order: 8548

Special Report/Formats:

☐ DW ☐ POTW/WWTP ☐ State: _____ ☐ Other: _____

☐ EDD/EDT (Electronic Data) Format: _____ ☐ LEVEL IV ☐ NELAC

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids Vegetation Bioassay Other DW - Drinking Water

ANALYSIS REQUESTED

SEE ATTACHED

Standard Turnaround (TAT)

R U S H

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments: Metals samples not filtered or preserved

Shipped by: Hand

Cooler ID(s): 4

Receipt Temp: 3.6 °C

On Ice: (Y) N

Custody Seal: On Bottle Y (N); On Cooler Y (N)

Intact: Y N

Signature Match: Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Diss As, Cd, Cu, Pb, Zn	Ca, Mg, Na, K, Cl, SO4, HCO3	pH, conductivity	Low Cr6
1	BLANK	11-10-11	1400	GW	X	X		X
2	LM-1	11	1330	11	X	X	X	X
3	LM-2	11	1315	11	X	X	X	X
4	CFR-4	11	1215	11	X	X	X	X
5	CFR-5	11	1145	11	X	X		X
6	CFR-5 DUP	11	1145	11	X	X		X
7	CFR-2	11-9-11	1400	11	X	X		X
8	ML-3	11	11:00	11	X	X		X
9	ML-2	11	1040	11	X	X		X
10	ML-1	11	1020	11	X	X		X

LABORATORY USE ONLY H11110203

Custody Record MUST be Signed

Relinquished by (print): John DeArment Date/Time: 11-10-11 4:15 Signature:

Relinquished by (print): Date/Time: Signature:

Sample Disposal: Return to Client: _____ Lab Disposal: _____

Received by (print): Date/Time: Signature:

Received by (print): Date/Time: Signature:

Received by Laboratory: Esther Merritt Date/Time: 11-10-11 16:15 Signature: Esther Merritt

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

Chain of Custody and Analytical Request Record

Page 2 of 2

PLEASE PRINT (Provide as much information as possible.)

Company Name: MT DEQ	Project Name, PWS, Permit, Etc.: Clark Fork River Groundwater 2011	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: PO Box 200901 Helena MT 59620	Contact Name: Brian Bartkowiak Phone/Fax: 461-3070	Email:	Sampler: (Please Print) John DeArment Atkins
Invoice Address: SAME	Invoice Contact & Phone: " "	Purchase Order:	Quote/Bottle Order: 8348

Special Report/Formats:

☐ DW ☐ POTW/WWTP ☐ State: _____ ☐ Other: _____

☐ EDD/EDT (Electronic Data) Format: _____ ☐ LEVEL IV ☐ NELAC

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids Vegetation Bioassay Other DW - Drinking Water

ANALYSIS REQUESTED

SEE ATTACHED

Standard Turnaround (TAT)

RUSH

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments: Metals samples not filtered or preserved

Shipped by: Hand

Cooler ID(s): 1

Receipt Temp: 3.6 °C

On Ice: (Y) N

Custody Seal: On Bottle Y (N); On Cooler Y (N); Intact Y N; Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Diss As, Cd, Cu, Pb, Zn	Ca, Mg, Na, K, Cl, SO4, Hardness
1	WST-01	11-9-11	1415	GW	x	x x
2	WST-02	"	1425	"	x	x x
3	WST-03	"	1440	"	x	x x
4	WST-04	"	1450	"	x	x x
5	CFR-3	"	1300	"	x	x x
6						
7						
8						
9						
10						

LABORATORY USE ONLY H11110203

Custody Record MUST be Signed

Relinquished by (print): John DeArment	Date/Time: 11-10-11 4:15	Signature:	Received by (print):	Date/Time:	Signature:
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
			Received by Laboratory: Esther Merritt	Date/Time: 11-10-11 16:15	Signature: Esther Merritt

Sample Disposal: Return to Client: _____ Lab Disposal: _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

Appendix B6

3rd Quarter Synoptic Monitoring
Surface Water Reports

ANALYTICAL SUMMARY REPORT

September 23, 2011

MT DEQ-Federal Superfund
PO Box 200901
Helena, MT 59620-0901

Workorder No.: H11080566 Quote ID: H624 - CFR Monitoring-474374

Project Name: Clark Fork River

Energy Laboratories Inc Helena MT received the following 13 samples for MT DEQ-Federal Superfund on 8/31/2011 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H11080566-001	CFR-03A	08/30/11 10:00	08/31/11	Aqueous	Metals by ICP/ICPMS, Dissolved Metals by ICP/ICPMS, Tot. Rec. Alkalinity Conductivity Hardness as CaCO3 Anions by Ion Chromatography Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite Nitrogen, Total Persulfate Metals Digestion by EPA 200.2 Digestion, Total P Water Nitrogen, Total Persulfate Preparation for TSS Phosphorus, Total Solids, Total Suspended
H11080566-002	CFR-03A Dup	08/30/11 10:30	08/31/11	Aqueous	Same As Above
H11080566-003	Blank	08/30/11 9:30	08/31/11	Aqueous	Same As Above
H11080566-004	SYN-01	08/30/11 11:00	08/31/11	Aqueous	Same As Above
H11080566-005	SYN-02	08/30/11 13:00	08/31/11	Aqueous	Same As Above
H11080566-006	SYN-03	08/30/11 13:45	08/31/11	Aqueous	Same As Above
H11080566-007	SYN-04	08/30/11 15:15	08/31/11	Aqueous	Same As Above
H11080566-008	SYN-05	08/30/11 16:30	08/31/11	Aqueous	Same As Above
H11080566-009	SYN-06	08/31/11 9:30	08/31/11	Aqueous	Same As Above
H11080566-010	SYN-07	08/31/11 10:30	08/31/11	Aqueous	Same As Above
H11080566-011	SYN-08	08/31/11 11:30	08/31/11	Aqueous	Same As Above
H11080566-012	SYN-09	08/31/11 12:45	08/31/11	Aqueous	Same As Above
H11080566-013	SS-25	08/31/11 13:45	08/31/11	Aqueous	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise reported.

Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

ANALYTICAL SUMMARY REPORT

Report Approved By:

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: Clark Fork River
Lab ID: H11080566-001
Client Sample ID CFR-03A

Report Date: 09/23/11
Collection Date: 08/30/11 10:00
DateReceived: 08/31/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	09/01/11 09:57 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	09/01/11 18:15 / cmm
Bicarbonate as HCO3	130	mg/L		4		A2320 B	09/01/11 18:15 / cmm
Sulfate	45	mg/L		1		E300.0	09/01/11 19:25 / zeg
Hardness as CaCO3	156	mg/L		1		A2340 B	09/13/11 09:51 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L		0.05		E353.2	09/01/11 16:44 / reh
Nitrogen, Total	0.31	mg/L		0.05		A4500 N-C	09/09/11 11:37 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 16:48 / reh
Phosphorus, Total as P	0.023	mg/L		0.005		E365.1	09/12/11 14:25 / reh
METALS, DISSOLVED							
Arsenic	0.015	mg/L		0.005		E200.8	09/10/11 01:49 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 01:49 / sld
Calcium	46	mg/L		1		E200.8	09/10/11 01:49 / sld
Copper	0.004	mg/L		0.001		E200.8	09/10/11 01:49 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 01:49 / sld
Magnesium	10	mg/L		1		E200.8	09/10/11 01:49 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 01:49 / sld
METALS, TOTAL RECOVERABLE							
Arsenic	0.015	mg/L		0.005		E200.8	09/10/11 01:53 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 01:53 / sld
Copper	0.012	mg/L		0.001		E200.8	09/10/11 01:53 / sld
Lead	0.0011	mg/L		0.0005		E200.8	09/10/11 01:53 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 01:53 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: Clark Fork River
Lab ID: H11080566-002
Client Sample ID CFR-03A Dup

Report Date: 09/23/11
Collection Date: 08/30/11 10:30
DateReceived: 08/31/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	6	mg/L		1		A2540 D	09/01/11 09:58 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	09/01/11 18:21 / cmm
Bicarbonate as HCO3	140	mg/L		4		A2320 B	09/01/11 18:21 / cmm
Sulfate	44	mg/L		1		E300.0	09/01/11 19:37 / zeg
Hardness as CaCO3	152	mg/L		1		A2340 B	09/13/11 09:51 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L		0.05		E353.2	09/01/11 16:47 / reh
Nitrogen, Total	0.20	mg/L		0.05		A4500 N-C	09/09/11 11:39 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 16:50 / reh
Phosphorus, Total as P	0.022	mg/L		0.005		E365.1	09/12/11 14:26 / reh
METALS, DISSOLVED							
Arsenic	0.015	mg/L		0.005		E200.8	09/10/11 01:57 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 01:57 / sld
Calcium	44	mg/L		1		E200.8	09/10/11 01:57 / sld
Copper	0.004	mg/L		0.001		E200.8	09/10/11 01:57 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 01:57 / sld
Magnesium	10	mg/L		1		E200.8	09/10/11 01:57 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 01:57 / sld
METALS, TOTAL RECOVERABLE							
Arsenic	0.015	mg/L		0.005		E200.8	09/10/11 02:02 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 02:02 / sld
Copper	0.010	mg/L		0.001		E200.8	09/10/11 02:02 / sld
Lead	0.0010	mg/L		0.0005		E200.8	09/10/11 02:02 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 02:02 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: Clark Fork River
Lab ID: H11080566-003
Client Sample ID Blank

Report Date: 09/23/11
Collection Date: 08/30/11 09:30
DateReceived: 08/31/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	09/01/11 09:58 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	ND	mg/L		4		A2320 B	09/01/11 18:25 / cmm
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	09/01/11 18:25 / cmm
Sulfate	ND	mg/L	D	2		E300.0	09/01/11 19:48 / zeg
Hardness as CaCO3	ND	mg/L		1		A2340 B	09/13/11 09:51 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/01/11 16:48 / reh
Nitrogen, Total	ND	mg/L		0.05		A4500 N-C	09/09/11 11:41 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 16:51 / reh
Phosphorus, Total as P	ND	mg/L		0.005		E365.1	09/12/11 14:28 / reh
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	09/10/11 02:36 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 02:36 / sld
Calcium	ND	mg/L		1		E200.8	09/10/11 02:36 / sld
Copper	ND	mg/L		0.001		E200.8	09/10/11 02:36 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 02:36 / sld
Magnesium	ND	mg/L		1		E200.8	09/10/11 02:36 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 02:36 / sld
METALS, TOTAL RECOVERABLE							
Arsenic	ND	mg/L		0.005		E200.8	09/10/11 02:41 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 02:41 / sld
Copper	ND	mg/L		0.001		E200.8	09/10/11 02:41 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 02:41 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 02:41 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: Clark Fork River
Lab ID: H11080566-004
Client Sample ID SYN-01

Report Date: 09/23/11
Collection Date: 08/30/11 11:00
DateReceived: 08/31/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	09/01/11 09:58 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	09/01/11 18:32 / cmm
Bicarbonate as HCO3	130	mg/L		4		A2320 B	09/01/11 18:32 / cmm
Sulfate	43	mg/L		1		E300.0	09/01/11 20:00 / zeg
Hardness as CaCO3	153	mg/L		1		A2340 B	09/13/11 09:51 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L		0.05		E353.2	09/01/11 16:50 / reh
Nitrogen, Total	0.41	mg/L		0.05		A4500 N-C	09/09/11 11:47 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 16:54 / reh
Phosphorus, Total as P	0.023	mg/L		0.005		E365.1	09/12/11 14:31 / reh
METALS, DISSOLVED							
Arsenic	0.014	mg/L		0.005		E200.8	09/10/11 02:45 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 02:45 / sld
Calcium	45	mg/L		1		E200.8	09/10/11 02:45 / sld
Copper	0.004	mg/L		0.001		E200.8	09/10/11 02:45 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 02:45 / sld
Magnesium	10	mg/L		1		E200.8	09/10/11 02:45 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 02:45 / sld
METALS, TOTAL RECOVERABLE							
Arsenic	0.015	mg/L		0.005		E200.8	09/10/11 02:50 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 02:50 / sld
Copper	0.010	mg/L		0.001		E200.8	09/10/11 02:50 / sld
Lead	0.0008	mg/L		0.0005		E200.8	09/10/11 02:50 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 02:50 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: Clark Fork River
Lab ID: H11080566-005
Client Sample ID SYN-02

Report Date: 09/23/11
Collection Date: 08/30/11 13:00
DateReceived: 08/31/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	4	mg/L		1		A2540 D	09/01/11 09:59 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	09/01/11 18:38 / cmm
Bicarbonate as HCO3	120	mg/L		4		A2320 B	09/01/11 18:38 / cmm
Sulfate	43	mg/L		1		E300.0	09/01/11 20:35 / zeg
Hardness as CaCO3	147	mg/L		1		A2340 B	09/13/11 09:51 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.05	mg/L		0.05		E353.2	09/01/11 16:51 / reh
Nitrogen, Total	0.21	mg/L		0.05		A4500 N-C	09/09/11 11:49 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 16:56 / reh
Phosphorus, Total as P	0.021	mg/L		0.005		E365.1	09/12/11 14:32 / reh
METALS, DISSOLVED							
Arsenic	0.014	mg/L		0.005		E200.8	09/10/11 02:54 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 02:54 / sld
Calcium	43	mg/L		1		E200.8	09/10/11 02:54 / sld
Copper	0.004	mg/L		0.001		E200.8	09/10/11 02:54 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 02:54 / sld
Magnesium	10	mg/L		1		E200.8	09/10/11 02:54 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 02:54 / sld
METALS, TOTAL RECOVERABLE							
Arsenic	0.015	mg/L		0.005		E200.8	09/10/11 03:30 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 03:30 / sld
Copper	0.009	mg/L		0.001		E200.8	09/10/11 03:30 / sld
Lead	0.0008	mg/L		0.0005		E200.8	09/10/11 03:30 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 03:30 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: Clark Fork River
Lab ID: H11080566-006
Client Sample ID SYN-03

Report Date: 09/23/11
Collection Date: 08/30/11 13:45
DateReceived: 08/31/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	6	mg/L		1		A2540 D	09/01/11 09:59 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	09/01/11 18:45 / cmm
Bicarbonate as HCO3	120	mg/L		4		A2320 B	09/01/11 18:45 / cmm
Sulfate	43	mg/L		1		E300.0	09/01/11 20:46 / zeg
Hardness as CaCO3	153	mg/L		1		A2340 B	09/13/11 09:51 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.05	mg/L		0.05		E353.2	09/01/11 16:52 / reh
Nitrogen, Total	0.37	mg/L		0.05		A4500 N-C	09/09/11 11:51 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 16:57 / reh
Phosphorus, Total as P	0.026	mg/L		0.005		E365.1	09/12/11 14:36 / reh
METALS, DISSOLVED							
Arsenic	0.015	mg/L		0.005		E200.8	09/10/11 03:34 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 03:34 / sld
Calcium	45	mg/L		1		E200.8	09/10/11 03:34 / sld
Copper	0.004	mg/L		0.001		E200.8	09/10/11 03:34 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 03:34 / sld
Magnesium	10	mg/L		1		E200.8	09/10/11 03:34 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 03:34 / sld
METALS, TOTAL RECOVERABLE							
Arsenic	0.015	mg/L		0.005		E200.8	09/10/11 03:38 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 03:38 / sld
Copper	0.013	mg/L		0.001		E200.8	09/10/11 03:38 / sld
Lead	0.0011	mg/L		0.0005		E200.8	09/10/11 03:38 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 03:38 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: Clark Fork River
Lab ID: H11080566-007
Client Sample ID SYN-04

Report Date: 09/23/11
Collection Date: 08/30/11 15:15
DateReceived: 08/31/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	09/01/11 09:59 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	09/01/11 18:52 / cmm
Bicarbonate as HCO3	120	mg/L		4		A2320 B	09/01/11 18:52 / cmm
Sulfate	43	mg/L		1		E300.0	09/01/11 20:58 / zeg
Hardness as CaCO3	144	mg/L		1		A2340 B	09/13/11 09:51 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.05	mg/L		0.05		E353.2	09/01/11 16:53 / reh
Nitrogen, Total	0.19	mg/L		0.05		A4500 N-C	09/09/11 12:01 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 16:58 / reh
Phosphorus, Total as P	0.025	mg/L		0.005		E365.1	09/12/11 14:39 / reh
METALS, DISSOLVED							
Arsenic	0.015	mg/L		0.005		E200.8	09/10/11 03:43 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 03:43 / sld
Calcium	42	mg/L		1		E200.8	09/10/11 03:43 / sld
Copper	0.004	mg/L		0.001		E200.8	09/10/11 03:43 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 03:43 / sld
Magnesium	9	mg/L		1		E200.8	09/10/11 03:43 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 03:43 / sld
METALS, TOTAL RECOVERABLE							
Arsenic	0.016	mg/L		0.005		E200.8	09/10/11 03:47 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 03:47 / sld
Copper	0.008	mg/L		0.001		E200.8	09/10/11 03:47 / sld
Lead	0.0006	mg/L		0.0005		E200.8	09/10/11 03:47 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 03:47 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: Clark Fork River
Lab ID: H11080566-008
Client Sample ID SYN-05

Report Date: 09/23/11
Collection Date: 08/30/11 16:30
DateReceived: 08/31/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	6	mg/L		1		A2540 D	09/01/11 09:59 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	09/01/11 18:59 / cmm
Bicarbonate as HCO3	120	mg/L		4		A2320 B	09/01/11 18:59 / cmm
Sulfate	42	mg/L		1		E300.0	09/01/11 21:09 / zeg
Hardness as CaCO3	147	mg/L		1		A2340 B	09/13/11 09:51 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/01/11 16:54 / reh
Nitrogen, Total	0.17	mg/L		0.05		A4500 N-C	09/09/11 12:07 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 16:59 / reh
Phosphorus, Total as P	0.026	mg/L		0.005		E365.1	09/12/11 14:40 / reh
METALS, DISSOLVED							
Arsenic	0.016	mg/L		0.005		E200.8	09/10/11 03:52 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 03:52 / sld
Calcium	43	mg/L		1		E200.8	09/10/11 03:52 / sld
Copper	0.004	mg/L		0.001		E200.8	09/10/11 03:52 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 03:52 / sld
Magnesium	9	mg/L		1		E200.8	09/10/11 03:52 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 03:52 / sld
METALS, TOTAL RECOVERABLE							
Arsenic	0.016	mg/L		0.005		E200.8	09/10/11 03:56 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 03:56 / sld
Copper	0.008	mg/L		0.001		E200.8	09/10/11 03:56 / sld
Lead	0.0006	mg/L		0.0005		E200.8	09/10/11 03:56 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 03:56 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: Clark Fork River
Lab ID: H11080566-009
Client Sample ID SYN-06

Report Date: 09/23/11
Collection Date: 08/31/11 09:30
DateReceived: 08/31/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	09/01/11 10:00 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	09/01/11 19:22 / cmm
Bicarbonate as HCO3	130	mg/L		4		A2320 B	09/01/11 19:22 / cmm
Sulfate	42	mg/L		1		E300.0	09/01/11 21:21 / zeg
Hardness as CaCO3	148	mg/L		1		A2340 B	09/13/11 09:51 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L		0.05		E353.2	09/01/11 16:58 / reh
Nitrogen, Total	0.17	mg/L		0.05		A4500 N-C	09/09/11 12:09 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 17:00 / reh
Phosphorus, Total as P	0.026	mg/L		0.005		E365.1	09/12/11 14:41 / reh
METALS, DISSOLVED							
Arsenic	0.015	mg/L		0.005		E200.8	09/10/11 04:00 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 04:00 / sld
Calcium	44	mg/L		1		E200.8	09/10/11 04:00 / sld
Copper	0.005	mg/L		0.001		E200.8	09/10/11 04:00 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 04:00 / sld
Magnesium	9	mg/L		1		E200.8	09/10/11 04:00 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 04:00 / sld
METALS, TOTAL RECOVERABLE							
Arsenic	0.015	mg/L		0.005		E200.8	09/10/11 04:05 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 04:05 / sld
Copper	0.011	mg/L		0.001		E200.8	09/10/11 04:05 / sld
Lead	0.0010	mg/L		0.0005		E200.8	09/10/11 04:05 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 04:05 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: Clark Fork River
Lab ID: H11080566-010
Client Sample ID SYN-07

Report Date: 09/23/11
Collection Date: 08/31/11 10:30
DateReceived: 08/31/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	09/01/11 10:00 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	09/01/11 19:35 / cmm
Bicarbonate as HCO3	130	mg/L		4		A2320 B	09/01/11 19:35 / cmm
Sulfate	42	mg/L		1		E300.0	09/01/11 21:56 / zeg
Hardness as CaCO3	146	mg/L		1		A2340 B	09/13/11 09:51 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L		0.05		E353.2	09/01/11 17:02 / reh
Nitrogen, Total	0.18	mg/L		0.05		A4500 N-C	09/09/11 12:11 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 17:04 / reh
Phosphorus, Total as P	0.024	mg/L		0.005		E365.1	09/12/11 14:42 / reh
METALS, DISSOLVED							
Arsenic	0.014	mg/L		0.005		E200.8	09/10/11 04:27 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 04:27 / sld
Calcium	43	mg/L		1		E200.8	09/10/11 04:27 / sld
Copper	0.003	mg/L		0.001		E200.8	09/10/11 04:27 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 04:27 / sld
Magnesium	9	mg/L		1		E200.8	09/10/11 04:27 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 04:27 / sld
METALS, TOTAL RECOVERABLE							
Arsenic	0.015	mg/L		0.005		E200.8	09/10/11 04:31 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 04:31 / sld
Copper	0.008	mg/L		0.001		E200.8	09/10/11 04:31 / sld
Lead	0.0007	mg/L		0.0005		E200.8	09/10/11 04:31 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 04:31 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: Clark Fork River
Lab ID: H11080566-011
Client Sample ID SYN-08

Report Date: 09/23/11
Collection Date: 08/31/11 11:30
DateReceived: 08/31/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	09/01/11 10:00 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	09/01/11 19:51 / cmm
Bicarbonate as HCO3	120	mg/L		4		A2320 B	09/01/11 19:51 / cmm
Sulfate	41	mg/L		1		E300.0	09/01/11 22:07 / zeg
Hardness as CaCO3	146	mg/L		1		A2340 B	09/13/11 09:51 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L		0.05		E353.2	09/01/11 17:03 / reh
Nitrogen, Total	0.15	mg/L		0.05		A4500 N-C	09/09/11 12:13 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 17:05 / reh
Phosphorus, Total as P	0.027	mg/L		0.005		E365.1	09/12/11 14:43 / reh
METALS, DISSOLVED							
Arsenic	0.014	mg/L		0.005		E200.8	09/10/11 04:36 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 04:36 / sld
Calcium	43	mg/L		1		E200.8	09/10/11 04:36 / sld
Copper	0.003	mg/L		0.001		E200.8	09/10/11 04:36 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 04:36 / sld
Magnesium	9	mg/L		1		E200.8	09/10/11 04:36 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 04:36 / sld
METALS, TOTAL RECOVERABLE							
Arsenic	0.015	mg/L		0.005		E200.8	09/10/11 04:40 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 04:40 / sld
Copper	0.008	mg/L		0.001		E200.8	09/10/11 04:40 / sld
Lead	0.0007	mg/L		0.0005		E200.8	09/10/11 04:40 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 04:40 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: Clark Fork River
Lab ID: H11080566-012
Client Sample ID SYN-09

Report Date: 09/23/11
Collection Date: 08/31/11 12:45
DateReceived: 08/31/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	09/01/11 10:01 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	110	mg/L		4		A2320 B	09/01/11 19:57 / cmm
Bicarbonate as HCO3	77	mg/L		4		A2320 B	09/01/11 19:57 / cmm
Sulfate	82	mg/L		1		E300.0	09/01/11 22:19 / zeg
Hardness as CaCO3	168	mg/L		1		A2340 B	09/13/11 09:51 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/01/11 17:04 / reh
Nitrogen, Total	1.05	mg/L		0.05		A4500 N-C	09/09/11 12:15 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 17:09 / reh
Phosphorus, Total as P	0.080	mg/L		0.005		E365.1	09/12/11 14:44 / reh
METALS, DISSOLVED							
Arsenic	0.036	mg/L		0.005		E200.8	09/10/11 04:45 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 04:45 / sld
Calcium	48	mg/L		1		E200.8	09/10/11 04:45 / sld
Copper	0.004	mg/L		0.001		E200.8	09/10/11 04:45 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 04:45 / sld
Magnesium	12	mg/L		1		E200.8	09/10/11 04:45 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 04:45 / sld
METALS, TOTAL RECOVERABLE							
Arsenic	0.036	mg/L		0.005		E200.8	09/10/11 04:49 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 04:49 / sld
Copper	0.006	mg/L		0.001		E200.8	09/10/11 04:49 / sld
Lead	0.0009	mg/L		0.0005		E200.8	09/10/11 04:49 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 04:49 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: Clark Fork River
Lab ID: H11080566-013
Client Sample ID SS-25

Report Date: 09/23/11
Collection Date: 08/31/11 13:45
DateReceived: 08/31/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		1		A2540 D	09/01/11 10:01 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	110	mg/L		4		A2320 B	09/01/11 20:04 / cmm
Bicarbonate as HCO3	79	mg/L		4		A2320 B	09/01/11 20:04 / cmm
Sulfate	81	mg/L		1		E300.0	09/01/11 22:54 / zeg
Hardness as CaCO3	166	mg/L		1		A2340 B	09/13/11 09:51 / sld
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/01/11 17:05 / reh
Nitrogen, Total	1.18	mg/L		0.05		A4500 N-C	09/09/11 12:17 / reh
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/08/11 17:10 / reh
Phosphorus, Total as P	0.078	mg/L		0.005		E365.1	09/12/11 14:45 / reh
METALS, DISSOLVED							
Arsenic	0.037	mg/L		0.005		E200.8	09/10/11 04:53 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 04:53 / sld
Calcium	48	mg/L		1		E200.8	09/10/11 04:53 / sld
Copper	0.004	mg/L		0.001		E200.8	09/10/11 04:53 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 04:53 / sld
Magnesium	11	mg/L		1		E200.8	09/10/11 04:53 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 04:53 / sld
METALS, TOTAL RECOVERABLE							
Arsenic	0.037	mg/L		0.005		E200.8	09/10/11 04:58 / sld
Cadmium	ND	mg/L		0.00008		E200.8	09/10/11 04:58 / sld
Copper	0.005	mg/L		0.001		E200.8	09/10/11 04:58 / sld
Lead	ND	mg/L		0.0005		E200.8	09/10/11 04:58 / sld
Zinc	ND	mg/L		0.01		E200.8	09/10/11 04:58 / sld

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 09/27/11
Project: Clark Fork River
Work Order: H11080566

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R74077
Sample ID: MBLK		Method Blank				Run: MAN-TECH_110901B			09/01/11 16:10	
Alkalinity, Total as CaCO3		ND	mg/L	2						
Sample ID: LCS-09012011		Laboratory Control Sample				Run: MAN-TECH_110901B			09/01/11 16:18	
Alkalinity, Total as CaCO3		610	mg/L	4.0	102	90	110			
Sample ID: H11080565-001ADUP	2	Sample Duplicate				Run: MAN-TECH_110901B			09/01/11 16:33	
Alkalinity, Total as CaCO3		260	mg/L	4.0				4.0	10	
Bicarbonate as HCO3		320	mg/L	4.0				4.0	10	
Sample ID: H11080565-002AMS		Sample Matrix Spike				Run: MAN-TECH_110901B			09/01/11 16:48	
Alkalinity, Total as CaCO3		830	mg/L	4.0	96	80	120			
Sample ID: H11080565-011ADUP	2	Sample Duplicate				Run: MAN-TECH_110901B			09/01/11 18:01	
Alkalinity, Total as CaCO3		160	mg/L	4.0				0.1	10	
Bicarbonate as HCO3		190	mg/L	4.0				0.1	10	
Sample ID: MBLK		Method Blank				Run: MAN-TECH_110901B			09/01/11 19:07	
Alkalinity, Total as CaCO3		ND	mg/L	4.0						
Sample ID: LCS-09012011		Laboratory Control Sample				Run: MAN-TECH_110901B			09/01/11 19:15	
Alkalinity, Total as CaCO3		620	mg/L	4.0	103	90	110			
Sample ID: H11080566-009ADUP	2	Sample Duplicate				Run: MAN-TECH_110901B			09/01/11 19:28	
Alkalinity, Total as CaCO3		120	mg/L	4.0				0.4	10	
Bicarbonate as HCO3		130	mg/L	4.0				1.2	10	
Sample ID: H11080566-010AMS		Sample Matrix Spike				Run: MAN-TECH_110901B			09/01/11 19:44	
Alkalinity, Total as CaCO3		670	mg/L	4.0	92	80	120			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 09/27/11
Project: Clark Fork River
Work Order: H11080566

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 D										Batch: 13628
Sample ID: MB-13628		Method Blank				Run: ACCU-124 (14410200)_110902				09/01/11 09:57
Solids, Total Suspended TSS @ 105 C		ND	mg/L	3						
Sample ID: LCS-13628		Laboratory Control Sample				Run: ACCU-124 (14410200)_110902				09/01/11 09:57
Solids, Total Suspended TSS @ 105 C		1820	mg/L	10	91	70	130			
Sample ID: H11080566-001ADUP		Sample Duplicate				Run: ACCU-124 (14410200)_110902				09/01/11 09:58
Solids, Total Suspended TSS @ 105 C		ND	mg/L	10					5	
Sample ID: H11080566-011ADUP		Sample Duplicate				Run: ACCU-124 (14410200)_110902				09/01/11 10:00
Solids, Total Suspended TSS @ 105 C		4.00	mg/L	10					5	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 09/27/11
Project: Clark Fork River
Work Order: H11080566

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500 N-C									Analytical Run: NUTRIENTS_110909A	
Sample ID: ICV-1	Initial Calibration Verification Standard								09/09/11 10:47	
Nitrogen, Total		1.03	mg/L	0.10	103	90	110			
Sample ID: CCV-21	Continuing Calibration Verification Standard								09/09/11 11:29	
Nitrogen, Total		0.510	mg/L	0.10	102	90	110			
Sample ID: CCV-36	Continuing Calibration Verification Standard								09/09/11 11:59	
Nitrogen, Total		0.500	mg/L	0.10	100	90	110			
Method: A4500 N-C									Batch: 13736	
Sample ID: LCS-2	Laboratory Control Sample					Run: NUTRIENTS_110909A			09/09/11 10:49	
Nitrogen, Total		31.8	mg/L	1.0	106	90	110			
Sample ID: MBLK-5	Method Blank					Run: NUTRIENTS_110909A			09/09/11 10:55	
Nitrogen, Total		ND	mg/L	0.02						
Sample ID: H11080566-003BMS	Sample Matrix Spike					Run: NUTRIENTS_110909A			09/09/11 11:43	
Nitrogen, Total		0.960	mg/L	0.10	96	90	110			
Sample ID: H11080566-003BMSD	Sample Matrix Spike Duplicate					Run: NUTRIENTS_110909A			09/09/11 11:45	
Nitrogen, Total		0.970	mg/L	0.10	97	90	110	1.0	20	
Method: A4500 N-C									Batch: 13738	
Sample ID: MBLK-33	Method Blank					Run: NUTRIENTS_110909A			09/09/11 11:53	
Nitrogen, Total		ND	mg/L	0.02						
Sample ID: LCS-34	Laboratory Control Sample					Run: NUTRIENTS_110909A			09/09/11 11:55	
Nitrogen, Total		31.2	mg/L	1.0	104	90	110			
Sample ID: H11080566-007BMS	Sample Matrix Spike					Run: NUTRIENTS_110909A			09/09/11 12:03	
Nitrogen, Total		1.16	mg/L	0.10	97	90	110			
Sample ID: H11080566-007BMSD	Sample Matrix Spike Duplicate					Run: NUTRIENTS_110909A			09/09/11 12:05	
Nitrogen, Total		1.15	mg/L	0.10	96	90	110	0.9	20	
Sample ID: H11090028-003AMS	Sample Matrix Spike					Run: NUTRIENTS_110909A			09/09/11 12:29	
Nitrogen, Total		0.960	mg/L	0.10	96	90	110			
Sample ID: H11090028-003AMSD	Sample Matrix Spike Duplicate					Run: NUTRIENTS_110909A			09/09/11 12:31	
Nitrogen, Total		0.960	mg/L	0.10	96	90	110	0.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 09/27/11
Project: Clark Fork River
Work Order: H11080566

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_110909A		
Sample ID: ICV STD	7	Initial Calibration Verification Standard							09/09/11 10:55	
Arsenic		0.0506	mg/L	0.0050	101	90	110			
Cadmium		0.0261	mg/L	0.0010	104	90	110			
Calcium		2.61	mg/L	0.50	104	90	110			
Copper		0.0515	mg/L	0.010	103	90	110			
Lead		0.0511	mg/L	0.010	102	90	110			
Magnesium		2.57	mg/L	0.50	103	90	110			
Zinc		0.0512	mg/L	0.010	102	90	110			
Sample ID: ICSA	7	Interference Check Sample A							09/09/11 10:59	
Arsenic		0.000171	mg/L	0.0050						
Cadmium		0.000443	mg/L	0.0010						
Calcium		113	mg/L	0.50	94	70	130			
Copper		0.000288	mg/L	0.010						
Lead		0.000126	mg/L	0.010						
Magnesium		41.3	mg/L	0.50	103	70	130			
Zinc		0.000984	mg/L	0.010						
Sample ID: ICSAB	7	Interference Check Sample AB							09/09/11 11:03	
Arsenic		0.0101	mg/L	0.0050	101	70	130			
Cadmium		0.0104	mg/L	0.0010	104	70	130			
Calcium		113	mg/L	0.50	94	70	130			
Copper		0.0197	mg/L	0.010	98	70	130			
Lead		9.30E-05	mg/L	0.010		0	0			
Magnesium		42.7	mg/L	0.50	107	70	130			
Zinc		0.0106	mg/L	0.010	106	70	130			
Sample ID: ICV STD	7	Initial Calibration Verification Standard							09/09/11 13:16	
Arsenic		0.0493	mg/L	0.0050	99	90	110			
Cadmium		0.0261	mg/L	0.0010	104	90	110			
Calcium		2.48	mg/L	0.50	99	90	110			
Copper		0.0500	mg/L	0.010	100	90	110			
Lead		0.0500	mg/L	0.010	100	90	110			
Magnesium		2.49	mg/L	0.50	100	90	110			
Zinc		0.0504	mg/L	0.010	101	90	110			
Sample ID: ICSA	7	Interference Check Sample A							09/09/11 13:21	
Arsenic		0.000187	mg/L	0.0050						
Cadmium		0.000538	mg/L	0.0010						
Calcium		110	mg/L	0.50	91	70	130			
Copper		0.000350	mg/L	0.010						
Lead		0.000134	mg/L	0.010						
Magnesium		39.5	mg/L	0.50	99	70	130			
Zinc		0.000978	mg/L	0.010						
Sample ID: ICSAB	7	Interference Check Sample AB							09/09/11 13:25	
Arsenic		0.00992	mg/L	0.0050	99	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 09/27/11
Project: Clark Fork River
Work Order: H11080566

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_110909A		
Sample ID: ICSAB	7	Interference Check Sample AB							09/09/11 13:25	
Cadmium		0.0101	mg/L	0.0010	101	70	130			
Calcium		109	mg/L	0.50	91	70	130			
Copper		0.0194	mg/L	0.010	97	70	130			
Lead		0.000114	mg/L	0.010		0	0			
Magnesium		40.5	mg/L	0.50	101	70	130			
Zinc		0.0102	mg/L	0.010	102	70	130			
Sample ID: ICV STD	7	Initial Calibration Verification Standard							09/09/11 23:06	
Arsenic		0.0498	mg/L	0.0050	100	90	110			
Cadmium		0.0264	mg/L	0.0010	105	90	110			
Calcium		2.53	mg/L	0.50	101	90	110			
Copper		0.0512	mg/L	0.010	102	90	110			
Lead		0.0500	mg/L	0.010	100	90	110			
Magnesium		2.53	mg/L	0.50	101	90	110			
Zinc		0.0514	mg/L	0.010	103	90	110			
Sample ID: ICSA	7	Interference Check Sample A							09/09/11 23:11	
Arsenic		0.000141	mg/L	0.0050						
Cadmium		0.000345	mg/L	0.0010						
Calcium		109	mg/L	0.50	91	70	130			
Copper		0.000297	mg/L	0.010						
Lead		0.000110	mg/L	0.010						
Magnesium		39.6	mg/L	0.50	99	70	130			
Zinc		0.000981	mg/L	0.010						
Sample ID: ICSAB	7	Interference Check Sample AB							09/09/11 23:15	
Arsenic		0.0102	mg/L	0.0050	102	70	130			
Cadmium		0.00974	mg/L	0.0010	97	70	130			
Calcium		110	mg/L	0.50	92	70	130			
Copper		0.0196	mg/L	0.010	98	70	130			
Lead		8.40E-05	mg/L	0.010		0	0			
Magnesium		40.2	mg/L	0.50	101	70	130			
Zinc		0.0107	mg/L	0.010	107	70	130			
Sample ID: ICV STD	7	Initial Calibration Verification Standard							09/10/11 10:00	
Arsenic		0.0509	mg/L	0.0050	102	90	110			
Cadmium		0.0267	mg/L	0.0010	107	90	110			
Calcium		2.52	mg/L	0.50	101	90	110			
Copper		0.0516	mg/L	0.010	103	90	110			
Lead		0.0510	mg/L	0.010	102	90	110			
Magnesium		2.51	mg/L	0.50	101	90	110			
Zinc		0.0515	mg/L	0.010	103	90	110			
Sample ID: ICSA	7	Interference Check Sample A							09/10/11 10:04	
Arsenic		0.000150	mg/L	0.0050						
Cadmium		0.000289	mg/L	0.0010						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 09/27/11
Project: Clark Fork River
Work Order: H11080566

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Analytical Run: ICPMS204-B_110909A	
Sample ID: ICSA	7	Interference Check Sample A							09/10/11 10:04	
Calcium		107	mg/L	0.50	89	70	130			
Copper		0.000301	mg/L	0.010						
Lead		0.000103	mg/L	0.010						
Magnesium		38.5	mg/L	0.50	96	70	130			
Zinc		0.000851	mg/L	0.010						
Sample ID: ICSAB	7	Interference Check Sample AB							09/10/11 10:09	
Arsenic		0.00982	mg/L	0.0050	98	70	130			
Cadmium		0.00968	mg/L	0.0010	97	70	130			
Calcium		107	mg/L	0.50	89	70	130			
Copper		0.0192	mg/L	0.010	96	70	130			
Lead		7.70E-05	mg/L	0.010		0	0			
Magnesium		39.8	mg/L	0.50	99	70	130			
Zinc		0.0103	mg/L	0.010	103	70	130			
Method: E200.8									Batch: 13633	
Sample ID: MB-13633	5	Method Blank				Run: ICPMS204-B_110909A			09/09/11 21:38	
Arsenic		6E-05	mg/L	5E-05						
Cadmium		ND	mg/L	2E-05						
Copper		ND	mg/L	0.0004						
Lead		3E-05	mg/L	2E-05						
Zinc		0.0009	mg/L	0.0003						
Sample ID: LCS-13633	5	Laboratory Control Sample				Run: ICPMS204-B_110909A			09/09/11 21:43	
Arsenic		0.496	mg/L	0.0050	99	85	115			
Cadmium		0.273	mg/L	0.0010	109	85	115			
Copper		0.484	mg/L	0.010	97	85	115			
Lead		0.511	mg/L	0.010	102	85	115			
Zinc		0.496	mg/L	0.010	99	85	115			
Sample ID: H11080566-002DMS3	5	Sample Matrix Spike				Run: ICPMS204-B_110909A			09/10/11 02:06	
Arsenic		0.513	mg/L	0.0050	100	70	130			
Cadmium		0.258	mg/L	0.0010	103	70	130			
Copper		0.513	mg/L	0.010	101	70	130			
Lead		0.502	mg/L	0.010	100	70	130			
Zinc		0.493	mg/L	0.010	97	70	130			
Sample ID: H11080566-002DMSD3	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110909A			09/10/11 02:10	
Arsenic		0.499	mg/L	0.0050	97	70	130	2.7	20	
Cadmium		0.256	mg/L	0.0010	102	70	130	1.0	20	
Copper		0.504	mg/L	0.010	99	70	130	1.7	20	
Lead		0.493	mg/L	0.010	98	70	130	1.9	20	
Zinc		0.485	mg/L	0.010	96	70	130	1.5	20	
Method: E200.8									Batch: R74253	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 09/27/11
Project: Clark Fork River
Work Order: H11080566

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R74253
Sample ID: ICB	7	Method Blank				Run: ICPMS204-B_110909A				09/09/11 13:51
Arsenic		ND	mg/L	0.0050						
Cadmium		ND	mg/L	8.0E-05						
Calcium		ND	mg/L	1.0						
Copper		ND	mg/L	0.0010						
Lead		ND	mg/L	0.00050						
Magnesium		ND	mg/L	1.0						
Zinc		0.000269	mg/L	0.010						
Sample ID: LFB	7	Laboratory Fortified Blank				Run: ICPMS204-B_110909A				09/09/11 13:56
Arsenic		0.0484	mg/L	0.0050	97	85	115			
Cadmium		0.0479	mg/L	0.0010	96	85	115			
Calcium		45.4	mg/L	0.50	91	85	115			
Copper		0.0478	mg/L	0.010	96	85	115			
Lead		0.0493	mg/L	0.010	99	85	115			
Magnesium		48.7	mg/L	0.50	97	85	115			
Zinc		0.0492	mg/L	0.010	98	85	115			
Sample ID: H11080538-003CMS	7	Sample Matrix Spike				Run: ICPMS204-B_110909A				09/10/11 01:09
Arsenic		0.0479	mg/L	0.0050	95	70	130			
Cadmium		0.0490	mg/L	0.0010	98	70	130			
Calcium		62.8	mg/L	1.0	82	70	130			
Copper		0.0466	mg/L	0.010	93	70	130			
Lead		0.0504	mg/L	0.010	101	70	130			
Magnesium		53.1	mg/L	1.0	91	70	130			
Zinc		0.0487	mg/L	0.010	93	70	130			
Sample ID: H11080538-003CMSD	7	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110909A				09/10/11 01:13
Arsenic		0.0492	mg/L	0.0050	97	70	130	2.6	20	
Cadmium		0.0487	mg/L	0.0010	97	70	130	0.6	20	
Calcium		64.4	mg/L	1.0	85	70	130	2.5	20	
Copper		0.0477	mg/L	0.010	95	70	130	2.3	20	
Lead		0.0499	mg/L	0.010	100	70	130	0.9	20	
Magnesium		54.5	mg/L	1.0	94	70	130	2.6	20	
Zinc		0.0488	mg/L	0.010	93	70	130	0.2	20	
Sample ID: H11080566-005CMS	7	Sample Matrix Spike				Run: ICPMS204-B_110909A				09/10/11 02:59
Arsenic		0.0623	mg/L	0.0050	96	70	130			
Cadmium		0.0479	mg/L	0.0010	96	70	130			
Calcium		86.6	mg/L	1.0	87	70	130			
Copper		0.0508	mg/L	0.010	94	70	130			
Lead		0.0500	mg/L	0.010	100	70	130			
Magnesium		55.8	mg/L	1.0	92	70	130			
Zinc		0.0515	mg/L	0.010	95	70	130			
Sample ID: H11080566-005CMSD	7	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110909A				09/10/11 03:03
Arsenic		0.0616	mg/L	0.0050	94	70	130	1.1	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund **Report Date:** 09/27/11

Project: Clark Fork River **Work Order:** H11080566

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Batch: R74253	
Sample ID: H11080566-005CMSD	7	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110909A			09/10/11 03:03	
Cadmium		0.0478	mg/L	0.0010	95	70	130	0.2	20	
Calcium		84.6	mg/L	1.0	83	70	130	2.3	20	
Copper		0.0502	mg/L	0.010	93	70	130	1.3	20	
Lead		0.0496	mg/L	0.010	99	70	130	0.8	20	
Magnesium		53.9	mg/L	1.0	89	70	130	3.5	20	
Zinc		0.0510	mg/L	0.010	94	70	130	1.0	20	
Sample ID: H11090016-002BMS	7	Sample Matrix Spike				Run: ICPMS204-B_110909A			09/10/11 05:33	
Arsenic		0.0497	mg/L	0.0050	98	70	130			
Cadmium		0.0445	mg/L	0.0010	89	70	130			
Calcium		267	mg/L	1.0		70	130			A
Copper		0.0500	mg/L	0.010	93	70	130			
Lead		0.0516	mg/L	0.010	102	70	130			
Magnesium		368	mg/L	1.0		70	130			A
Zinc		0.384	mg/L	0.010		70	130			A
Sample ID: H11090016-002BMSD	7	Sample Matrix Spike Duplicate				Run: ICPMS204-B_110909A			09/10/11 05:38	
Arsenic		0.0482	mg/L	0.0050	96	70	130	3.0	20	
Cadmium		0.0438	mg/L	0.0010	88	70	130	1.6	20	
Calcium		261	mg/L	1.0		70	130	2.2	20	A
Copper		0.0486	mg/L	0.010	90	70	130	2.7	20	
Lead		0.0511	mg/L	0.010	101	70	130	1.1	20	
Magnesium		363	mg/L	1.0		70	130	1.4	20	A
Zinc		0.372	mg/L	0.010		70	130	3.3	20	A

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 09/27/11
Project: Clark Fork River
Work Order: H11080566

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC102-H_110901A	
Sample ID: ICV090111-12		Initial Calibration Verification Standard							09/01/11 15:21	
Sulfate		400	mg/L	1.0	101	90	110			
Sample ID: CCV090111-30		Continuing Calibration Verification Standard							09/01/11 18:50	
Sulfate		400	mg/L	1.0	99	90	110			
Sample ID: CCV090111-44		Continuing Calibration Verification Standard							09/01/11 21:33	
Sulfate		400	mg/L	1.0	99	90	110			
Method: E300.0									Batch: R74080	
Sample ID: ICB090111-13		Method Blank				Run: IC102-H_110901A			09/01/11 15:33	
Sulfate		ND	mg/L	0.02						
Sample ID: LFB090111-14		Laboratory Fortified Blank				Run: IC102-H_110901A			09/01/11 15:45	
Sulfate		190	mg/L	1.1	96	90	110			
Sample ID: H11080566-004AMS		Sample Matrix Spike				Run: IC102-H_110901A			09/01/11 20:11	
Sulfate		240	mg/L	1.1	101	90	110			
Sample ID: H11080566-004AMSD		Sample Matrix Spike Duplicate				Run: IC102-H_110901A			09/01/11 20:23	
Sulfate		250	mg/L	1.1	101	90	110	0.2	20	
Sample ID: H11080566-012AMS		Sample Matrix Spike				Run: IC102-H_110901A			09/01/11 22:31	
Sulfate		290	mg/L	1.1	102	90	110			
Sample ID: H11080566-012AMSD		Sample Matrix Spike Duplicate				Run: IC102-H_110901A			09/01/11 22:42	
Sulfate		280	mg/L	1.1	101	90	110	0.3	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 09/27/11
Project: Clark Fork River
Work Order: H11080566

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E350.1									Analytical Run: FIA203-HE_110908C	
Sample ID: ICV	Initial Calibration Verification Standard								09/08/11 15:42	
Nitrogen, Ammonia as N		1.09	mg/L	0.10	109	90	110			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								09/08/11 15:46	
Nitrogen, Ammonia as N		-0.0256	mg/L	0.10		0	0			
Method: E350.1									Batch: R74249	
Sample ID: LFB	Laboratory Fortified Blank					Run: FIA203-HE_110908C			09/08/11 15:44	
Nitrogen, Ammonia as N		1.01	mg/L	0.10	101	90	110			
Sample ID: MBLK	Method Blank					Run: FIA203-HE_110908C			09/08/11 15:48	
Nitrogen, Ammonia as N		ND	mg/L	0.002						
Sample ID: H11080566-003EMS	Sample Matrix Spike					Run: FIA203-HE_110908C			09/08/11 16:52	
Nitrogen, Ammonia as N		0.932	mg/L	0.10	93	80	120			
Sample ID: H11080566-003EMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_110908C			09/08/11 16:53	
Nitrogen, Ammonia as N		0.941	mg/L	0.10	94	80	120	1.1	10	
Sample ID: H11080566-011EMS	Sample Matrix Spike					Run: FIA203-HE_110908C			09/08/11 17:06	
Nitrogen, Ammonia as N		0.937	mg/L	0.10	94	80	120			
Sample ID: H11080566-011EMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_110908C			09/08/11 17:07	
Nitrogen, Ammonia as N		0.945	mg/L	0.10	95	80	120	0.9	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 09/27/11
Project: Clark Fork River
Work Order: H11080566

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2									Analytical Run: FIA203-HE_110901A	
Sample ID: ICV	Initial Calibration Verification Standard								09/01/11 16:15	
Nitrogen, Nitrate+Nitrite as N		1.06	mg/L	0.050	106	90	110			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								09/01/11 16:21	
Nitrogen, Nitrate+Nitrite as N		-0.00236	mg/L	0.050		0	0			
Sample ID: CCV	Continuing Calibration Verification Standard								09/01/11 16:40	
Nitrogen, Nitrate+Nitrite as N		0.485	mg/L	0.050	97	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								09/01/11 16:57	
Nitrogen, Nitrate+Nitrite as N		0.486	mg/L	0.050	97	90	110			
Method: E353.2									Batch: R74074	
Sample ID: LCS	Laboratory Control Sample				Run: FIA203-HE_110901A				09/01/11 16:16	
Nitrogen, Nitrate+Nitrite as N		25.4	mg/L	0.20	105	90	110			
Sample ID: LFB	Laboratory Fortified Blank				Run: FIA203-HE_110901A				09/01/11 16:17	
Nitrogen, Nitrate+Nitrite as N		0.987	mg/L	0.050	99	90	110			
Sample ID: MBLK	Method Blank				Run: FIA203-HE_110901A				09/01/11 16:22	
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.0009						
Sample ID: H11080566-001EMS	Sample Matrix Spike				Run: FIA203-HE_110901A				09/01/11 16:45	
Nitrogen, Nitrate+Nitrite as N		0.983	mg/L	0.050	92	90	110			
Sample ID: H11080566-001EMSD	Sample Matrix Spike Duplicate				Run: FIA203-HE_110901A				09/01/11 16:46	
Nitrogen, Nitrate+Nitrite as N		0.995	mg/L	0.050	93	90	110	1.2	20	
Sample ID: H11080566-009EMS	Sample Matrix Spike				Run: FIA203-HE_110901A				09/01/11 16:59	
Nitrogen, Nitrate+Nitrite as N		0.991	mg/L	0.050	93	90	110			
Sample ID: H11080566-009EMSD	Sample Matrix Spike Duplicate				Run: FIA203-HE_110901A				09/01/11 17:00	
Nitrogen, Nitrate+Nitrite as N		0.996	mg/L	0.050	93	90	110	0.5	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 09/27/11
Project: Clark Fork River
Work Order: H11080566

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E365.1									Analytical Run: FIA202-HE_110912A	
Sample ID: ICV	Initial Calibration Verification Standard								09/12/11 14:13	
Phosphorus, Total as P		0.261	mg/L	0.010	104	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								09/12/11 14:16	
Phosphorus, Total as P		0.247	mg/L	0.010	99	90	110			
Sample ID: CCV1	Continuing Calibration Verification Standard								09/12/11 14:17	
Phosphorus, Total as P		0.00745	mg/L	0.010	74	50	150			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								09/12/11 14:18	
Phosphorus, Total as P		-0.00472	mg/L	0.010		0	0			
Sample ID: CCV	Continuing Calibration Verification Standard								09/12/11 14:34	
Phosphorus, Total as P		0.242	mg/L	0.010	97	90	110			
Sample ID: CCV1	Continuing Calibration Verification Standard								09/12/11 14:35	
Phosphorus, Total as P		0.00801	mg/L	0.010	80	50	150			
Method: E365.1									Batch: 13758	
Sample ID: LCS-13758	Laboratory Control Sample					Run: FIA202-HE_110912A			09/12/11 14:14	
Phosphorus, Total as P		8.19	mg/L	0.025	98	90	110			
Sample ID: MB-13758	Method Blank					Run: FIA202-HE_110912A			09/12/11 14:19	
Phosphorus, Total as P		ND	mg/L	0.0009						
Sample ID: H11080566-003EMS	Sample Matrix Spike					Run: FIA202-HE_110912A			09/12/11 14:29	
Phosphorus, Total as P		0.183	mg/L	0.010	92	90	110			
Sample ID: H11080566-003EMSD	Sample Matrix Spike Duplicate					Run: FIA202-HE_110912A			09/12/11 14:30	
Phosphorus, Total as P		0.189	mg/L	0.010	95	90	110	3.3	20	
Sample ID: H11080566-006EMS	Sample Matrix Spike					Run: FIA202-HE_110912A			09/12/11 14:37	
Phosphorus, Total as P		0.232	mg/L	0.010	103	90	110			
Sample ID: H11080566-006EMSD	Sample Matrix Spike Duplicate					Run: FIA202-HE_110912A			09/12/11 14:38	
Phosphorus, Total as P		0.236	mg/L	0.010	105	90	110	1.4	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Workorder Receipt Checklist

H11080566

MT DEQ-Federal Superfund

Login completed by: Tracy L. Lorash
Date Received: 8/31/2011

Reviewed by: BL2000\kwiegand
Received by: TLL

Reviewed Date: 9/7/2011
Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Container/Temp Blank temperature:	.4°C On Ice		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	Not Applicable ☐

Contact and Corrective Action Comments:

Samples SYN-06 and SYN-07 do not have any analysis requested checked on COC. Emailed Erich Weber. TI 9/1/11. Per email from John DeArment, All of those samples get the same analysis. TI 9/6/11.

Chain of Custody and Analytical Request Record

PLEASE PRINT (Provide as much information as possible.)

Company Name:	Project Name, PWS, Permit, Etc.	Sample Origin	EPA/State Compliance:
DEQ / Atkins	Clark Fork River	State: MT	Yes ☐ No ☒
Report Mail Address: John DeArment, Atkins 1120 Cedar St. Missoula, MT 59802	**Contact Name:** Erich Weber **Phone/Fax:** 495-1377	**Email:**	**Sampler: (Please Print)** John DeArment
Invoice Address: DEQ PO Box 200901 Helena MT 59620	**Invoice Contact & Phone:** Brian Bartkowiak	**Purchase Order:**	**Quote/Bottle Order:**

Page 29 of 30

Special Report/Formats:

☐ DW
☐ POTW/WWTP
☐ State: _____
☐ Other: _____
☐ EDD/EDT (Electronic Data) Format: _____
☐ LEVEL IV
☐ NELAC

ANALYSIS REQUESTED

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids Vegetation Bioassay Other DW - Drinking Water

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	TR: Arsenic, Cadmium, Copper, Lead, Mercury, Zinc	Dissolved: Arsenic, Cadmium, Copper, Lead, Mercury, Zinc	TP, TPN, NO2+3, Ammonia	Hardness	Alkalinity, Sulfate	TSS	SEE ATTACHED
1 CFR-03A	8/30/11	10:00	W	X	X	X	X	X	X	
2 CFR-03A DUP	"	10:30	W	X	X	X	X	X	X	
3 Blank	"	9:30	W	X	X	X	X	X	X	
4 SYN-01	"	11:00	W	X	X	X	X	X	X	
5 SYN-02	"	1300	W	X	X	X	X	X	X	
6 SYN-03	"	1345	W	X	X	X	X	X	X	
7 SYN-04	"	1515	W	X	X	X	X	X	X	
8 SYN-05	"	1630	W	X	X	X	X	X	X	
9 SYN-06	8/31/11	930								
10 SYN-07	8/31/11	1030								

Standard Turnaround (TAT) — **RUSH**

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments: See previous orders for project detection limits

Stripped by: Hand del

Cooler ID(s): Y

Receipt Temp 4 °C

On Ice: (Y) N

Custody Seal On Bottle Y (N) On Cooler Y (N)

Intact Y N

Signature Match Y N

LABORATORY USE ONLY H110805666

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
John DeArment	8/31/11 16:05				
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
			Received by Laboratory: Tracy Carol	Date/Time: 8/31/11 16:05	Signature: Tracy Carol

Sample Disposal: Return to Client: _____ Lab Disposal: _____

Chain of Custody and Analytical Request Record

PLEASE PRINT (Provide as much information as possible.)

Company Name: DEQ/ Atkins	Project Name, PWS, Permit, Etc.: Clark Fork River	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: John DeArment Atkins 1120 Cedar St. Missoula, MT 59802	Contact Name: Phone/Fax: Erich Weber 495-1377	Email:	Sampler: (Please Print) John DeArment
Invoice Address: DEQ PO Box 200901 Helena MT 59620	Invoice Contact & Phone: Brian Bartkowiak	Purchase Order:	Quote/Bottle Order:

Special Report/Formats:

☐ DW ☐ EDD/EDT (Electronic Data)
☐ POTW/WWTP Format: _____
☐ State: _____ ☐ LEVEL IV
☐ Other: _____ ☐ NELAC

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids Vegetation Bioassay Other
DW - Drinking Water

ANALYSIS REQUESTED

SEE ATTACHED

Standard Turnaround (TAT)

R U S H

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments: See previous orders for project detection limits

Shipped by: Hand del.
Cooler ID(s): Y
Receipt Temp: .4 °C
On Ice: (Y) N
Custody Seal: On Bottle Y (N) / On Cooler Y (N)
Intact: Y N
Signature Match: Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	TR: As, Cd, Cu, Pb, Zn	Diss: As, Cd, Cu, Pb, Zn	TP, TPN, NO2+3, Hardness	Hardness	Alkalinity, Sulfate	TSS
1	SYN-08	8/31/11	1130	GW	x	x	x	0	0	0
2	SYN-09	"	1245	GW	x	x	x	x	x	x
3	SS-25	"	1345	W	x	x	x	x	x	x
4										
5										
6										
7										
8										
9										
10										

LABORATORY USE ONLY H110805G4

Custody Record MUST be Signed

Relinquished by (print): John DeArment	Date/Time: 8/31/11 16:05	Signature:	Received by (print):	Date/Time:	Signature:
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Sample Disposal: Return to Client: _____ Lab Disposal: _____			Received by Laboratory: Tracy Loraah	Date/Time: 8/31/11 16:05	Signature: Tracy Loraah

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.
This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

APPENDIX C

SURFACE WATER DATA

Clark Fork River Operable Unit, 2011

August 2012

Table C-1. Field Parameters - CFROU 2011

SITE ID	Date	Time	Weather	Air Temp, Estimated (Deg F)	pH	Water Temp (Deg C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Sat)	EC (uS/cm)	Turbidity (NTU)	Staff Gauge (FT)	Flow (CFS, Unadj.)	Flow (CFS, USGS)	Field Observations
SS-25	4/13/2011	11:00	Hazy, calm, mild	48(E)	8.50	6.40	11.07	90.2	311.1	8.38	2.15			Slight to moderate turbidity, stable hydrograph. First visit to this site.
CFR-03A	4/13/2011	10:15	Hazy skies, mild, calm	48(E)	8.11	5.30	11.10	88.0	267.7	5.86	2.26			Slight to moderate turbidity, stable hydrograph. Waded X-section with DH-81.
CFR-27H	4/13/2011	8:45	Hazy skies, mild temperatures	40(E)	7.74	6.10	10.42	84.1	290.0	8.76	2.96			Bridge crane, 6 sub-samples. Stable hydrograph.
CFR-42G	4/12/2011	15:15	Partly cloudy, mild, light breeze	50(E)	8.61	9.20	12.65	110.0	322.7	9.24				Waded X-section with DH-81 sampler. Moderate turbidity. Stage down from previous week.
CFR-53C	4/12/2011	13:15	Clear, sunny, light breeze	48(E)	8.47	7.10	12.21	101.1	259.9	9.89				River is moderately dirty. Bridge crane with 10 sub-samples. Collected duplicate and blank QA samples here.
CFR-84F	4/12/2011	11:00	Clear, sunny, light breeze	45(E)	8.27	6.10	11.80	95.2	272.7	10.5	3.84			Water is turbid. Bridge crane with 10 sub-samples.
CFR-116A	4/12/2011	9:00	Clear skies	40(E)	8.18	5.00	11.36	89.2	208.9	9.77	4.93			River is turbid. Receding hydrograph since April 3. Bridge crane with 9 sub-samples. Bankfull stage.
SS-25	6/08/2011	13:15	Rain	50(E)	8.80	10.00	9.09	80.7	165.4	8.42				Extremely high flow. Slight to moderate turbidity. Mixing between MW Bypass and Pond 2 discharge unknown.
CFR-03A	6/08/2011	11:15	Hard rain	50(E)	8.76	9.70	9.00	79.6	177.5	19.2				Bankfull flow. USGS sampling concurrently. Hand depth integrated samples with long handled DH-81.
CFR-27H	6/08/2011	9:00	Partly cloudy, cool.	50(E)	8.13	9.90	8.90	78.4	211.8	38.7				Bankfull flow, rising stage and at peak for the year to date. Very turbid and lots of floating debris.
CFR-42G	6/07/2011	16:30	Light rain, overcast.	55(E)	8.22	11.80	8.83	81.7	194.0	142				Highest flow sampled here program start to date. Near bankfull, lots of floating debris.
CFR-53C	6/07/2011	15:15	Misting, overcast.	55(E)	8.17	11.50	9.10	83.4	163.1	58.2				Highest flow sampled here program start to date. Less than bankfull stage.
CFR-84F	6/07/2011	13:00	Light to moderate rain.	50(E)	8.07	12.50	8.60	80.7	188.6	43.2				Highest flow sampled to date.
CFR-116A	6/07/2011	10:30	Rain, mostly cloudy.	58(E)	7.98	11.50	9.26	85.0	113.0	43.9				Highest flow sampled to date and rising now. Very turbid.
SS-25	8/31/11	13:45			9.25	17.70	10.37	108.9	385.0	2.77				
WSC abv confl.	8/31/11	12:30			8.35	11.34	9.60	87.9	270.0	2.56				
CFR-03A	8/30/11	9:30	Sunny	75(E)	8.68	13.19	8.98	85.8	320.0	slight				
SYN-01	8/30/11	11:00	Sunny	75(E)	8.81	13.59	9.71	93.4	310.0	2.48		149.83		
SYN-02	8/30/11	13:00			8.91	14.53	10.05	98.9	307	2.56		154.15		
SYN-03	8/30/11	13:45			8.93	15.04	10.31	102.1	306.0	2.98		0.01		
SYN-04	8/30/11	15:15	Partly sunny	80(E)	8.98	15.86	9.58	96.8	304.0	2.06		154.20		
SYN-05	8/30/11	16:30			8.99	16.23	9.27	93.8	301.0	3.73		164.90		
SYN-06	8/31/11	9:30			8.72	11.93	9.13	84.7	307.0	3.13		126.79		
SYN-07	8/31/11	10:30			8.89	12.29	9.75	90.8	304.0	2.96		164.19		
SYN-08	8/31/11	11:30			8.93	13.02	10.07	95.4	302.0	1.98		171.47		
SYN-09	8/31/11	12:45	Sunny, breezy	75(E)	9.55	17.72	10.98	115.5	368.0	2.75		48.74		
SS-25	8/31/11	13:45			9.25	17.70	10.37	108.9	385.0	2.77				
CFR-03A	8/30/11	9:30	Sunny	75(E)	8.68	13.19	8.98	85.8	320.0	slight				
CFR-27H	9/02/11	9:30	Sunny, calm	55(E)	8.17	10.92	8.98	81.4	370.0	3.39				
CFR-42G	9/01/11	16:30		65(E)	8.63	15.50	10.46	105.3	376.0	3.71				
CFR-53C	9/01/11	14:30	Rain showers, cool, breezy	60(E)	8.47	14.92	9.52	94.3	356.0	3.68				
CFR-84F	9/01/11	12:00	Partly cloudy, breezy, warming up	70(E)	8.27	15.02	9.47	93.9	439.0	4.33				
CFR-116A	9/01/11	9:30	Partly cloudy, light breeze	55(E)	8.19	13.25	8.98	85.8	313.0	1.8				
SS-25	12/02/11	12:00	Cloudy, calm	30(E)	8.46	0.80	12.32	86.2	293.9	3.81			70(P)	
CFR-03A	12/02/11	11:15	Relatively calm, snow	30(E)	8.20	0.60	12.27	86.4	229.4	3.11			154(P)	
CFR-27H	12/02/11	9:30	Cloudy, windy, snow flurries, cold	25(E)	8.01	0.10	12.08	82.9	245.0	3.73			328(P)	
CFR-42G	12/01/11	15:00	Clear, calm, pleasant	35(E)	8.34	0.10	14.15	97.1	240.3	10.60			Ice	
CFR-53C	12/01/11	13:45	Sunny, clear skies, nice	32(E)	8.52	0.20	14.85	102.3	224.4	5.84			503(P)	
CFR-84F	12/01/11	11:45	Clear, light breeze, pleasant	28(E)	8.05	1.80	13.07	94.2	249.1	4.90			700(P)	
CFR-116A	12/01/11	10:00	Clear, cold, calm	25(E)	7.92	1.40	12.93	92.0	202.2	3.99			1120(P)	

Table C-2. Surface Water Data - CFROU 2011

1st Quarter 2011

Sample ID	Client Sample ID	Matrix	Collection DateTime	Solids, Total Suspended TSS @ 105 C, mg/L	Alkalinity, Total as CaCO3, mg/L	Bicarbonate as HCO3, mg/L	SO4, mg/L	Hardness as CaCO3, mg/L	Nitrogen, Ammonia as N, mg/L	NO3+NO2 as N, mg/L	N-Total, mg/L	Phosphorus, Total as P, mg/L	As-D, mg/L	Cd-D, mg/L	Cu-D, mg/L	Pb-D, mg/L	Zn-D, mg/L	As-TR, mg/L	Cd-TR, mg/L	Cu-TR, mg/L	Pb-TR, mg/L	Zn-TR, mg/L	Ca-TR, mg/L	Mg-TR, mg/L	Ca-D, mg/L	Mg-D, mg/L
H11040177-001	CFR-116A	Surface Water	04/12/2011 09:00	18	130	150	39	155	<0.05	<0.05	0.27	0.020	0.005	<0.00008	0.004	<0.0005	0.01	0.031	0.00012	0.017	0.0025	0.06	44	12	44	11
H11040177-002	CFR-84F	Surface Water	04/12/2011 11:00	25	160	180	56	198	<0.05	<0.05	0.24	0.027	0.008	<0.00008	0.005	<0.0005	0.01	0.010	0.00016	0.025	0.0037	0.03	56	14	55	13
H11040177-003	CFR-53C	Surface Water	04/12/2011 13:15	26	150	170	51	181	<0.05	0.05	0.35	0.032	0.007	<0.00008	0.006	<0.0005	<0.01	0.010	0.00013	0.027	0.0036	0.03	53	12	52	12
H11040177-004	CFR-53C Dup	Surface Water	04/12/2011 13:45	24	150	170	51	181	<0.05	0.06	0.39	0.034	0.007	<0.00008	0.006	<0.0005	<0.01	0.010	0.00013	0.027	0.0034	0.03	52	12	52	12
H11040177-005	Field Blank	Surface Water	04/12/2011 14:45	<1	<4	<4	<1	<1	<0.05	<0.05	<0.05	<0.005	<0.005	<0.00008	<0.001	<0.0005	0.02	<0.005	<0.00008	<0.001	<0.0005	<0.01	<1	<1	<1	<1
H11040177-006	CFR-42G	Surface Water	04/12/2011 15:15	28	160	180	73	212	<0.05	0.18	0.47	0.032	0.010	<0.00008	0.008	<0.0005	0.01	0.015	0.00021	0.043	0.0055	0.04	62	14	63	14
H11040177-007	CFR-27H	Surface Water	04/13/2011 08:45	24	150	170	79	211	<0.05	0.15	0.65	0.027	0.010	<0.00008	0.007	<0.0005	0.02	0.015	0.00022	0.040	0.0054	0.04	62	14	58	13
H11040177-008	CFR-03A	Surface Water	04/13/2011 10:15	10	120	140	86	195	<0.05	<0.05	0.37	0.025	0.010	<0.00008	0.004	<0.0005	0.01	0.012	0.00017	0.017	0.0031	0.02	57	13	55	13
H11040177-009	SS-25	Surface Water	04/13/2011 11:00	11	110	130	110	201	<0.05	<0.05	0.49	0.036	0.014	<0.00008	0.004	0.0007	<0.01	0.016	0.00023	0.016	0.0043	0.03	58	14	56	13

2nd Quarter 2011

Sample ID	Client Sample ID	Matrix	Collection Date	Solids, Total Suspended TSS @ 105 C, mg/L	Alkalinity, Total as CaCO3, mg/L	Bicarbonate as HCO3, mg/L	SO4, mg/L	Hardness as CaCO3, mg/L	Nitrogen, Ammonia as N, mg/L	NO3+NO2 as N, mg/L	N-Total, mg/L	Phosphorus, Total as P, mg/L	As-D, mg/L	Cd-D, mg/L	Cu-D, mg/L	Pb-D, mg/L	Zn-D, mg/L	As-TR, mg/L	Cd-TR, mg/L	Cu-TR, mg/L	Pb-TR, mg/L	Zn-TR, mg/L	Ca-TR, mg/L	Mg-TR, mg/L		
H11060184-001	CFR-116A	Surface Water	06/07/2011 10:30	130	64	78	10	76	<0.05	<0.05	0.25	0.133	0.007	<0.00008	0.008	<0.0005	0.02	0.013	0.00033	0.058	0.0095	0.09	21	6		
H11060184-002	CFR-84F	Surface Water	06/07/2011 13:00	92	99	120	19	119	<0.05	<0.05	0.40	0.134	0.014	<0.00008	0.014	<0.0005	0.02	0.025	0.00042	0.085	0.0142	0.11	34	8		
H11060184-003	CFR-53C	Surface Water	06/07/2011 15:15	124	86	110	16	109	<0.05	0.05	0.36	0.170	0.012	<0.00008	0.013	<0.0005	0.01	0.024	0.00059	0.087	0.0136	0.10	32	7		
H11060184-004	CFR-42G	Surface Water	06/07/2011 16:30	268	94	110	27	136	<0.05	0.10	0.51	0.300	0.023	0.00009	0.021	<0.0005	0.02	0.072	0.00123	0.303	0.0515	0.25	39	10		
H11060184-005	Field Blank	Surface Water	06/08/2011 08:45	4	<4	<4	<1	<1	<0.05	<0.05	<0.05	<0.005	<0.005	<0.00008	<0.001	<0.0005	0.02	<0.005	<0.00008	<0.001	<0.0005	<0.01	<1	<1		
H11060184-006	CFR-27H	Surface Water	06/08/2011 09:00	96	92	110	46	138	<0.05	0.09	0.57	0.176	0.025	0.00017	0.044	<0.0005	0.03	0.048	0.00086	0.214	0.0263	0.18	41	9		
H11060184-007	CFR-27H Dup	Surface Water	06/08/2011 09:00	96	92	110	46	138	<0.05	0.08	0.58	0.184	0.026	0.00016	0.041	0.0005	0.03	0.048	0.00081	0.208	0.0255	0.17	41	9		
H11060184-008	CFR-03A	Surface Water	06/08/2011 11:15	38	78	91	36	117	<0.05	0.10	1.94	0.093	0.027	0.00016	0.025	<0.0005	0.02	0.037	0.00041	0.086	0.0092	0.08	36	7		
H11060184-009	SS-25	Surface Water	06/08/2011 13:15	8	68	79	36	102	<0.05	0.06	0.59	0.062	0.039	<0.00008	0.012	<0.0005	<0.01	0.042	0.00016	0.019	0.0022	0.02	31	6		

3rd Quarter 2011

Sample ID	Client Sample ID	Matrix	Collection Date	Solids, Total Suspended TSS @ 105 C, mg/L	Alkalinity, Total as CaCO3, mg/L	Bicarbonate as HCO3, mg/L	SO4, mg/L	Hardness as CaCO3, mg/L	Nitrogen, Ammonia as N, mg/L	NO3+NO2 as N, mg/L	N-Total, mg/L	Phosphorus, Total as P, mg/L	As-D, mg/L	Cd-D, mg/L	Cu-D, mg/L	Pb-D, mg/L	Zn-D, mg/L	As-TR, mg/L	Cd-TR, mg/L	Cu-TR, mg/L	Pb-TR, mg/L	Zn-TR, mg/L	Ca-TR, mg/L	Mg-TR, mg/L		
H11090040-001	CFR-116A	Surface Water	09/01/2011 09:00	<1	150	180	39	150	<0.05	<0.05	0.14	0.013	0.008	<0.00008	0.003	<0.0005	<0.01	0.008	<0.00008	0.005	<0.0005	<0.01	41	12		
H11090040-002	CFR-84F	Surface Water	09/01/2011 12:00	10	180	220	66	205	<0.05	<0.05	0.19	0.030	0.013	<0.00008	0.005	<0.0005	<0.01	0.013	0.00010	0.014	0.0015	0.02	57	15		
H11090040-003	CFR-53C	Surface Water	09/01/2011 14:30	6	160	190	47	171	<0.05	<0.05	0.19	0.022	0.013	<0.00008	0.007	<0.0005	<0.01	0.014	0.00009	0.014	0.0012	0.01	50	11		
H11090040-004	CFR-42G	Surface Water	09/01/2011 16:30	4	160	200	55	172	<0.05	<0.05	0.22	0.020	0.018	<0.00008	0.009	<0.0005	<0.01	0.018	0.00013	0.020	0.0017	0.02	49	12		
H11090040-005	CFR-27H	Surface Water	09/02/2011 09:30	6	150	190	56	173	<0.05	0.08	0.25	0.017	0.016	<0.00008	0.008	<0.0005	0.01	0.017	0.00014	0.019	0.0019	0.02	50	12		
H11090040-006	CFR-27H Dupe	Surface Water	09/02/2011 09:45	6	160	190	56	170	<0.05	0.08	0.22	0.018	0.016	<0.00008	0.007	<0.0005	0.01	0.017	0.00013	0.019	0.0019	0.02	49	12		
H11090040-007	Field Blank	Surface Water	09/02/2011 10:00	<1	<4	<4	<1	<1	<0.05	<0.05	<0.05	<0.005	<0.005	<0.00008	<0.001	<0.0005	0.01	<0.005	<0.00008	<0.001	<0.0005	<0.01	<1	<1		
H11080566-001	CFR-03A	Surface Water	08/30/2011 10:00	<1	120	130	45	156	<0.05	0.06	0.31	0.023	0.015	<0.00008	0.004	<0.0005	<0.01	0.015	<0.00008	0.012	0.0011	<0.01	46	10		
H11080566-013	SS-25	Surface Water		<1	110	79	81	166	<0.05	<0.05	1.18	0.078	0.037	<0.00008	0.004	<0.0005	<0.01	0.037	<0.00008	0.005	<0.0005	<0.01	48	11		

3rd Quarter 2011 Synoptic

Sample ID	Client Sample ID	Matrix	Collection Date	Solids, Total Suspended TSS @ 105 C, mg/L	Alkalinity, Total as CaCO3, mg/L	Bicarbonate as HCO3, mg/L	SO4, mg/L	Hardness as CaCO3, mg/L	Nitrogen, Ammonia as N, mg/L	NO3+NO2 as N, mg/L	N-Total, mg/L	Phosphorus, Total as P, mg/L	As-D, mg/L	Cd-D, mg/L	Cu-D, mg/L	Pb-D, mg/L	Zn-D, mg/L	As-TR, mg/L	Cd-TR, mg/L	Cu-TR, mg/L	Pb-TR, mg/L	Zn-TR, mg/L	Ca-D, mg/L	Mg-D, mg/L		
H11080566-001	CFR-03A	Surface Water	08/30/2011 10:00	<1	120	130	45	156	<0.05	0.06	0.31	0.023	0.015	<0.00008	0.004	<0.0005	<0.01	0.015	<0.00008	0.012	0.0011	<0.01	46	10		
H11080566-002	CFR-03A Dup	Surface Water	08/30/2011 10:30	6	120	140	44	152	<0.05	0.06	0.20	0.022	0.015	<0.00008	0.004	<0.0005	<0.01	0.015	<0.00008	0.010	0.0010	<0.01	44	10		
H11080566-003	Blank	Surface Water	08/30/2011 09:30	<1	<4	<4	<2	<1	<0.05	<0.05	<0.05	<0.005	<0.005	<0.00008	<0.001	<0.0005	<0.01	<0.005	<0.00008	<0.001	<0.0005	<0.01	<1	<1		
H11080566-004	SYN-01	Surface Water	08/30/2011 11:00	<1	120	130	43	153	<0.05	0.06	0.41	0.023	0.014	<0.00008	0.004	<0.0005	<0.01	0.015	<0.00008	0.010	0.0008	<0.01	45	10		
H11080566-005	SYN-02	Surface Water	08/30/2011 01:00	4	120	120	43	147	<0.05	0.05	0.21	0.021	0.014	<0.00008	0.004	<0.0005	<0.01	0.015	<0.00008	0.009	0.0008	<0.01	43	10		
H11080566-006	SYN-03	Surface Water	08/30/2011 13:45	6	120	120	43	153	<0.05	0.05	0.37	0.026	0.015	<0.00008	0.004	<0.0005	<0.01	0.015	<0.00008	0.013	0.0011	<0.01	45	10		
H11080566-007	SYN-04	Surface Water	08/30/2011 15:15	<1	120	120	43	144	<0.05	0.05	0.19	0.025	0.015	<0.00008	0.004	<0.0005	<0.01	0.016	<0.00008	0.008	0.0006	<0.01	42	9		
H11080566-008	SYN-05	Surface Water	08/30/2011 16:30	6	120	120	42	147	<0.05	<0.05	0.17	0.026	0.016	<0.00008	0.004	<0.0005	<0.01	0.016	<0.00008	0.008	0.0006	<0.01	43	9		
H11080566-009	SYN-06	Surface Water	08/31/2011 09:30	<1	120	130	42	148	<0.05	0.06	0.17	0.026	0.015	<0.00008	0.005	<0.0005	<0.01	0.015	<0.00008	0.011	0.0010	<0.01	44	9		
H11080566-010	SYN-07	Surface Water	08/31/2011 10:30	<1	120	130	42	146	<0.05	0.06	0.18	0.024	0.014	<0.00008	0.003	<0.0005	<0.01	0.015	<0.00008	0.008	0.0007	<0.01	43	9		
H11080566-011	SYN-08	Surface Water	08/31/2011 11:30	<1	120	120	41	146	<0.05	0.06	0.15	0.027	0.014	<0.00008	0.003	<0.0005	<0.01	0.015	<0.00008	0.008	0.0007	<0.01	43	9		
H11080566-012	SYN-09	Surface Water	08/31/2011 12:45	<1	110	77	82	168	<0.05	<0.05	1.05	0.080	0.036	<0.00008	0.004	<0.0005	<0.01	0.036	<0.00008	0.006	0.0009	<0.01	48	12		
H11080566-013	SS-25	Surface Water	08/31/2011 13:45	<1	110	79	81	166	<0.05	<0.05	1.18	0.078	0.037	<0.00008	0.004	<0.0005	<0.01	0.037	<0.00008	0.005	<0.0005	<0.01	48	11		

4th Quarter 2011

Sample ID	Client Sample ID	Matrix	Collection Date	Solids, Total Suspended TSS @ 105 C, mg/L	Alkalinity, Total as CaCO3, mg/L	Bicarbonate as HCO3, mg/L	SO4, mg/L	Hardness as CaCO3, mg/L	Nitrogen, Ammonia as N, mg/L	NO3+NO2 as N, mg/L	N-Total, mg/L	Phosphorus, Total as P, mg/L	As-D, mg/L	Cd-D, mg/L	Cu-D, mg/L	Pb-D, mg/L	Zn-D, mg/L	As-TR, mg/L	Cd-TR, mg/L	Cu-TR, mg/L	Pb-TR, mg/L	Zn-TR, mg/L	Ca-TR, mg/L	Mg-TR, mg/L		
H11120043-001	CFR-116A	Surface Water	12/01/2011 10:00	<1	140	170	44	174	<0.05	<0.05	0.15	0.006	0.006	<0.00008	0.003	<0.0005	<0.01	0.006	<0.00008	0.008	0.0009	0.01	48	13		
H11120043-002	CFR-84F	Surface Water	12/01/2011 11:45	6	160	190	61	204	<0.05	0.07	0.12	0.009	0.007	<0.00008	0.004	<0.0005	<0.01	0.008	0.00009	0.011	0.0014	0.02	57	15		
H11120043-003	CFR-53C	Surface Water	12/01/2011 13:45	4	150	170	58	194	<0.05	0.12	1.11	0.014	0.008	<0.00008	0.005	<0.0005	<0.01	0.009	0.00012	0.017	0.0018	0.02	56	13		
H11120043-004	CFR-42G	Surface Water	12/01/2011 15:00	10	160	180	67	210	<0.05	0.22	0.7	0.021	0.010	<0.00008	0.006	<0.0005	<0.01	0.013	0.00019	0.031	0.0034	0.03	60	14		
H11120043-005	CFR-27H	Surface Water	12/02/2011 09:30	<1	150	180	70	214	<0.05	0.27	0.39	0.013	0.010	<0.00008	0.005	<0.0005	0.01	0.011	0.00013	0.013	0.0013	0.02	62	14		
H11120043-006	CFR-27H Dupe	Surface Water	12/02/2011 09:30	8	160	190	70	214	<0.05	0.27	0.42	0.013	0.010	<0.00008	0.005	<0.0005	0.01	0.011	0.00013	0.014	0.0014	0.02	62	14		
H11120043-007	Field Blank	Surface Water	12/02/2011 09:00	<1	<4	<4	<1	<1	<0.05	<0.05	<0.05	<0.005	<0.005	<0.00008	<0.001	<0.0005	<0.01	<0.005	<0.00008	<0.001	<0.0005	<0.01	<1	<1		
H11120043-008	CFR-03A	Surface Water	12/02/2011 11:15	<1	130	160	72	197	<0.05	0.07	0.25	0.020	0.010	0.00008	0.004	<0.0005	<0.01	0.012	0.00015	0.010	0.0013	0.01	57	13		
H11120043-009	SS-25	Surface Water	12/02/2011 12:00	<1	120	150	130	231	<0.05	<0.05	0.54	0.047	0.018	0.00010	0.006	<0.0005	<0.01	0.021	0.00018	0.011	0.0019	0.02	66	16		

APPENDIX D

IN-STREAM SEDIMENT DATA

Clark Fork River Operable Unit, 2011

August 2012

Table D-1. In-Stream Sediment Data

Sample ID	Client Sample ID	Matrix	Collection Date Time	No. 18 Sieve, wt% retained	No. 230 Sieve, wt% passed	No. 230 Sieve, wt% retained	As-T, mg/kg	Cd-T, mg/kg	Cu-T, mg/kg	Pb-T, mg/kg	Zn-T, mg/kg
H11090040-008	CFR-116A Sediment Sieve <0.065mm	Sediment	09/01/2011 09:00		4.6		23	1.7	236	93	435
H11090040-009	CFR-116A Sediment Sieve 0.065-1mm	Sediment	09/01/2011 09:00			94.8	9	0.2	54	19	166
H11090040-010	CFR-116A Sediment Sieve 1-2mm	Sediment	09/01/2011 09:00	0.6			14	1.0	110	24	310
H11090040-011	CFR-84F Sediment Sieve <0.065mm	Sediment	09/01/2011 12:00		6.0		36	3.0	395	80	835
H11090040-012	CFR-84F Sediment Sieve 0.065-1mm	Sediment	09/01/2011 12:00			76.6	12	0.5	102	23	285
H11090040-013	CFR-84F Sediment Sieve 1-2mm	Sediment	09/01/2011 12:00	14.5			10	0.3	74	16	182
H11090040-014	CFR-53C Sediment Sieve <0.065mm	Sediment	09/01/2011 14:30		16.4		27	1.4	333	64	377
H11090040-015	CFR-53C Sediment Sieve 0.065-1mmmm	Sediment	09/01/2011 14:30			74.0	18	0.4	172	33	238
H11090040-016	CFR-53C Sediment Sieve 1-2mm	Sediment	09/01/2011 14:30	5.2			14	0.2	107	20	190
H11090040-017	CFR-42G Sediment Sieve <0.065mm	Sediment	09/01/2011 16:30		9.8		45	2.1	528	89	537
H11090040-018	CFR-42G Sediment Sieve 0.065-1mm	Sediment	09/01/2011 16:30			88.3	25	0.3	165	32	232
H11090040-019	CFR-42G Sediment Sieve 1-2mm	Sediment	09/01/2011 16:30	1.3			74	0.9	421	47	317
H11090040-020	CFR-27H Sediment Sieve <0.065mm	Sediment	09/02/2011 09:30		2.0		49	1.2	511	77	440
H11090040-021	CFR-27H Sediment Sieve 0.065-1mm	Sediment	09/02/2011 09:30			48.7	16	0.3	119	36	211
H11090040-022	CFR-27H Sediment Sieve 1-2mm	Sediment	09/02/2011 09:30	31.2			13	<0.2	154	31	190
H11090040-023	CFR-27H Dupe Sediment Sieve <0.065mm	Sediment	09/02/2011 09:45		0.6		48	1.3	445	95	419
H11090040-024	CFR-27H Dupe Sediment Sieve 0.065-1mm	Sediment	09/02/2011 09:45			29.6	15	0.3	106	43	161
H11090040-025	CFR-27H Dupe Sediment Sieve 1-2mm	Sediment	09/02/2011 09:45	50.5			11	0.3	103	54	214
H11090040-026	SS-25 Sediment Sieve <0.065mm	Sediment	09/02/2011 15:00		0.6		36	2.6	173	70	326
H11090040-027	SS-25 Sediment Sieve 0.065-1mm	Sediment	09/02/2011 15:00			14.8	15	0.3	43	21	176
H11090040-028	SS-25 Sediment Sieve 1-2mm	Sediment	09/02/2011 15:00	7.9			12	0.2	31	14	232
H11090040-029	CFR-03A Sediment Sieve <0.065mm	Sediment	09/02/2011 12:30		5.4		52	2.0	559	74	404
H11090040-030	CFR-03A Sediment Sieve 0.065-1mm	Sediment	09/02/2011 12:30			47.0	31	0.4	173	39	283
H11090040-031	CFR-03A Sediment Sieve 1-2mm	Sediment	09/02/2011 12:30	15.4			134	0.6	332	55	707

APPENDIX E

MACROINVERTEBRATE ANALYSIS

Clark Fork River Operable Unit, 2011

August 2012

Table E-1. Results of internal quality control procedures for subsampling and taxonomy for macroinvertebrate samples, and taxonomic comparability for diatom samples. Clark Fork basin samples, 2011.

RAI Sample ID	Station name	Site ID	Sorting efficiency	Bray-Curtis similarity for taxonomy and enumeration
PBSJ11CFR001	SBC at Warm Springs Rep 1	SS-25	99.17%	
PBSJ11CFR002	SBC at Warm Springs Rep 2	SS-25	99.85%	
PBSJ11CFR003	SBC at Warm Springs Rep 3	SS-25	98.48%	
PBSJ11CFR004	SBC at Warm Springs Rep 4	SS-25	99.82%	
PBSJ11CFR005	Clark Fork near Galen Rep 1	CFR-03A	96.46%	
PBSJ11CFR006	Clark Fork near Galen Rep 2	CFR-03A	98.84%	97.46%
PBSJ11CFR007	Clark Fork near Galen Rep 3	CFR-03A	98.59%	
PBSJ11CFR008	Clark Fork near Galen Rep 4	CFR-03A	100%	
PBSJ11CFR009	Clark Fork at Deer Lodge Rep 1	CFR-27H	98.45%	
PBSJ11CFR010	Clark Fork at Deer Lodge Rep 2	CFR-27H	96.75%	
PBSJ11CFR011	Clark Fork at Deer Lodge Rep 3	CFR-27H	94.06%	
PBSJ11CFR012	Clark Fork at Deer Lodge Rep 4	CFR-27H	96.65%	
PBSJ11CFR013	Clark Fork above Little Blackfoot River near Garrison Rep 1	CFR-42G	100%	96.05%
PBSJ11CFR014	Clark Fork above Little Blackfoot River near Garrison Rep 2	CFR-42G	97.11%	
PBSJ11CFR015	Clark Fork above Little Blackfoot River near Garrison Rep 3	CFR-42G	100%	
PBSJ11CFR016	Clark Fork above Little Blackfoot River near Garrison Rep 4	CFR-42G	97.02%	
PBSJ11CFR017	Clark Fork at Gold Creek Rep 1	CFR-53C	98.2%	
PBSJ11CFR018	Clark Fork at Gold Creek Rep 2	CFR-53C	100%	
PBSJ11CFR019	Clark Fork at Gold Creek Rep 3	CFR-53C	95.12%	
PBSJ11CFR020	Clark Fork at Gold Creek Rep 4	CFR-53C	96.51%	
PBSJ11CFR021	Clark Fork near Drummond Rep 1	CFR-84F	94.01%	
PBSJ11CFR022	Clark Fork near Drummond Rep 2	CFR-84F	98.79%	
PBSJ11CFR023	Clark Fork near Drummond Rep 3	CFR-84F	97.65%	
PBSJ11CFR024	Clark Fork near Drummond Rep 4	CFR-84F	99.04%	
PBSJ11CFR025	Clark Fork at Turah Rep 1	CFR-116A	100%	
PBSJ11CFR026	Clark Fork at Turah Rep 2	CFR-116A	97.84%	
PBSJ11CFR027	Clark Fork at Turah Rep 3	CFR-116A	97.87%	95.28%
PBSJ11CFR028	Clark Fork at Turah Rep 4	CFR-116A	96.29%	
PBSJ11CFRP001	SBC at Warm Springs Rep 1	SS-25		
PBSJ11CFRP002	Clark Fork near Galen Rep 1	CFR-03A		
PBSJ11CFRP003	Clark Fork at Deer Lodge Rep 1	CFR-27H		
PBSJ11CFRP004	Clark Fork above Little Blackfoot River near Garrison Rep 1	CFR-42G		
PBSJ11CFRP005	Clark Fork at Gold Creek Rep 1	CFR-53C		

Table E-1. Results of internal quality control procedures for subsampling and taxonomy for macroinvertebrate samples, and taxonomic comparability for diatom samples. Clark Fork basin samples, 2011.

RAI Sample ID	Station name	Site ID	Sorting efficiency	Bray-Curtis similarity for taxonomy and enumeration
PBSJ11CFRP006	Clark Fork near Drummond Rep 1	CFR-84F		
PBSJ11CFRP007	Clark Fork at Turah Rep 1	CFR-116A		90.17%

Table E-2. Raw macroinvertebrate bioassessment scores and impairment classifications for replicate samples, using seven assessment indices. Clark Fork basin, September 2011.

Index	McGuire biointegrity metrics (McGuire 2010)		MMI (Jessup et al. 2005)		RIVPACS (Hawkins 2005)		MVFP (Bollman 1998)		Historic MDEQ(Bukantis 1998)		McGuire nutrient-sensitive subset (McGuire 2010)		McGuire metals-sensitive subset (McGuire 2010)	
Site ID/Sample replicate	score	impairment class	score	impairment class	score	Impairment class	score	impairment class	score	impairment class	score	impairment class	score	impairment class
SS-25/rep 1	75.76	Slight	54.70	None	0.35	Severe	38.89	Moderate	52.38	Moderate	66.67	Slight	77.78	Slight
SS-25/rep 2	60.61	Moderate	45.20	Moderate	0.35	Severe	38.89	Moderate	76.67	None	44.44	Moderate	77.78	Slight
SS-25/rep 3	68.18	Moderate	48.00	None	0.35	Severe	44.44	Moderate	38.1	Moderate	77.78	Slight	72.22	Slight
SS-25/rep 4	71.21	Slight	52.30	None	0.21	Severe	50.00	Moderate	38.1	Moderate	55.56	Moderate	72.22	Slight
CFR-03A/rep 1	75.76	Slight	50.70	None	0.35	Severe	44.44	Moderate	47.62	Moderate	83.33	None	83.33	None
CFR-03A/rep 2	84.85	Slight	56.80	None	0.35	Severe	61.11	Slight	66.67	Moderate	94.44	None	77.78	Slight
CFR-03A/rep 3	93.94	None	52.60	None	0.35	Severe	55.56	Slight	71.43	Moderate	88.89	None	88.89	None
CFR-03A/rep 4	78.79	Slight	51.70	None	0.35	Severe	38.89	Moderate	47.62	Moderate	88.89	None	83.33	None
CFR-27H/rep 1	90.91	None	56.50	None	0.71	Moderate	50.00	Moderate	66.67	Moderate	88.89	None	88.89	None
CFR-27H/rep 2	92.42	None	53.20	None	0.71	Moderate	44.44	Moderate	57.14	Moderate	94.44	None	88.89	None
CFR-27H/rep 3	89.39	Slight	66.80	None	0.71	Moderate	50.00	Moderate	71.43	Moderate	94.44	None	83.33	None
CFR-27H/rep 4	90.91	None	61.90	None	0.99	None	44.44	Moderate	71.43	Moderate	94.44	None	83.33	None
CFR-42G/rep 1	83.33	Slight	63.80	None	0.61	Moderate	44.44	Moderate	52.38	Moderate	83.33	None	72.22	Slight
CFR-42G/rep 2	87.88	Slight	62.80	None	0.76	Moderate	66.67	Slight	61.9	Moderate	83.33	None	83.33	None
CFR-42G/rep 3	78.79	Slight	51.40	None	0.76	Moderate	50.00	Moderate	52.38	Moderate	77.78	Slight	83.33	None
CFR-42G/rep 4	81.82	Slight	57.20	None	0.76	Moderate	50.00	Moderate	52.38	Moderate	83.33	None	83.33	None
CFR-53C/rep 1	86.36	Slight	60.70	None	0.85	None	50.00	Moderate	66.67	Moderate	100.00	None	66.67	Slight
CFR-53C/rep 2	86.36	Slight	54.50	None	0.71	Moderate	55.56	Slight	57.14	Moderate	94.44	None	72.22	Slight
CFR-53C/rep 3	84.85	Slight	66.20	None	0.71	Moderate	66.67	Slight	57.14	Moderate	94.44	None	66.67	Slight
CFR-53C/rep 4	87.88	Slight	50.40	None	0.85	None	50.00	Moderate	71.43	Moderate	94.44	None	72.22	Slight
CFR-84F/rep 1	85.00	Slight	52.00	None	1.04	None	50.00	Moderate	76.19	None	94.44	None	72.22	Slight
CFR-84F/rep 2	75.00	Slight	48.50	None	1.04	None	44.44	Moderate	47.62	Moderate	83.33	None	66.67	Slight
CFR-84F/rep 3	75.00	Slight	59.70	None	1.19	None	55.56	Slight	42.86	Moderate	83.33	None	66.67	Slight
CFR-84F/rep 4	81.82	Slight	49.20	None	0.89	None	61.11	Slight	57.14	Moderate	77.78	Slight	83.33	None
CFR-116A/rep 1	86.36	Slight	64.60	None	0.51	Moderate	88.89	None	28.57	Moderate	83.33	None	83.33	None
CFR-116A/rep 2	86.67	Slight	69.90	None	0.44	Moderate	83.33	None	42.86	Moderate	88.89	None	72.22	Slight
CFR-116A/rep 3	78.33	Slight	65.60	None	0.51	Moderate	77.78	Slight	61.9	Moderate	94.44	None	66.67	Slight
CFR-116A/rep 4	70.00	Slight	66.00	None	0.44	Moderate	61.11	Slight	42.86	Moderate	88.89	None	50.00	Moderate

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC001

RAI No.: PBSJ11CFRC001 **Sta. Name:** Silver Bow Creek at Warms Springs
Client ID: SS-25
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12323750

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Amphipoda	10	0.10%	No	Unknown	Damaged	4	CG
Nemata	0	0.00%	Yes	Unknown		5	UN
Turbellaria	11	0.11%	Yes	Unknown		4	PR
Hyalellidae							
Hyalella sp.	19	0.19%	Yes	Unknown		8	CG
Hydridae							
Hydra sp.	2	0.02%	Yes	Unknown		8	PR
Sphaeriidae							
Sphaeriidae	2	0.02%	Yes	Immature		8	CF
Ephemeroptera							
Baetidae							
Baetidae	1	0.01%	Yes	Larva	Damaged	4	CG
Baetis sp.	9	0.09%	No	Larva	Damaged	5	CG
Baetis tricaudatus	197	1.96%	Yes	Larva		4	CG
Ephemerellidae							
Ephemerella sp.	3	0.03%	Yes	Larva	Early Instar	1.5	SC
Ephemerellidae	23	0.23%	No	Larva	Early Instar	1	CG
Heptageniidae							
Heptageniidae	1	0.01%	Yes	Larva	Damaged	4	SC
Leptohyphidae							
Tricorythodes sp.	2	0.02%	Yes	Larva		4	CG
Plecoptera							
Perlidae							
Claassenia sabulosa	1	0.01%	Yes	Larva		3	PR
Perlodidae							
Perlodidae	18	0.18%	No	Larva	Early Instar	2	PR
Skwala sp.	37	0.37%	Yes	Larva		3	PR
Pteronarcyidae							
Pteronarcella sp.	2	0.02%	Yes	Larva		4	SH
Pteronarcys sp.	1	0.01%	Yes	Larva	Early Instar	2	SH

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC001

RAI No.: PBSJ11CFRC001 **Sta. Name:** Silver Bow Creek at Warms Springs
Client ID: SS-25
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12323750

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Trichoptera							
Brachycentridae							
Amiocentrus aspilus	8	0.08%	Yes	Larva		3	CG
Brachycentridae	1	0.01%	No	Larva	Early Instar	1	CF
Brachycentrus americanus	4	0.04%	Yes	Larva		1	CF
Brachycentrus occidentalis	298	2.97%	Yes	Larva		2	CF
Glossosomatidae							
Glossosoma sp.	73	0.73%	Yes	Larva		0	SC
Glossosomatidae	12	0.12%	No	Pupa		0	SC
Protoptila sp.	4	0.04%	Yes	Larva		1	SC
Hydropsychidae							
Ceratopsyche sp.	2	0.02%	No	Larva	Damaged	5	CF
Ceratopsyche cockerelli	574	5.72%	Yes	Larva		11	CF
Cheumatopsyche sp.	1244	12.40%	Yes	Larva		5	CF
Hydropsyche occidentalis	3191	31.80%	Yes	Larva		4	CF
Hydropsychidae	1054	10.50%	No	Larva	Early Instar	4	CF
Hydroptilidae							
Hydroptilidae	1	0.01%	No	Pupa		4	PH
Hydroptilidae sp. (RAI Taxon # 0001)	2	0.02%	Yes	Larva		11	SH
Lepidostomatidae							
Lepidostoma sp.	156	1.55%	Yes	Larva		1	SH
Leptoceridae							
Nectopsyche sp.	1	0.01%	Yes	Larva		2	SH
Oecetis sp.	1	0.01%	Yes	Larva		8	PR
Rhyacophilidae							
Rhyacophila sp.	1	0.01%	Yes	Pupa		1	PR
Lepidoptera							
Crambidae							
Petrophila sp.	2	0.02%	Yes	Larva		5	SC
Coleoptera							
Elmidae							
Elmidae	15	0.15%	No	Larva	Early Instar	4	CG
Heterlimnius sp.	1	0.01%	Yes	Adult		3	CG
Optioservus sp.	111	1.11%	No	Larva		5	SC
Optioservus sp.	62	0.62%	Yes	Adult		5	SC
Zaitzevia sp.	51	0.51%	Yes	Adult		5	CG
Zaitzevia sp.	200	1.99%	No	Larva		5	CG
Diptera							
Empididae							
Chelifera / Metachela sp.	3	0.03%	Yes	Larva		5	PR
Simuliidae							
Simulium sp.	46	0.46%	No	Pupa		6	CF
Simulium sp.	311	3.10%	Yes	Larva		6	CF
Tipulidae							
Antocha monticola	1	0.01%	Yes	Larva		3	CG
Hexatoma sp.	2	0.02%	Yes	Larva		2	PR
Tipula sp.	15	0.15%	Yes	Larva		4	SH

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC001

RAI No.: PBSJ11CFRC001 **Sta. Name:** Silver Bow Creek at Warms Springs
Client ID: SS-25
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12323750

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Chironomidae							
Chironomidae							
Cardiocladius sp.	2	0.02%	No	Pupa		5	PR
Cardiocladius sp.	5	0.05%	Yes	Larva		5	PR
Cricotopus sp.	248	2.47%	No	Pupa		7	SH
Cricotopus sp.	1001	9.98%	Yes	Larva		7	SH
Diamesa sp.	8	0.08%	No	Pupa		5	CG
Diamesa sp.	121	1.21%	Yes	Larva		5	CG
Diamesinae	2	0.02%	No	Pupa	Damaged	5	CG
Eukiefferiella sp.	250	2.49%	Yes	Larva		8	CG
Eukiefferiella sp.	18	0.18%	No	Pupa		8	CG
Micropsectra sp.	84	0.84%	Yes	Larva		4	CG
Microtendipes sp.	1	0.01%	Yes	Larva		6	CF
Orthocladiinae	43	0.43%	No	Pupa	Damaged	6	CG
Orthocladiinae	6	0.06%	No	Larva	Early Instar	6	CG
Orthocladius sp.	47	0.47%	No	Pupa		6	CG
Orthocladius sp.	284	2.83%	Yes	Larva		6	CG
Pagastia sp.	1	0.01%	No	Pupa		1	CG
Pagastia sp.	3	0.03%	Yes	Larva		1	CG
Parametriocnemus sp.	5	0.05%	No	Pupa		5	CG
Parametriocnemus sp.	22	0.22%	Yes	Larva		5	CG
Polypedilum sp.	1	0.01%	Yes	Larva		6	SH
Potthastia Gaedii Gr.	1	0.01%	Yes	Larva		2	CG
Potthastia Longimana Gr.	2	0.02%	Yes	Larva		2	CG
Pseudochironomus sp.	1	0.01%	Yes	Larva		5	CG
Thienemannimyia Gr.	11	0.11%	Yes	Larva		5	PR
Tvetenia sp.	73	0.73%	Yes	Larva		5	CG
Tvetenia sp.	8	0.08%	No	Pupa		5	CG
Sample Count	**10034**						

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC002

RAI No.: PBSJ11CFRC002 **Sta. Name:** Clark Fork near Galen
Client ID: CFR-03A
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12323800

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Nemata	0	0.00%	Yes	Unknown		5	UN
Turbellaria	10	0.25%	Yes	Unknown		4	PR
Enchytraeidae							
Enchytraeidae	2	0.05%	Yes	Unknown		4	CG
Naididae							
Naididae (Naidinae)	5	0.13%	Yes	Unknown		8	CG
Pisidiidae							
Pisidium sp.	1	0.03%	Yes	Unknown		5	CF
Ephemeroptera							
Baetidae							
Baetidae	4	0.10%	No	Larva	Damaged	4	CG
Baetis sp.	14	0.35%	No	Larva	Damaged	5	CG
Baetis tricaudatus	130	3.29%	Yes	Larva		4	CG
Ephemerellidae							
Caudatella hystrix	1	0.03%	Yes	Larva		0	SC
Drunella sp.	3	0.08%	No	Larva	Early Instar	1	SC
Drunella doddsii	1	0.03%	Yes	Larva		1	SC
Drunella grandis	2	0.05%	Yes	Larva		2	PR
Ephemerellidae	2	0.05%	No	Larva	Early Instar	1	CG
Heptageniidae							
Nixe sp.	2	0.05%	Yes	Larva		4	SC
Leptohyphidae							
Tricorythodes sp.	1	0.03%	Yes	Larva		4	CG
Plecoptera							
Nemouridae							
Malenka sp.	1	0.03%	Yes	Larva		1	SH
Perlidae							
Hesperoperla pacifica	6	0.15%	Yes	Larva		1	PR
Perlodidae							
Perlodidae	4	0.10%	No	Larva	Early Instar	2	PR
Skwala sp.	15	0.38%	Yes	Larva		3	PR
Pteronarcyidae							
Pteronarcella sp.	20	0.51%	Yes	Larva		4	SH

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC002

RAI No.: PBSJ11CFRC002 **Sta. Name:** Clark Fork near Galen
Client ID: CFR-03A
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12323800

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Trichoptera							
Brachycentridae							
Amiocentrus aspilus	5	0.13%	Yes	Larva		3	CG
Brachycentridae	3	0.08%	No	Larva	Early Instar	1	CF
Brachycentrus americanus	3	0.08%	Yes	Larva		1	CF
Brachycentrus occidentalis	267	6.77%	Yes	Larva		2	CF
Glossosomatidae							
Glossosoma sp.	111	2.81%	Yes	Larva		0	SC
Glossosomatidae	8	0.20%	No	Pupa		0	SC
Protoptila sp.	17	0.43%	Yes	Larva		1	SC
Helicopsychidae							
Helicopsyche sp.	1	0.03%	Yes	Larva		3	SC
Hydropsychidae							
Ceratopsyche sp.	167	4.23%	No	Larva	Early Instar	5	CF
Ceratopsyche cockerelli	245	6.21%	Yes	Larva		11	CF
Ceratopsyche slossonae	200	5.07%	Yes	Larva		11	CF
Cheumatopsyche sp.	46	1.17%	Yes	Larva		5	CF
Hydropsyche sp.	97	2.46%	No	Larva	Early Instar	5	CF
Hydropsyche occidentalis	444	11.25%	Yes	Larva		4	CF
Hydropsychidae	392	9.93%	No	Larva	Early Instar	4	CF
Lepidostomatidae							
Lepidostoma sp.	6	0.15%	Yes	Larva		1	SH
Limnephilidae							
Amphicosmoecus canax	1	0.03%	Yes	Larva		1	SH
Rhyacophilidae							
Rhyacophila sp.	1	0.03%	No	Pupa		1	PR
Rhyacophila sp.	1	0.03%	No	Larva	Damaged	1	PR
Rhyacophila Brunnea Gr.	57	1.44%	Yes	Larva		2	PR
Rhyacophila Hyalinata Gr.	1	0.03%	Yes	Larva		0	PR
Coleoptera							
Elmidae							
Cleptelmis addenda	17	0.43%	Yes	Adult		4	CG
Cleptelmis addenda	12	0.30%	No	Larva		4	CG
Elmidae	2	0.05%	No	Larva	Early Instar	4	CG
Heterlimnius sp.	16	0.41%	Yes	Adult		3	CG
Heterlimnius sp.	3	0.08%	No	Larva		3	CG
Optioservus sp.	180	4.56%	Yes	Adult		5	SC
Optioservus sp.	355	9.00%	No	Larva		5	SC
Zaitzevia sp.	38	0.96%	No	Larva		5	CG
Zaitzevia sp.	52	1.32%	Yes	Adult		5	CG

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC002

RAI No.: PBSJ11CFRC002 **Sta. Name:** Clark Fork near Galen
Client ID: CFR-03A
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12323800

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Diptera							
Athericidae							
Atherix sp.	19	0.48%	Yes	Larva		5	PR
Empididae							
Chelifera / Metachela sp.	3	0.08%	Yes	Larva		5	PR
Empididae	1	0.03%	No	Larva	Early Instar	6	PR
Simuliidae							
Simulium sp.	3	0.08%	No	Pupa		6	CF
Simulium sp.	41	1.04%	Yes	Larva		6	CF
Tipulidae							
Antocha monticola	9	0.23%	Yes	Larva		3	CG
Hexatoma sp.	3	0.08%	Yes	Larva		2	PR
Tipulidae	1	0.03%	Yes	Larva	Early Instar	3	SH
Chironomidae							
Chironomidae							
Cardiocladius sp.	1	0.03%	Yes	Pupa		5	PR
Cricotopus sp.	2	0.05%	Yes	Larva		7	SH
Cricotopus sp.	2	0.05%	No	Pupa		7	SH
Cricotopus (Nostococladius) sp.	518	13.13%	Yes	Larva		6	SH
Eukiefferiella sp.	13	0.33%	No	Pupa		8	CG
Eukiefferiella sp.	149	3.78%	Yes	Larva		8	CG
Microtendipes sp.	1	0.03%	Yes	Larva		6	CF
Orthocladiinae	1	0.03%	No	Pupa	Damaged	6	CG
Orthocladius sp.	159	4.03%	Yes	Larva		6	CG
Orthocladius sp.	4	0.10%	No	Pupa		6	CG
Pagastia sp.	17	0.43%	Yes	Larva		1	CG
Pagastia sp.	5	0.13%	No	Pupa		1	CG
Parametriocnemus sp.	1	0.03%	Yes	Larva		5	CG
Polypedilum sp.	1	0.03%	Yes	Pupa		6	SH
Thienemanniella sp.	1	0.03%	Yes	Larva		6	CG
Tvetenia sp.	5	0.13%	No	Pupa		5	CG
Tvetenia sp.	14	0.35%	Yes	Larva		5	CG
Sample Count	**3946**						

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC003

RAI No.: PBSJ11CFRC003 **Sta. Name:** Clark Fork at Deer Lodge
Client ID: CFR-27H
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12324200

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Nemata	0	0.00%	Yes	Unknown		5	UN
Turbellaria	45	1.40%	Yes	Unknown		4	PR
Naididae							
Naididae (Naidinae)	2	0.06%	Yes	Unknown		8	CG
Naididae (Tubificinae)	1	0.03%	Yes	Unknown		11	CG
Pisidiidae							
Pisidium sp.	1	0.03%	Yes	Unknown		5	CF
Odonata							
Gomphidae							
Gomphidae	1	0.03%	Yes	Larva	Early Instar	2.5	PR
Ephemeroptera							
Baetidae							
Acentrella sp.	6	0.19%	Yes	Larva		4	CG
Baetis sp.	2	0.06%	No	Larva	Damaged	5	CG
Baetis tricaudatus	20	0.62%	Yes	Larva		4	CG
Ephemerellidae							
Drunella grandis	1	0.03%	Yes	Larva		2	PR
Ephemerella sp.	15	0.47%	No	Larva	Early Instar	1.5	SC
Ephemerella excrucians	16	0.50%	Yes	Larva		4	SH
Heptageniidae							
Heptageniidae	2	0.06%	No	Larva	Damaged	4	SC
Rhithrogena sp.	4	0.12%	Yes	Larva		0	CG
Leptohyphidae							
Tricorythodes sp.	8	0.25%	Yes	Larva		4	CG
Plecoptera							
Perlodidae							
Isoperla sp.	19	0.59%	Yes	Larva		2	PR
Perlodidae	7	0.22%	No	Larva	Early Instar	2	PR
Skwala sp.	115	3.57%	Yes	Larva		3	PR
Pteronarcyidae							
Pteronarcella sp.	4	0.12%	Yes	Larva		4	SH

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC003

RAI No.: PBSJ11CFRC003 **Sta. Name:** Clark Fork at Deer Lodge
Client ID: CFR-27H
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12324200

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Trichoptera							
Brachycentridae							
Amiocentrus aspilus	1	0.03%	Yes	Larva		3	CG
Brachycentridae	2	0.06%	No	Larva	Early Instar	1	CF
Brachycentrus occidentalis	2	0.06%	Yes	Larva		2	CF
Glossosomatidae							
Glossosoma sp.	73	2.26%	Yes	Larva		0	SC
Glossosomatidae	9	0.28%	No	Pupa		0	SC
Protoptila sp.	13	0.40%	Yes	Larva		1	SC
Helicopsychidae							
Helicopsyche sp.	48	1.49%	Yes	Larva		3	SC
Hydropsychidae							
Arctopsyche grandis	29	0.90%	Yes	Larva		2	PR
Ceratopsyche cockerelli	252	7.82%	Yes	Larva		11	CF
Ceratopsyche slossonae	22	0.68%	Yes	Larva		11	CF
Cheumatopsyche sp.	31	0.96%	Yes	Larva		5	CF
Hydropsyche occidentalis	688	21.34%	Yes	Larva		4	CF
Hydropsychidae	279	8.65%	No	Larva	Early Instar	4	CF
Hydroptilidae							
Hydroptila sp.	7	0.22%	Yes	Larva		6	PH
Hydroptilidae	1	0.03%	No	Larva	Damaged	4	PH
Hydroptilidae	1	0.03%	No	Pupa		4	PH
Lepidostomatidae							
Lepidostoma sp.	363	11.26%	Yes	Larva		1	SH
Leptoceridae							
Oecetis sp.	8	0.25%	Yes	Larva		8	PR
Coleoptera							
Elmidae							
Elmidae	5	0.16%	No	Larva	Early Instar	4	CG
Heterlimnius sp.	5	0.16%	Yes	Adult		3	CG
Optioservus sp.	220	6.82%	No	Larva		5	SC
Optioservus sp.	27	0.84%	Yes	Adult		5	SC
Zaitzevia sp.	8	0.25%	Yes	Adult		5	CG
Zaitzevia sp.	76	2.36%	No	Larva		5	CG
Diptera							
Athericidae							
Atherix sp.	88	2.73%	Yes	Larva		5	PR
Simuliidae							
Simulium sp.	1	0.03%	No	Pupa		6	CF
Simulium sp.	8	0.25%	Yes	Larva		6	CF
Tipulidae							
Antocha monticola	3	0.09%	Yes	Larva		3	CG
Hexatoma sp.	10	0.31%	Yes	Larva		2	PR

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC003

RAI No.: PBSJ11CFRC003 **Sta. Name:** Clark Fork at Deer Lodge
Client ID: CFR-27H
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12324200

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Chironomidae							
Chironomidae							
Cricotopus sp.	19	0.59%	No	Pupa		7	SH
Cricotopus sp.	66	2.05%	Yes	Larva		7	SH
Eukiefferiella sp.	190	5.89%	Yes	Larva		8	CG
Eukiefferiella sp.	12	0.37%	No	Pupa		8	CG
Micropsectra sp.	1	0.03%	Yes	Larva		4	CG
Microtendipes sp.	2	0.06%	Yes	Larva		6	CF
Orthocladiinae	3	0.09%	No	Pupa	Damaged	6	CG
Orthocladius sp.	11	0.34%	No	Pupa		6	CG
Orthocladius sp.	318	9.86%	Yes	Larva		6	CG
Parametriocnemus sp.	2	0.06%	No	Pupa		5	CG
Parametriocnemus sp.	1	0.03%	Yes	Larva		5	CG
Polypedilum sp.	1	0.03%	Yes	Larva		6	SH
Potthastia Gaedii Gr.	2	0.06%	Yes	Larva		2	CG
Thienemanniella sp.	1	0.03%	Yes	Pupa		6	CG
Thienemannimyia Gr.	2	0.06%	Yes	Larva		5	PR
Tvetenia sp.	6	0.19%	No	Pupa		5	CG
Tvetenia sp.	38	1.18%	Yes	Larva		5	CG
Sample Count	**3224**						

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC004

RAI No.: PBSJ11CFRC004
Client ID: CFR-42G
Date Coll.: 9/19/2011
No. Jars:
Sta. Name: Clark Fork above Little Blackfoot River near Garrison
STORET ID: 12324400

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Nemata	0	0.00%	Yes	Unknown		5	UN
Ephemeroptera							
Baetidae							
Acentrella sp.	11	0.35%	Yes	Larva		4	CG
Baetidae	1	0.03%	No	Larva	Early Instar	4	CG
Baetis sp.	5	0.16%	No	Larva	Damaged	5	CG
Baetis tricaudatus	53	1.68%	Yes	Larva		4	CG
Ephemerellidae							
Drunella grandis	1	0.03%	Yes	Larva		2	PR
Ephemerella sp.	21	0.67%	Yes	Larva	Early Instar	1.5	SC
Heptageniidae							
Rhithrogena sp.	1	0.03%	Yes	Larva		0	CG
Leptohyphidae							
Tricorythodes sp.	13	0.41%	Yes	Larva		4	CG
Plecoptera							
Perlodidae							
Isogenoides sp.	10	0.32%	Yes	Larva		3	PR
Perlodidae	25	0.79%	No	Larva	Early Instar	2	PR
Skwala sp.	39	1.24%	Yes	Larva		3	PR
Pteronarcyidae							
Pteronarcella sp.	1	0.03%	Yes	Larva		4	SH

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC004

RAI No.: PBSJ11CFRC004
Client ID: CFR-42G
Date Coll.: 9/19/2011
No. Jars:
Sta. Name: Clark Fork above Little Blackfoot River near Garrison
STORET ID: 12324400

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Trichoptera							
Brachycentridae							
Amiocentrus aspilus	3	0.10%	Yes	Larva		3	CG
Brachycentrus americanus	1	0.03%	Yes	Larva		1	CF
Brachycentrus occidentalis	5	0.16%	Yes	Larva		2	CF
Glossosomatidae							
Glossosoma sp.	40	1.27%	Yes	Larva		0	SC
Glossosomatidae	13	0.41%	No	Pupa		0	SC
Protoptila sp.	35	1.11%	Yes	Larva		1	SC
Helicopsychidae							
Helicopsyche sp.	38	1.21%	Yes	Larva		3	SC
Hydropsychidae							
Arctopsyche grandis	74	2.35%	Yes	Larva		2	PR
Ceratopsyche sp.	1	0.03%	No	Larva	Early Instar	5	CF
Ceratopsyche cockerelli	354	11.25%	Yes	Larva		11	CF
Ceratopsyche slossonae	3	0.10%	Yes	Larva		11	CF
Cheumatopsyche sp.	37	1.18%	Yes	Larva		5	CF
Hydropsyche occidentalis	739	23.48%	Yes	Larva		4	CF
Hydropsychidae	306	9.72%	No	Larva	Early Instar	4	CF
Hydroptilidae							
Hydroptila sp.	3	0.10%	Yes	Larva		6	PH
Lepidostomatidae							
Lepidostoma sp.	39	1.24%	Yes	Larva		1	SH
Leptoceridae							
Nectopsyche sp.	2	0.06%	Yes	Larva		2	SH
Oecetis sp.	34	1.08%	Yes	Larva		8	PR
Coleoptera							
Elmidae							
Heterlimnius sp.	2	0.06%	Yes	Adult		3	CG
Optioservus sp.	21	0.67%	No	Larva		5	SC
Optioservus sp.	19	0.60%	Yes	Adult		5	SC
Zaitzevia sp.	37	1.18%	No	Larva		5	CG
Zaitzevia sp.	6	0.19%	Yes	Adult		5	CG
Diptera							
Athericidae							
Atherix sp.	10	0.32%	Yes	Larva		5	PR
Empididae							
Hemerodromia sp.	2	0.06%	Yes	Larva		6	PR
Simuliidae							
Simulium sp.	20	0.64%	Yes	Larva		6	CF
Simulium sp.	2	0.06%	No	Pupa		6	CF
Tipulidae							
Antocha monticola	8	0.25%	Yes	Larva		3	CG
Hexatoma sp.	35	1.11%	Yes	Larva		2	PR

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC004

RAI No.: PBSJ11CFRC004
Client ID: CFR-42G
Date Coll.: 9/19/2011
No. Jars:
Sta. Name: Clark Fork above Little Blackfoot River near Garrison
STORET ID: 12324400

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Chironomidae							
Chironomidae							
Cardiocladius sp.	1	0.03%	No	Pupa		5	PR
Cardiocladius sp.	13	0.41%	Yes	Larva		5	PR
Cricotopus sp.	68	2.16%	No	Pupa		7	SH
Cricotopus sp.	221	7.02%	Yes	Larva		7	SH
Diamesa sp.	1	0.03%	Yes	Larva		5	CG
Eukiefferiella sp.	316	10.04%	Yes	Larva		8	CG
Eukiefferiella sp.	39	1.24%	No	Pupa		8	CG
Micropsectra sp.	1	0.03%	Yes	Larva		4	CG
Nanocladius sp.	1	0.03%	Yes	Larva		3	CG
Orthocladiinae	1	0.03%	No	Larva	Early Instar	6	CG
Orthocladiinae	2	0.06%	No	Pupa	Damaged	6	CG
Orthocladius sp.	356	11.31%	Yes	Larva		6	CG
Orthocladius sp.	11	0.35%	No	Pupa		6	CG
Parametriocnemus sp.	1	0.03%	No	Pupa		5	CG
Parametriocnemus sp.	5	0.16%	Yes	Larva		5	CG
Potthastia Gaedii Gr.	1	0.03%	Yes	Larva		2	CG
Thienemanniella sp.	1	0.03%	Yes	Larva		6	CG
Thienemanniella sp.	1	0.03%	No	Pupa		6	CG
Tvetenia sp.	5	0.16%	No	Pupa		5	CG
Tvetenia sp.	32	1.02%	Yes	Larva		5	CG
Sample Count	**3147**						

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC005

RAI No.: PBSJ11CFRC005 **Sta. Name:** Clark Fork at Gold Creek
Client ID: CFR-53C
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12324680

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Nemata	0	0.00%	Yes	Unknown		5	UN
Turbellaria	1	0.10%	Yes	Unknown		4	PR
Naididae							
Naididae (Tubificinae)	1	0.10%	Yes	Unknown		11	CG
Ephemeroptera							
Baetidae							
Acentrella sp.	9	0.88%	Yes	Larva		4	CG
Baetis tricaudatus	58	5.64%	Yes	Larva		4	CG
Ephemerellidae							
Drunella sp.	5	0.49%	No	Larva	Early Instar	1	SC
Drunella grandis	1	0.10%	Yes	Larva		2	PR
Ephemerella sp.	16	1.56%	Yes	Larva	Early Instar	1.5	SC
Heptageniidae							
Cinygmula sp.	2	0.19%	Yes	Larva		0	SC
Rhithrogena sp.	8	0.78%	Yes	Larva		0	CG
Plecoptera							
Chloroperlidae							
Suwallia sp.	2	0.19%	Yes	Larva		1	PR
Sweltsa sp.	2	0.19%	Yes	Larva		0	PR
Perlidae							
Claassenia sabulosa	8	0.78%	Yes	Larva		3	PR
Hesperoperla pacifica	3	0.29%	Yes	Larva		1	PR
Perlodidae							
Isogenoides sp.	6	0.58%	Yes	Larva		3	PR
Perlodidae	9	0.88%	No	Larva	Early Instar	2	PR
Skwala sp.	10	0.97%	Yes	Larva		3	PR
Pteronarcyidae							
Pteronarcella sp.	1	0.10%	Yes	Larva		4	SH
Pteronarcys sp.	1	0.10%	Yes	Larva	Early Instar	2	SH

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC005

RAI No.: PBSJ11CFRC005 **Sta. Name:** Clark Fork at Gold Creek
Client ID: CFR-53C
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12324680

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Trichoptera							
Brachycentridae							
Amiocentrus aspilus	1	0.10%	Yes	Larva		3	CG
Brachycentridae	1	0.10%	No	Pupa		1	CF
Brachycentrus americanus	1	0.10%	Yes	Larva		1	CF
Brachycentrus occidentalis	11	1.07%	Yes	Larva		2	CF
Glossosomatidae							
Glossosoma sp.	8	0.78%	Yes	Larva		0	SC
Helicopsychidae							
Helicopsyche sp.	3	0.29%	Yes	Larva		3	SC
Hydropsychidae							
Arctopsyche grandis	52	5.06%	Yes	Larva		2	PR
Ceratopsyche cockerelli	89	8.66%	Yes	Larva		11	CF
Cheumatopsyche sp.	3	0.29%	Yes	Larva		5	CF
Hydropsyche occidentalis	164	15.95%	Yes	Larva		4	CF
Hydropsychidae	39	3.79%	No	Larva	Early Instar	4	CF
Lepidostomatidae							
Lepidostoma sp.	123	11.96%	Yes	Larva		1	SH
Leptoceridae							
Oecetis sp.	4	0.39%	Yes	Larva		8	PR
Coleoptera							
Elmidae							
Elmidae	2	0.19%	No	Larva	Early Instar	4	CG
Heterlimnius sp.	10	0.97%	Yes	Adult		3	CG
Heterlimnius sp.	3	0.29%	No	Larva		3	CG
Optioservus sp.	42	4.09%	Yes	Adult		5	SC
Optioservus sp.	11	1.07%	No	Larva		5	SC
Zaitzevia sp.	17	1.65%	Yes	Adult		5	CG
Zaitzevia sp.	63	6.13%	No	Larva		5	CG
Diptera							
Athericidae							
Atherix sp.	19	1.85%	Yes	Larva		5	PR
Simuliidae							
Simulium sp.	1	0.10%	Yes	Larva		6	CF
Tipulidae							
Dicranota sp.	1	0.10%	Yes	Larva		3	PR
Hexatoma sp.	38	3.70%	Yes	Larva		2	PR

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC005

RAI No.: PBSJ11CFRC005 **Sta. Name:** Clark Fork at Gold Creek
Client ID: CFR-53C
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12324680

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Chironomidae							
Chironomidae							
Cricotopus sp.	24	2.33%	Yes	Larva		7	SH
Cricotopus sp.	16	1.56%	No	Pupa		7	SH
Cricotopus (Nostococladius) sp.	1	0.10%	Yes	Larva		6	SH
Eukiefferiella sp.	5	0.49%	No	Pupa		8	CG
Eukiefferiella sp.	76	7.39%	Yes	Larva		8	CG
Micropsectra sp.	1	0.10%	Yes	Larva		4	CG
Microtendipes sp.	4	0.39%	Yes	Larva		6	CF
Orthocladius sp.	1	0.10%	No	Pupa		6	CG
Orthocladius sp.	34	3.31%	Yes	Larva		6	CG
Polypedilum sp.	1	0.10%	Yes	Larva		6	SH
Psectrocladius sp.	1	0.10%	Yes	Larva		8	CG
Tvetenia sp.	12	1.17%	Yes	Larva		5	CG
Tvetenia sp.	3	0.29%	No	Pupa		5	CG
Sample Count	**1028**						

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC006

RAI No.: PBSJ11CFRC006 **Sta. Name:** Clark Fork near Drummond
Client ID: CFR-84F
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12331800

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Turbellaria	1	0.05%	Yes	Unknown		4	PR
Naididae							
Naididae (Naidinae)	4	0.19%	Yes	Unknown		8	CG
Naididae (Tubificinae)	2	0.09%	Yes	Unknown		11	CG
Odonata							
Gomphidae							
Ophiogomphus sp.	1	0.05%	Yes	Larva		5	PR
Ephemeroptera							
Baetidae							
Acentrella sp.	51	2.37%	Yes	Larva		4	CG
Baetis tricaudatus	89	4.13%	Yes	Larva		4	CG
Diphetor hageni	1	0.05%	Yes	Larva		5	CG
Ephemerellidae							
Drunella grandis	3	0.14%	Yes	Larva		2	PR
Ephemerella sp.	159	7.38%	Yes	Larva	Early Instar	1.5	SC
Heptageniidae							
Heptageniidae	3	0.14%	Yes	Larva	Early Instar	4	SC
Leptohyphidae							
Tricorythodes sp.	4	0.19%	Yes	Larva		4	CG
Plecoptera							
Perlidae							
Claassenia sabulosa	2	0.09%	Yes	Larva		3	PR
Perlidae	1	0.05%	Yes	Larva	Damaged	2	PR
Perlodidae							
Isogenoides sp.	1	0.05%	Yes	Larva		3	PR
Perlodidae	16	0.74%	No	Larva	Early Instar	2	PR
Skwala sp.	4	0.19%	Yes	Larva		3	PR
Pteronarcyidae							
Pteronarcella sp.	5	0.23%	Yes	Larva		4	SH

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC006

RAI No.: PBSJ11CFRC006 **Sta. Name:** Clark Fork near Drummond
Client ID: CFR-84F
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12331800

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Trichoptera							
Brachycentridae							
Amiocentrus aspilus	7	0.32%	Yes	Larva		3	CG
Brachycentrus occidentalis	4	0.19%	Yes	Larva		2	CF
Glossosomatidae							
Glossosoma sp.	3	0.14%	Yes	Larva		0	SC
Glossosomatidae	1	0.05%	No	Pupa		0	SC
Helicopsychidae							
Helicopsyche sp.	3	0.14%	Yes	Larva		3	SC
Hydropsychidae							
Arctopsyche grandis	48	2.23%	Yes	Larva		2	PR
Ceratopsyche cockerelli	99	4.60%	Yes	Larva		11	CF
Cheumatopsyche sp.	15	0.70%	Yes	Larva		5	CF
Hydropsyche occidentalis	703	32.64%	Yes	Larva		4	CF
Hydropsychidae	310	14.39%	No	Larva	Early Instar	4	CF
Hydroptilidae							
Hydroptila sp.	1	0.05%	Yes	Larva		6	PH
Lepidostomatidae							
Lepidostoma sp.	11	0.51%	Yes	Larva		1	SH
Leptoceridae							
Nectopsyche sp.	2	0.09%	Yes	Larva		2	SH
Oecetis sp.	13	0.60%	Yes	Larva		8	PR
Coleoptera							
Elmidae							
Heterlimnius sp.	10	0.46%	Yes	Adult		3	CG
Optioservus sp.	5	0.23%	No	Larva		5	SC
Optioservus sp.	27	1.25%	Yes	Adult		5	SC
Zaitzevia sp.	4	0.19%	Yes	Adult		5	CG
Zaitzevia sp.	17	0.79%	No	Larva		5	CG
Diptera							
Athericidae							
Atherix sp.	106	4.92%	Yes	Larva		5	PR
Empididae							
Hemerodromia sp.	2	0.09%	Yes	Larva		6	PR
Simuliidae							
Simulium sp.	6	0.28%	No	Pupa		6	CF
Simulium sp.	13	0.60%	Yes	Larva		6	CF
Tipulidae							
Hexatoma sp.	9	0.42%	Yes	Larva		2	PR
Tipula sp.	3	0.14%	Yes	Larva		4	SH
Tipulidae	1	0.05%	No	Larva	Damaged	3	SH

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC006

RAI No.: PBSJ11CFRC006 **Sta. Name:** Clark Fork near Drummond
Client ID: CFR-84F
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12331800

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Chironomidae							
Chironomidae							
Brillia sp.	1	0.05%	Yes	Larva		4	SH
Cardiocladius sp.	1	0.05%	No	Pupa		5	PR
Cardiocladius sp.	3	0.14%	Yes	Larva		5	PR
Cricotopus sp.	137	6.36%	Yes	Larva		7	SH
Cricotopus sp.	5	0.23%	No	Pupa		7	SH
Eukiefferiella sp.	98	4.55%	Yes	Larva		8	CG
Eukiefferiella sp.	2	0.09%	No	Pupa		8	CG
Micropsectra sp.	2	0.09%	Yes	Larva		4	CG
Microtendipes sp.	5	0.23%	Yes	Larva		6	CF
Orthocladiinae	3	0.14%	No	Pupa	Damaged	6	CG
Orthocladius sp.	2	0.09%	No	Pupa		6	CG
Orthocladius sp.	54	2.51%	Yes	Larva		6	CG
Paracladopelma sp.	1	0.05%	Yes	Larva		7	CG
Parametriocnemus sp.	9	0.42%	No	Pupa		5	CG
Parametriocnemus sp.	24	1.11%	Yes	Larva		5	CG
Polypedilum sp.	1	0.05%	Yes	Larva		6	SH
Rheocricotopus sp.	2	0.09%	Yes	Larva		4	CG
Tanytarsus sp.	1	0.05%	Yes	Larva		6	CF
Thienemanniella sp.	1	0.05%	Yes	Larva		6	CG
Thienemannimyia Gr.	5	0.23%	Yes	Larva		5	PR
Tvetenia sp.	25	1.16%	Yes	Larva		5	CG
Tvetenia sp.	2	0.09%	No	Pupa		5	CG
Sample Count	**2154**						

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC007

RAI No.: PBSJ11CFRC007 **Sta. Name:** Clark Fork at Turah
Client ID: CFR-116A
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12334550

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Ephemeroptera							
Ameletidae							
Ameletus sp.	19	1.18%	Yes	Larva		0	SC
Baetidae							
Acentrella sp.	64	3.98%	Yes	Larva		4	CG
Baetis tricaudatus	79	4.92%	Yes	Larva		4	CG
Ephemerellidae							
Attenella margarita	1	0.06%	Yes	Larva		3	CG
Drunella doddsii	4	0.25%	Yes	Larva		1	SC
Drunella grandis	1	0.06%	Yes	Larva		2	PR
Ephemerella sp.	46	2.86%	Yes	Larva	Early Instar	1.5	SC
Ephemerella tibialis	13	0.81%	Yes	Larva		2	CG
Heptageniidae							
Cinygmula sp.	5	0.31%	Yes	Larva		0	SC
Heptageniidae	3	0.19%	Yes	Larva	Damaged	4	SC
Nixe sp.	2	0.12%	Yes	Larva		4	SC
Rhithrogena sp.	78	4.85%	Yes	Larva		0	CG
Leptohyphidae							
Tricorythodes sp.	2	0.12%	Yes	Larva		4	CG
Leptophlebiidae							
Paraleptophlebia sp.	1	0.06%	Yes	Larva		1	CG
Plecoptera							
Perlidae							
Claassenia sabulosa	15	0.93%	Yes	Larva		3	PR
Hesperoperla pacifica	2	0.12%	Yes	Larva		1	PR
Perlodidae							
Isogenoides sp.	5	0.31%	Yes	Larva		3	PR
Perlodidae	15	0.93%	No	Larva	Early Instar	2	PR
Skwala sp.	19	1.18%	Yes	Larva		3	PR

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC007

RAI No.: PBSJ11CFRC007 **Sta. Name:** Clark Fork at Turah
Client ID: CFR-116A
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12334550

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Trichoptera							
Glossosomatidae							
Glossosomatidae	2	0.12%	Yes	Pupa		0	SC
Hydropsychidae							
Arctopsyche grandis	20	1.24%	Yes	Larva		2	PR
Ceratopsyche cockerelli	25	1.56%	Yes	Larva		11	CF
Ceratopsyche slossonae	1	0.06%	Yes	Larva		11	CF
Cheumatopsyche sp.	11	0.68%	Yes	Larva		5	CF
Hydropsyche sp.	7	0.44%	No	Larva	Early Instar	5	CF
Hydropsyche occidentalis	78	4.85%	Yes	Larva		4	CF
Hydropsychidae	20	1.24%	No	Larva	Early Instar	4	CF
Hydroptilidae							
Hydroptila sp.	5	0.31%	Yes	Larva		6	PH
Hydroptilidae	3	0.19%	No	Pupa		4	PH
Hydroptilidae	1	0.06%	No	Larva	Damaged	4	PH
Lepidostomatidae							
Lepidostoma sp.	12	0.75%	Yes	Larva		1	SH
Psychomyiidae							
Psychomyia sp.	4	0.25%	Yes	Larva		2	CG
Lepidoptera							
Crambidae							
Petrophila sp.	1	0.06%	Yes	Larva		5	SC
Coleoptera							
Elmidae							
Heterlimnius sp.	1	0.06%	No	Larva		3	CG
Heterlimnius sp.	2	0.12%	Yes	Adult		3	CG
Optioservus sp.	12	0.75%	Yes	Adult		5	SC
Optioservus sp.	16	1.00%	No	Larva		5	SC
Zaitzevia sp.	3	0.19%	Yes	Adult		5	CG
Zaitzevia sp.	14	0.87%	No	Larva		5	CG
Diptera							
Athericidae							
Atherix sp.	30	1.87%	Yes	Larva		5	PR
Empididae							
Chelifera / *Metachela* sp.	1	0.06%	Yes	Larva		5	PR
Empididae	1	0.06%	No	Larva	Damaged	6	PR
Tanyderidae							
Protanyderus sp.	1	0.06%	Yes	Larva		5	UN
Tipulidae							
Hexatoma sp.	20	1.24%	Yes	Larva		2	PR
Limnophila sp.	20	1.24%	Yes	Larva		3	PR

Taxa Listing

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC007

RAI No.: PBSJ11CFRC007 **Sta. Name:** Clark Fork at Turah
Client ID: CFR-116A
Date Coll.: 9/19/2011 **No. Jars:** **STORET ID:** 12334550

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Chironomidae							
Chironomidae							
Brillia sp.	1	0.06%	Yes	Larva		4	SH
Cardiocladius sp.	2	0.12%	Yes	Larva		5	PR
Corynoneura sp.	1	0.06%	Yes	Larva		7	CG
Corynoneura sp.	1	0.06%	No	Pupa		7	CG
Cricotopus sp.	34	2.12%	No	Pupa		7	SH
Cricotopus sp.	79	4.92%	Yes	Larva		7	SH
Cricotopus (Nostococladius) sp.	1	0.06%	Yes	Larva		6	SH
Diamesa sp.	13	0.81%	Yes	Larva		5	CG
Diamesinae	1	0.06%	No	Pupa	Damaged	5	CG
Diamesinae	1	0.06%	No	Larva	Damaged	5	CG
Eukiefferiella sp.	7	0.44%	No	Pupa		8	CG
Eukiefferiella sp.	95	5.91%	Yes	Larva		8	CG
Micropsectra sp.	2	0.12%	Yes	Larva		4	CG
Microtendipes sp.	3	0.19%	Yes	Larva		6	CF
Orthocladiinae	1	0.06%	No	Pupa	Damaged	6	CG
Orthocladius sp.	68	4.23%	No	Pupa		6	CG
Orthocladius sp.	561	34.91%	Yes	Larva		6	CG
Pagastia sp.	1	0.06%	Yes	Larva		1	CG
Paracladopelma sp.	1	0.06%	Yes	Larva		7	CG
Parakiefferiella sp.	1	0.06%	Yes	Pupa		6	CG
Parametriocnemus sp.	2	0.12%	No	Pupa		5	CG
Parametriocnemus sp.	3	0.19%	Yes	Larva		5	CG
Polypedilum sp.	1	0.06%	No	Pupa		6	SH
Polypedilum sp.	2	0.12%	Yes	Larva		6	SH
Potthastia sp.	7	0.44%	No	Pupa		2	CG
Potthastia Gaedii Gr.	17	1.06%	Yes	Larva		2	CG
Rheotanytarsus sp.	3	0.19%	Yes	Larva		6	CF
Tanytarsini	1	0.06%	No	Larva	Damaged	6	CF
Tanytarsus sp.	5	0.31%	Yes	Larva		6	CF
Tanytarsus sp.	1	0.06%	No	Pupa		6	CF
Thienemanniella sp.	1	0.06%	Yes	Larva		6	CG
Thienemanniella sp.	2	0.12%	No	Pupa		6	CG
Thienemannimyia Gr.	1	0.06%	Yes	Larva		5	PR
Tvetenia sp.	2	0.12%	Yes	Larva		5	CG
Sample Count	**1607**						

Metrics Report

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC001
Sta. Name: Silver Bow Creek at Warms Springs
Client ID: SS-25
STORET ID 12323750
Coll. Date: 9/19/2011

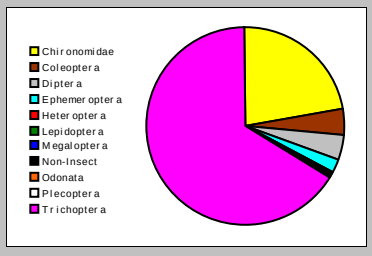
Abundance Measures

Sample Count: 10034
Sample Abundance: of sample used

Coll. Procedure: Hess
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	4	44	0.44%
Odonata			
Ephemeroptera	5	236	2.35%
Plecoptera	4	59	0.59%
Heteroptera			
Megaloptera			
Trichoptera	13	6627	66.05%
Lepidoptera	1	2	0.02%
Coleoptera	3	440	4.39%
Diptera	5	378	3.77%
Chironomidae	15	2248	22.40%

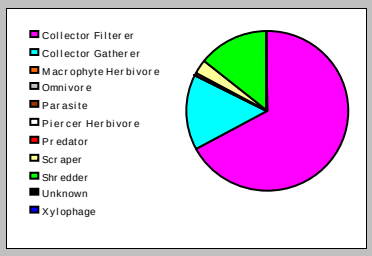


Dominant Taxa

Category	A	PRA
Hydropsyche occidentalis	3191	31.80%
Cricotopus	1249	12.45%
Cheumatopsyche	1244	12.40%
Hydropsychidae	1054	10.50%
Ceratopsyche cockerelli	574	5.72%
Simulium	357	3.56%
Orthocladius	331	3.30%
Brachycentrus occidentalis	298	2.97%
Eukiefferiella	268	2.67%
Zaitzevia	251	2.50%
Baetis tricaudatus	197	1.96%
Optioservus	173	1.72%
Lepidostoma	156	1.55%
Diamesa	129	1.29%
Micropsectra	84	0.84%

Functional Composition

Category	R	A	PRA
Predator	10	94	0.94%
Parasite			
Collector Gatherer	18	1516	15.11%
Collector Filterer	8	6728	67.05%
Macrophyte Herbivore			
Piercer Herbivore	0	1	0.01%
Xylophage			
Scraper	6	268	2.67%
Shredder	8	1427	14.22%
Omnivore			
Unknown			

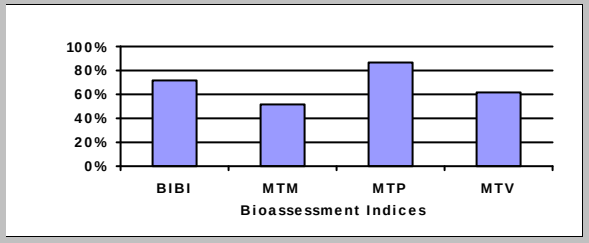


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	50	5	3		3
Non-Insect Percent	0.44%				
E Richness	5	3		2	
P Richness	4	3		3	
T Richness	13	5		3	
EPT Richness	22		3		3
EPT Percent	68.99%		3		2
Oligochaeta+Hirudinea Percent					
Baetidae/Ephemeroptera	0.877				
Hydropsychidae/Trichoptera	0.915				
Dominance					
Dominant Taxon Percent	31.80%		2		2
Dominant Taxa (2) Percent	44.25%				
Dominant Taxa (3) Percent	56.65%	3			
Dominant Taxa (10) Percent	87.87%				
Diversity					
Shannon H (loge)	2.140				
Shannon H (log2)	3.087		3		
Margalef D	5.441				
Simpson D	0.203				
Evenness	0.065				
Function					
Predator Richness	10		3		
Predator Percent	0.94%	1			
Filterer Richness	8				
Filterer Percent	67.05%			0	
Collector Percent	82.16%		1		0
Scraper+Shredder Percent	16.89%		2		0
Scraper/Filterer	0.040				
Scraper/Scraper+Filterer	0.038				
Habit					
Burrower Richness	4				
Burrower Percent	0.25%				
Swimmer Richness	2				
Swimmer Percent	2.06%				
Clinger Richness	22	5			
Clinger Percent	49.05%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	3				
Hemoglobin Bearer Percent	0.03%				
Air Breather Richness	3				
Air Breather Percent	0.18%				
Voltinism					
Univoltine Richness	19				
Semivoltine Richness	8	5			
Multivoltine Percent	24.61%		3		
Tolerance					
Sediment Tolerant Richness	4				
Sediment Tolerant Percent	0.20%				
Sediment Sensitive Richness	1				
Sediment Sensitive Percent	0.73%				
Metals Tolerance Index	5.928				
Pollution Sensitive Richness	2	1		2	
Pollution Tolerant Percent	16.68%	5		1	
Hilsenhoff Biotic Index	4.710		3		1
Intolerant Percent	6.02%				
Supertolerant Percent	2.91%				
CTQa	74.044				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	36	72.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	26	86.67%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	11	61.11%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	11	52.38%	Moderate



Metrics Report

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC002
Sta. Name: Clark Fork near Galen
Client ID: CFR-03A
STORET ID 12323800
Coll. Date: 9/19/2011

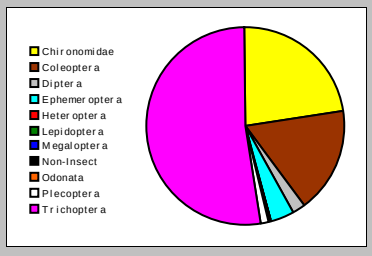
Abundance Measures

Sample Count: 3946
Sample Abundance: of sample used

Coll. Procedure: Hess
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	2	11	0.28%
Odonata			
Ephemeroptera	6	160	4.05%
Plecoptera	4	46	1.17%
Heteroptera			
Megaloptera			
Trichoptera	14	2073	52.53%
Lepidoptera			
Coleoptera	4	675	17.11%
Diptera	6	80	2.03%
Chironomidae	11	894	22.66%

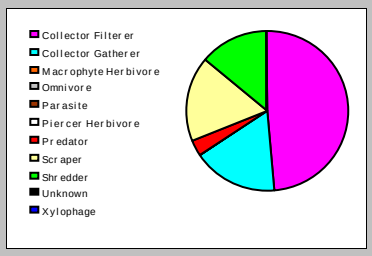


Dominant Taxa

Category	A	PRA
Optioservus	535	13.56%
Cricotopus (Nostococladius)	518	13.13%
Hydropsyche occidentalis	444	11.25%
Hydropsychidae	392	9.93%
Brachycentrus occidentalis	267	6.77%
Ceratopsyche cockerelli	245	6.21%
Ceratopsyche slossonae	200	5.07%
Ceratopsyche	167	4.23%
Orthocladius	163	4.13%
Eukiefferiella	162	4.11%
Baetis tricaudatus	130	3.29%
Glossosoma	111	2.81%
Hydropsyche	97	2.46%
Zaitzevia	90	2.28%
Rhyacophila Brunnea Gr.	57	1.44%

Functional Composition

Category	R	A	PRA
Predator	10	124	3.14%
Parasite			
Collector Gatherer	15	681	17.26%
Collector Filterer	9	1910	48.40%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	7	679	17.21%
Shredder	8	552	13.99%
Omnivore			
Unknown			

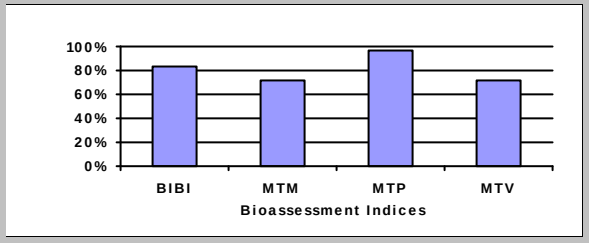


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	47	5	3		3
Non-Insect Percent	0.28%				
E Richness	6	3		3	
P Richness	4	3		3	
T Richness	14	5		3	
EPT Richness	24		3		3
EPT Percent	57.75%		3		2
Oligochaeta+Hirudinea Percent	0.18%				
Baetidae/Ephemeroptera	0.925				
Hydropsychidae/Trichoptera	0.767				
Dominance					
Dominant Taxon Percent	13.56%		3		3
Dominant Taxa (2) Percent	26.69%				
Dominant Taxa (3) Percent	37.94%	5			
Dominant Taxa (10) Percent	78.38%				
Diversity					
Shannon H (loge)	2.691				
Shannon H (log2)	3.882		3		
Margalef D	6.046				
Simpson D	0.096				
Evenness	0.052				
Function					
Predator Richness	10		3		
Predator Percent	3.14%	1			
Filterer Richness	9				
Filterer Percent	48.40%			0	
Collector Percent	65.66%		2		2
Scraper+Shredder Percent	31.20%		3		1
Scraper/Filterer	0.355				
Scraper/Scraper+Filterer	0.262				
Habit					
Burrower Richness	4				
Burrower Percent	13.25%				
Swimmer Richness	1				
Swimmer Percent	3.65%				
Clinger Richness	25	5			
Clinger Percent	49.85%				
Characteristics					
Cold Stenotherm Richness	3				
Cold Stenotherm Percent	13.18%				
Hemoglobin Bearer Richness	2				
Hemoglobin Bearer Percent	0.05%				
Air Breather Richness	3				
Air Breather Percent	0.33%				
Voltinism					
Univoltine Richness	23				
Semivoltine Richness	8	5			
Multivoltine Percent	26.66%		3		
Tolerance					
Sediment Tolerant Richness	4				
Sediment Tolerant Percent	0.35%				
Sediment Sensitive Richness	2				
Sediment Sensitive Percent	15.94%				
Metals Tolerance Index	4.733				
Pollution Sensitive Richness	4	5		3	
Pollution Tolerant Percent	17.54%	5		1	
Hilsenhoff Biotic Index	4.495		3		1
Intolerant Percent	13.20%				
Supertolerant Percent	4.23%				
CTQa	66.927				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	42	84.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	29	96.67%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	13	72.22%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	15	71.43%	Slight



Metrics Report

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC003
Sta. Name: Clark Fork at Deer Lodge
Client ID: CFR-27H
STORET ID 12324200
Coll. Date: 9/19/2011

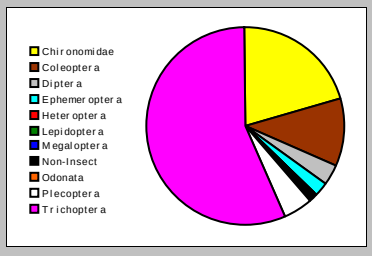
Abundance Measures

Sample Count: 3224
Sample Abundance: of sample used

Coll. Procedure: Hess
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	2	46	1.43%
Odonata	1	1	0.03%
Ephemeroptera	6	74	2.30%
Plecoptera	3	145	4.50%
Heteroptera			
Megaloptera			
Trichoptera	13	1829	56.73%
Lepidoptera			
Coleoptera	3	341	10.58%
Diptera	4	110	3.41%
Chironomidae	11	675	20.94%

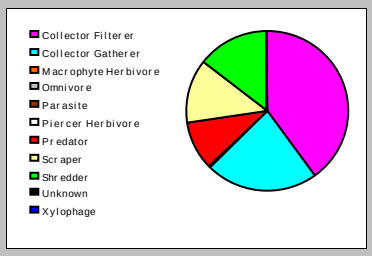


Dominant Taxa

Category	A	PRA
Hydropsyche occidentalis	688	21.34%
Lepidostoma	363	11.26%
Orthocladius	329	10.20%
Hydropsychidae	279	8.65%
Ceratopsyche cockerelli	252	7.82%
Optioservus	247	7.66%
Eukiefferiella	202	6.27%
Skwala	115	3.57%
Atherix	88	2.73%
Cricotopus	85	2.64%
Zaitzevia	84	2.61%
Glossosoma	73	2.26%
Helicopsyche	48	1.49%
Turbellaria	45	1.40%
Tvetenia	44	1.36%

Functional Composition

Category	R	A	PRA
Predator	10	325	10.08%
Parasite			
Collector Gatherer	17	726	22.52%
Collector Filterer	8	1288	39.95%
Macrophyte Herbivore			
Piercer Herbivore	1	9	0.28%
Xylophage			
Scraper	4	407	12.62%
Shredder	5	469	14.55%
Omnivore			
Unknown			

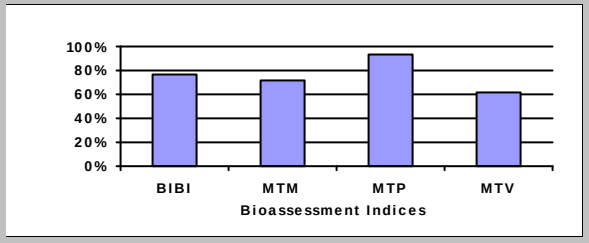


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	43	5	3		3
Non-Insect Percent	1.43%				
E Richness	6	3		3	
P Richness	3	1		2	
T Richness	13	5		3	
EPT Richness	22		3		3
EPT Percent	63.52%		3		2
Oligochaeta+Hirudinea Percent	0.09%				
Baetidae/Ephemeroptera	0.378				
Hydropsychidae/Trichoptera	0.711				
Dominance					
Dominant Taxon Percent	21.34%		3		3
Dominant Taxa (2) Percent	32.60%				
Dominant Taxa (3) Percent	42.80%	5			
Dominant Taxa (10) Percent	82.13%				
Diversity					
Shannon H (loge)	2.521				
Shannon H (log2)	3.637		3		
Margalef D	5.609				
Simpson D	0.130				
Evenness	0.060				
Function					
Predator Richness	10		3		
Predator Percent	10.08%	3			
Filterer Richness	8				
Filterer Percent	39.95%			0	
Collector Percent	62.47%		2		2
Scraper+Shredder Percent	27.17%		2		1
Scraper/Filterer	0.316				
Scraper/Scraper+Filterer	0.240				
Habit					
Burrower Richness	2				
Burrower Percent	0.34%				
Swimmer Richness	2				
Swimmer Percent	0.87%				
Clinger Richness	23	5			
Clinger Percent	34.99%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	2				
Hemoglobin Bearer Percent	0.09%				
Air Breather Richness	2				
Air Breather Percent	0.40%				
Voltinism					
Univoltine Richness	18				
Semivoltine Richness	7	5			
Multivoltine Percent	23.48%		3		
Tolerance					
Sediment Tolerant Richness	3				
Sediment Tolerant Percent	0.65%				
Sediment Sensitive Richness	2				
Sediment Sensitive Percent	3.16%				
Metals Tolerance Index	4.326				
Pollution Sensitive Richness	2	1		2	
Pollution Tolerant Percent	16.16%	5		1	
Hilsenhoff Biotic Index	4.163		3		1
Intolerant Percent	17.03%				
Supertolerant Percent	6.58%				
CTQa	70.436				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	38	76.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	28	93.33%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	11	61.11%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	15	71.43%	Slight



Metrics Report

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC004
Sta. Name: Clark Fork above Little Blackfoot River near Garrison
Client ID: CFR-42G
STORET ID 12324400
Coll. Date: 9/19/2011

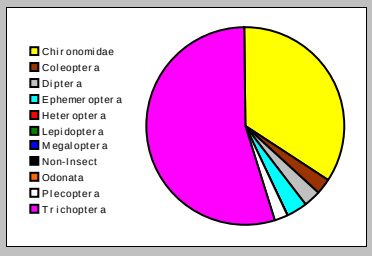
Abundance Measures

Sample Count: 3147
Sample Abundance: of sample used

Coll. Procedure: Hess
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect			
Odonata			
Ephemeroptera	6	106	3.37%
Plecoptera	3	75	2.38%
Heteroptera			
Megaloptera			
Trichoptera	15	1727	54.88%
Lepidoptera			
Coleoptera	3	85	2.70%
Diptera	5	77	2.45%
Chironomidae	11	1077	34.22%

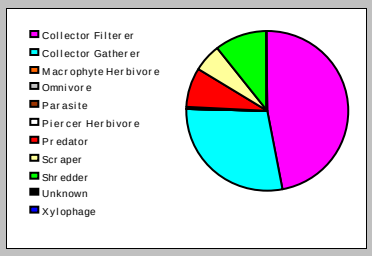


Dominant Taxa

Category	A	PRA
Hydropsyche occidentalis	739	23.48%
Orthocladius	367	11.66%
Eukiefferiella	355	11.28%
Ceratopsyche cockerelli	354	11.25%
Hydropsychidae	306	9.72%
Cricotopus	289	9.18%
Arctopsyche grandis	74	2.35%
Baetis tricaudatus	53	1.68%
Zaitzevia	43	1.37%
Optioservus	40	1.27%
Glossosoma	40	1.27%
Skwala	39	1.24%
Lepidostoma	39	1.24%
Helicopsyche	38	1.21%
Tvetenia	37	1.18%

Functional Composition

Category	R	A	PRA
Predator	9	244	7.75%
Parasite			
Collector Gatherer	17	914	29.04%
Collector Filterer	7	1468	46.65%
Macrophyte Herbivore			
Piercer Herbivore	1	3	0.10%
Xylophage			
Scraper	5	187	5.94%
Shredder	4	331	10.52%
Omnivore			
Unknown			

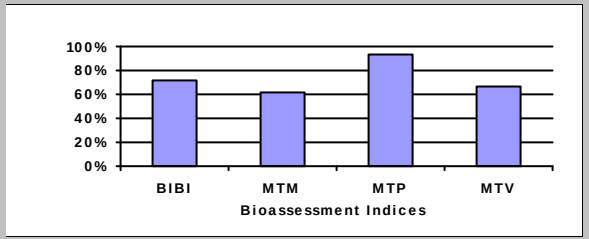


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	43	5	3		3
Non-Insect Percent	0.00%				
E Richness	6	3		3	
P Richness	3	1		2	
T Richness	15	5		3	
EPT Richness	24		3		3
EPT Percent	60.63%		3		2
Oligochaeta+Hirudinea Percent					
Baetidae/Ephemeroptera	0.660				
Hydropsychidae/Trichoptera	0.877				
Dominance					
Dominant Taxon Percent	23.48%		3		3
Dominant Taxa (2) Percent	35.14%				
Dominant Taxa (3) Percent	46.43%	5			
Dominant Taxa (10) Percent	83.25%				
Diversity					
Shannon H (loge)	2.437				
Shannon H (log2)	3.516		3		
Margalef D	5.339				
Simpson D	0.142				
Evenness	0.063				
Function					
Predator Richness	9		3		
Predator Percent	7.75%	1			
Filterer Richness	7				
Filterer Percent	46.65%			0	
Collector Percent	75.69%		2		1
Scraper+Shredder Percent	16.46%		2		0
Scraper/Filterer	0.127				
Scraper/Scraper+Filterer	0.113				
Habit					
Burrower Richness	2				
Burrower Percent	1.56%				
Swimmer Richness	3				
Swimmer Percent	2.26%				
Clinger Richness	22	5			
Clinger Percent	34.41%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness					
Hemoglobin Bearer Percent					
Air Breather Richness	2				
Air Breather Percent	1.37%				
Voltinism					
Univoltine Richness	19				
Semivoltine Richness	7	5			
Multivoltine Percent	36.54%		3		
Tolerance					
Sediment Tolerant Richness	3				
Sediment Tolerant Percent	1.78%				
Sediment Sensitive Richness	2				
Sediment Sensitive Percent	3.62%				
Metals Tolerance Index	5.970				
Pollution Sensitive Richness	2	1		2	
Pollution Tolerant Percent	6.99%	5		2	
Hilsenhoff Biotic Index	4.908		3		1
Intolerant Percent	9.31%				
Supertolerant Percent	12.36%				
CTQa	67.600				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	36	72.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	28	93.33%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	12	66.67%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	13	61.90%	Slight



Metrics Report

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC005
Sta. Name: Clark Fork at Gold Creek
Client ID: CFR-53C
STORET ID 12324680
Coll. Date: 9/19/2011

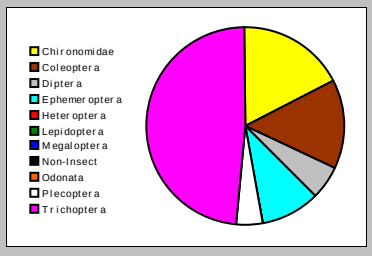
Abundance Measures

Sample Count: 1028
Sample Abundance: of sample used

Coll. Procedure: Hess
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	1	1	0.10%
Odonata			
Ephemeroptera	6	99	9.63%
Plecoptera	8	42	4.09%
Heteroptera			
Megaloptera			
Trichoptera	11	499	48.54%
Lepidoptera			
Coleoptera	3	148	14.40%
Diptera	4	59	5.74%
Chironomidae	9	179	17.41%

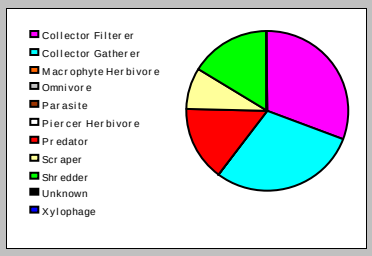


Dominant Taxa

Category	A	PRA
Hydropsyche occidentalis	164	15.95%
Lepidostoma	123	11.96%
Ceratopsyche cockerelli	89	8.66%
Eukiefferiella	81	7.88%
Zaitzevia	80	7.78%
Baetis tricaudatus	58	5.64%
Optioservus	53	5.16%
Arctopsyche grandis	52	5.06%
Cricotopus	40	3.89%
Hydropsychidae	39	3.79%
Hexatoma	38	3.70%
Orthocladius	35	3.40%
Atherix	19	1.85%
Ephemerella	16	1.56%
Tvetenia	15	1.46%

Functional Composition

Category	R	A	PRA
Predator	13	156	15.18%
Parasite			
Collector Gatherer	12	305	29.67%
Collector Filterer	7	313	30.45%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	5	87	8.46%
Shredder	6	167	16.25%
Omnivore			
Unknown			

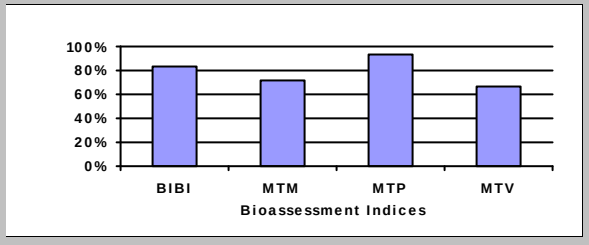


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	42	5	3		3
Non-Insect Percent	0.10%				
E Richness	6	3		3	
P Richness	8	5		3	
T Richness	11	5		3	
EPT Richness	25		3		3
EPT Percent	62.26%		3		2
Oligochaeta+Hirudinea Percent	0.10%				
Baetidae/Ephemeroptera	0.677				
Hydropsychidae/Trichoptera	0.695				
Dominance					
Dominant Taxon Percent	15.95%		3		3
Dominant Taxa (2) Percent	27.92%				
Dominant Taxa (3) Percent	36.58%	5			
Dominant Taxa (10) Percent	75.78%				
Diversity					
Shannon H (loge)	2.808				
Shannon H (log2)	4.051		3		
Margalef D	6.205				
Simpson D	0.089				
Evenness	0.051				
Function					
Predator Richness	13		3		
Predator Percent	15.18%	3			
Filterer Richness	7				
Filterer Percent	30.45%			0	
Collector Percent	60.12%		2		2
Scraper+Shredder Percent	24.71%		2		0
Scraper/Filterer	0.278				
Scraper/Scraper+Filterer	0.218				
Habit					
Burrower Richness	2				
Burrower Percent	3.79%				
Swimmer Richness	2				
Swimmer Percent	6.52%				
Clinger Richness	24	5			
Clinger Percent	36.48%				
Characteristics					
Cold Stenotherm Richness	1				
Cold Stenotherm Percent	0.10%				
Hemoglobin Bearer Richness	2				
Hemoglobin Bearer Percent	0.49%				
Air Breather Richness	2				
Air Breather Percent	3.79%				
Voltinism					
Univoltine Richness	18				
Semivoltine Richness	10	5			
Multivoltine Percent	24.03%		3		
Tolerance					
Sediment Tolerant Richness	2				
Sediment Tolerant Percent	3.79%				
Sediment Sensitive Richness	3				
Sediment Sensitive Percent	5.93%				
Metals Tolerance Index	4.265				
Pollution Sensitive Richness	2	1		2	
Pollution Tolerant Percent	15.86%	5		1	
Hilsenhoff Biotic Index	3.922		3		2
Intolerant Percent	27.53%				
Supertolerant Percent	8.37%				
CTQa	58.769				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	42	84.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	28	93.33%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	12	66.67%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	15	71.43%	Slight



Metrics Report

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC006
Sta. Name: Clark Fork near Drummond
Client ID: CFR-84F
STORET ID 12331800
Coll. Date: 9/19/2011

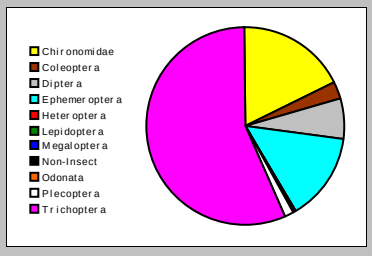
Abundance Measures

Sample Count: 2154
Sample Abundance: of sample used

Coll. Procedure: Hess
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect	1	1	0.05%
Odonata	1	1	0.05%
Ephemeroptera	7	310	14.39%
Plecoptera	5	29	1.35%
Heteroptera			
Megaloptera			
Trichoptera	12	1220	56.64%
Lepidoptera			
Coleoptera	3	63	2.92%
Diptera	5	140	6.50%
Chironomidae	15	384	17.83%

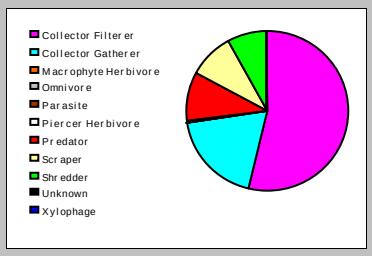


Dominant Taxa

Category	A	PRA
Hydropsyche occidentalis	703	32.64%
Hydropsychidae	310	14.39%
Ephemerella	159	7.38%
Cricotopus	142	6.59%
Atherix	106	4.92%
Eukiefferiella	100	4.64%
Ceratopsyche cockerelli	99	4.60%
Baetis tricaudatus	89	4.13%
Orthocladius	56	2.60%
Acentrella	51	2.37%
Arctopsyche grandis	48	2.23%
Parametriocnemus	33	1.53%
Optioservus	32	1.49%
Tvetenia	27	1.25%
Zaitzevia	21	0.97%

Functional Composition

Category	R	A	PRA
Predator	14	216	10.03%
Parasite			
Collector Gatherer	17	414	19.22%
Collector Filterer	7	1156	53.67%
Macrophyte Herbivore			
Piercer Herbivore	1	1	0.05%
Xylophage			
Scraper	5	201	9.33%
Shredder	7	166	7.71%
Omnivore			
Unknown			

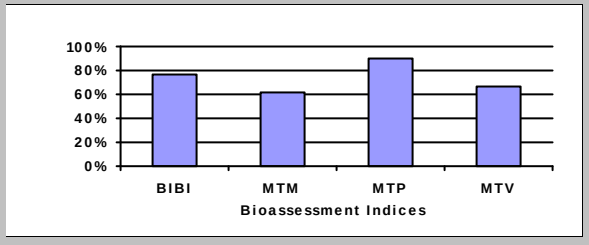


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	49	5	3		3
Non-Insect Percent	0.05%				
E Richness	7	3		3	
P Richness	5	3		3	
T Richness	12	5		3	
EPT Richness	24		3		3
EPT Percent	72.38%		3		3
Oligochaeta+Hirudinea Percent	0.28%				
Baetidae/Ephemeroptera	0.455				
Hydropsychidae/Trichoptera	0.963				
Dominance					
Dominant Taxon Percent	32.64%		2		2
Dominant Taxa (2) Percent	47.03%				
Dominant Taxa (3) Percent	54.41%	3			
Dominant Taxa (10) Percent	84.26%				
Diversity					
Shannon H (loge)	2.405				
Shannon H (log2)	3.470		3		
Margalef D	6.684				
Simpson D	0.186				
Evenness	0.058				
Function					
Predator Richness	14		3		
Predator Percent	10.03%	3			
Filterer Richness	7				
Filterer Percent	53.67%			0	
Collector Percent	72.89%		2		1
Scraper+Shredder Percent	17.04%		2		0
Scraper/Filterer	0.174				
Scraper/Scraper+Filterer	0.148				
Habit					
Burrower Richness	5				
Burrower Percent	0.88%				
Swimmer Richness	4				
Swimmer Percent	6.64%				
Clinger Richness	21	5			
Clinger Percent	38.39%				
Characteristics					
Cold Stenotherm Richness	0				
Cold Stenotherm Percent	0.00%				
Hemoglobin Bearer Richness	3				
Hemoglobin Bearer Percent	0.32%				
Air Breather Richness	2				
Air Breather Percent	0.60%				
Voltinism					
Univoltine Richness	18				
Semivoltine Richness	9	5			
Multivoltine Percent	24.47%		3		
Tolerance					
Sediment Tolerant Richness	4				
Sediment Tolerant Percent	0.84%				
Sediment Sensitive Richness	2				
Sediment Sensitive Percent	2.37%				
Metals Tolerance Index	5.755				
Pollution Sensitive Richness	1	1		1	
Pollution Tolerant Percent	9.24%	5		2	
Hilsenhoff Biotic Index	4.331		3		1
Intolerant Percent	11.93%				
Supertolerant Percent	5.43%				
CTQa	73.128				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	38	76.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	27	90.00%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	12	66.67%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	13	61.90%	Slight



Metrics Report

Project ID: PBSJ11CFRC
RAI No.: PBSJ11CFRC007
Sta. Name: Clark Fork at Turah
Client ID: CFR-116A
STORET ID 12334550
Coll. Date: 9/19/2011

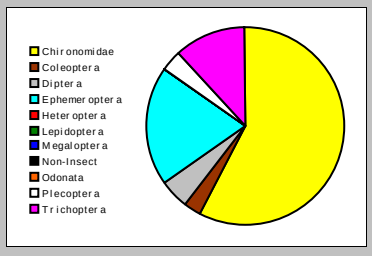
Abundance Measures

Sample Count: 1607
Sample Abundance: of sample used

Coll. Procedure: Hess
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Non-Insect			
Odonata			
Ephemeroptera	14	318	19.79%
Plecoptera	4	56	3.48%
Heteroptera			
Megaloptera			
Trichoptera	9	189	11.76%
Lepidoptera	1	1	0.06%
Coleoptera	3	48	2.99%
Diptera	5	73	4.54%
Chironomidae	21	922	57.37%

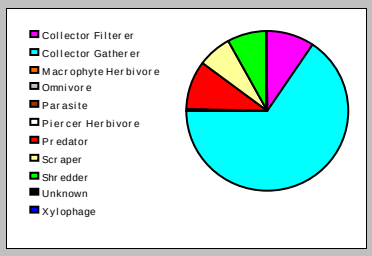


Dominant Taxa

Category	A	PRA
Orthocladius	629	39.14%
Cricotopus	113	7.03%
Eukiefferiella	102	6.35%
Baetis tricaudatus	79	4.92%
Rhithrogena	78	4.85%
Hydropsyche occidentalis	78	4.85%
Acentrella	64	3.98%
Ephemerella	46	2.86%
Atherix	30	1.87%
Optioservus	28	1.74%
Ceratopsyche cockerelli	25	1.56%
Limnophila	20	1.24%
Hydropsychidae	20	1.24%
Hexatoma	20	1.24%
Arctopsyche grandis	20	1.24%

Functional Composition

Category	R	A	PRA
Predator	12	152	9.46%
Parasite			
Collector Gatherer	22	1050	65.34%
Collector Filterer	7	155	9.65%
Macrophyte Herbivore			
Piercer Herbivore	1	9	0.56%
Xylophage			
Scraper	9	110	6.85%
Shredder	5	130	8.09%
Omnivore			
Unknown	1	1	0.06%

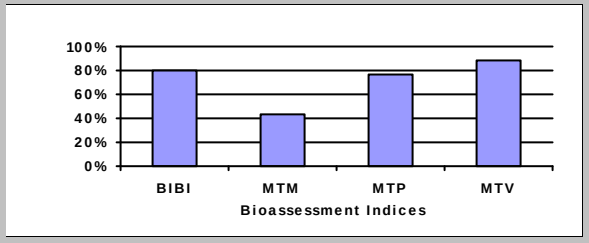


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
Composition					
Taxa Richness	57	5	3		3
Non-Insect Percent	0.00%				
E Richness	14	5		3	
P Richness	4	3		3	
T Richness	9	3		3	
EPT Richness	27		3		3
EPT Percent	35.03%		2		0
Oligochaeta+Hirudinea Percent					
Baetidae/Ephemeroptera	0.450				
Hydropsychidae/Trichoptera	0.857				
Dominance					
Dominant Taxon Percent	39.14%		2		1
Dominant Taxa (2) Percent	46.17%				
Dominant Taxa (3) Percent	52.52%	3			
Dominant Taxa (10) Percent	77.60%				
Diversity					
Shannon H (loge)	2.550				
Shannon H (log2)	3.678		3		
Margalef D	7.729				
Simpson D	0.182				
Evenness	0.053				
Function					
Predator Richness	12		3		
Predator Percent	9.46%	1			
Filterer Richness	7				
Filterer Percent	9.65%			2	
Collector Percent	74.98%		2		1
Scraper+Shredder Percent	14.93%		1		0
Scraper/Filterer	0.710				
Scraper/Scraper+Filterer	0.415				
Habit					
Burrower Richness	6				
Burrower Percent	2.80%				
Swimmer Richness	4				
Swimmer Percent	10.14%				
Clinger Richness	23	5			
Clinger Percent	26.63%				
Characteristics					
Cold Stenotherm Richness	2				
Cold Stenotherm Percent	0.31%				
Hemoglobin Bearer Richness	3				
Hemoglobin Bearer Percent	0.44%				
Air Breather Richness	2				
Air Breather Percent	2.49%				
Voltinism					
Univoltine Richness	23				
Semivoltine Richness	6	5			
Multivoltine Percent	66.83%		1		
Tolerance					
Sediment Tolerant Richness	3				
Sediment Tolerant Percent	2.61%				
Sediment Sensitive Richness	3				
Sediment Sensitive Percent	1.56%				
Metals Tolerance Index	5.130				
Pollution Sensitive Richness	4	5		3	
Pollution Tolerant Percent	5.91%	5		2	
Hilsenhoff Biotic Index	4.849		3		1
Intolerant Percent	16.61%				
Supertolerant Percent	6.35%				
CTQa	74.720				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	40	80.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	23	76.67%	Slight
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	16	88.89%	None
MTM	Montana DEQ Mountains (Bukantis 1998)	9	42.86%	Moderate



Taxa Listing

Project ID: PBSJ11CFRP
RAI No.: PBSJ11CFRP001

RAI No.: PBSJ11CFRP001 **Sta. Name:** Silver Bow Creek at Warms Springs
Client ID: SS-25
Date Coll.: 9/2/2011 **No. Jars:** 1 **STORET ID:** 12323750

Taxonomic Name	Count	PRA	Abnorm.	Comment
Diatoms				
Bacillariophyta				
Achnanthidium minutissimum	9	1.50%	0.00	
Amphora sp.	1	0.17%	0.00	
Amphora pediculus	2	0.33%	0.00	
Amphora veneta	9	1.50%	0.00	
Cocconeis pediculus	3	0.50%	0.00	
Cocconeis placentula	71	11.83%	1.00	
Cyclostephanos tholiformis	3	0.50%	0.00	
Cymbella mexicana	6	1.00%	0.00	
Encyonema silesiacum	6	1.00%	0.00	
Eolimna minima	5	0.83%	0.00	
Epithemia sorex	8	1.33%	0.00	
Fragilaria vaucheriae	31	5.17%	0.00	
Geissleria decussis	3	0.50%	0.00	
Gomphoneis minuta	18	3.00%	0.00	
Gomphonema sp.	5	0.83%	0.00	
Gomphonema minutum	2	0.33%	0.00	
Gomphonema olivaceum	10	1.67%	0.00	
Gomphonema pala	10	1.67%	0.00	
Gomphonema parvulum	2	0.33%	0.00	
Mayamaea atomus	1	0.17%	0.00	
Melosira varians	42	7.00%	0.00	
Navicula caterva	2	0.33%	0.00	
Navicula cryptocephala	2	0.33%	0.00	
Navicula cryptotenella	22	3.67%	0.00	
Navicula tripunctata	5	0.83%	0.00	
Nitzschia sp.	10	1.67%	0.00	
Nitzschia amphibia	3	0.50%	0.00	
Nitzschia archibaldii	13	2.17%	0.00	
Nitzschia dissipata	15	2.50%	0.00	
Nitzschia fonticola	58	9.67%	1.00	
Nitzschia frustulum	1	0.17%	0.00	
Nitzschia inconspicua	2	0.33%	0.00	
Nitzschia linearis	2	0.33%	0.00	
Nitzschia palea	19	3.17%	0.00	
Nitzschia paleacea	39	6.50%	0.00	
Nitzschia perminuta	2	0.33%	0.00	
Planothidium sp.	4	0.67%	0.00	
Planothidium frequentissimum	2	0.33%	0.00	
Planothidium lanceolatum	1	0.17%	0.00	
Reimeria sinuata	5	0.83%	0.00	
Rhoicosphenia abbreviata	5	0.83%	0.00	
Stephanocyclus meneghiniana	2	0.33%	0.00	
Synedra acus	34	5.67%	0.00	
Synedra ulna	104	17.33%	0.00	
Tryblionella hungarica	1	0.17%	0.00	

Taxa Listing

Project ID: PBSJ11CFRP
RAI No.: PBSJ11CFRP001

RAI No.:	PBSJ11CFRP001			**Sta. Name:**	Silver Bow Creek at Warms Springs
Client ID:	SS-25				
Date Coll.:	9/2/2011	**No. Jars:**	1	**STORET ID:**	12323750

Taxonomic Name	Count	PRA	Abnorm.	Comment
Sample Count	**600**			

Taxa Listing

Project ID: PBSJ11CFRP
RAI No.: PBSJ11CFRP002

RAI No.: PBSJ11CFRP002 **Sta. Name:** Clark Fork near Galen
Client ID: CFR-03A
Date Coll.: 9/2/2011 **No. Jars:** 1 **STORET ID:** 12323800

Taxonomic Name	Count	PRA	Abnorm.	Comment
Diatoms				
Bacillariophyta				
Achnanthidium deflexum sp.	1	0.17%	0.00	
Achnanthidium minutissimum	62	10.33%	0.00	
Adlafia minuscula	1	0.17%	0.00	
Amphora inariensis	8	1.33%	0.00	
Amphora pediculus	19	3.17%	0.00	
Amphora veneta	2	0.33%	0.00	
Cocconeis pediculus	9	1.50%	0.00	
Cocconeis placentula	51	8.50%	0.00	
Cymbella excisa	4	0.67%	0.00	
Diatoma moniliformis	31	5.17%	0.00	
Encyonema minutum	2	0.33%	0.00	
Encyonema silesiacum	35	5.83%	0.00	
Eolimna minima	10	1.67%	0.00	
Epithemia sorex	2	0.33%	0.00	
Fragilaria vaucheriae	6	1.00%	0.00	
Geissleria acceptata	2	0.33%	0.00	
Gomphonema sp.	4	0.67%	0.00	
Gomphonema olivaceoides	2	0.33%	0.00	
Gomphonema olivaceum	7	1.17%	0.00	
Gomphonema parvulum	2	0.33%	0.00	
Mayamaea atomus	4	0.67%	0.00	
Navicula sp.	5	0.83%	0.00	
Navicula antonii	3	0.50%	0.00	
Navicula capitatoradiata	2	0.33%	0.00	
Navicula caterva	1	0.17%	0.00	
Navicula cryptocephala	2	0.33%	0.00	
Navicula cryptotenella	46	7.67%	0.00	
Navicula tripunctata	33	5.50%	0.00	
Nitzschia sp.	4	0.67%	0.00	
Nitzschia archibaldii	2	0.33%	0.00	
Nitzschia dissipata	104	17.33%	0.00	
Nitzschia fonticola	14	2.33%	0.00	
Nitzschia frustulum	6	1.00%	0.00	
Nitzschia inconspicua	32	5.33%	0.00	
Nitzschia linearis	5	0.83%	0.00	
Nitzschia palea	5	0.83%	0.00	
Nitzschia paleacea	16	2.67%	0.00	
Nitzschia sublinearis	1	0.17%	0.00	
Planothidium sp.	3	0.50%	0.00	
Reimeria sinuata	8	1.33%	0.00	
Rhoicosphenia abbreviata	11	1.83%	0.00	
Sellaphora seminulum	2	0.33%	0.00	
Staurosira construens	6	1.00%	0.00	
Staurosirella leptostauron	4	0.67%	0.00	
Staurosirella pinnata	12	2.00%	0.00	

Taxa Listing

Project ID: PBSJ11CFRP
RAI No.: PBSJ11CFRP002

RAI No.: PBSJ11CFRP002 **Sta. Name:** Clark Fork near Galen
Client ID: CFR-03A
Date Coll.: 9/2/2011 **No. Jars:** 1 **STORET ID:** 12323800

Taxonomic Name	Count	PRA	Abnorm.	Comment
Stephanocyclus meneghiniana	4	0.67%	0.00	
Surirella ovalis	2	0.33%	0.00	
Synedra acus	1	0.17%	0.00	
Synedra ulna	2	0.33%	0.00	
Sample Count	**600**			

Taxa Listing

Project ID: PBSJ11CFRP
RAI No.: PBSJ11CFRP003

RAI No.: PBSJ11CFRP003 **Sta. Name:** Clark Fork at Deer Lodge
Client ID: CFR-27H
Date Coll.: 9/2/2011 **No. Jars:** 1 **STORET ID:** 12324200

Taxonomic Name	Count	PRA	Abnorm.	Comment
Diatoms				
Bacillariophyta				
Achnanthidium minutissimum	24	4.00%	0.00	
Adlafia minuscula	1	0.17%	0.00	
Amphora inariensis	4	0.67%	0.00	
Amphora pediculus	21	3.50%	0.00	
Caloneis tenuis	1	0.17%	0.00	
Cocconeis pediculus	6	1.00%	0.00	
Cocconeis placentula	21	3.50%	0.00	
Diatoma mesodon	1	0.17%	0.00	
Diatoma moniliformis	7	1.17%	0.00	
Encyonema silesiacum	9	1.50%	0.00	
Encyonema ventricosum	12	2.00%	0.00	
Eolimna minima	12	2.00%	0.00	
Fragilaria capucina	7	1.17%	0.00	
Fragilaria vaucheriae	11	1.83%	0.00	
Gomphonema sp.	2	0.33%	0.00	
Gomphonema olivaceoides	6	1.00%	0.00	
Gomphonema olivaceum	4	0.67%	0.00	
Luticola muticopsis	1	0.17%	0.00	
Mayamaea agrestis	9	1.50%	0.00	
Mayamaea atomus	16	2.67%	0.00	
Navicula caterva	4	0.67%	0.00	
Navicula cryptotenella	7	1.17%	0.00	
Nitzschia sp.	3	0.50%	0.00	
Nitzschia acicularis	8	1.33%	0.00	
Nitzschia amphibia	2	0.33%	0.00	
Nitzschia archibaldii	20	3.33%	0.00	
Nitzschia dissipata	198	33.00%	0.00	
Nitzschia fonticola	8	1.33%	0.00	
Nitzschia heufleriana	1	0.17%	0.00	
Nitzschia inconspicua	26	4.33%	0.00	
Nitzschia linearis	26	4.33%	0.00	
Nitzschia microcephala	2	0.33%	0.00	
Nitzschia palea	17	2.83%	0.00	
Nitzschia paleacea	44	7.33%	0.00	
Nitzschia perminuta	1	0.17%	0.00	
Planothidium lanceolatum	1	0.17%	0.00	
Pseudostaurosira brevistriata	1	0.17%	0.00	
Reimeria sinuata	15	2.50%	0.00	
Rhoicosphenia abbreviata	1	0.17%	0.00	
Rhopalodia gibba	2	0.33%	0.00	
Sellaphora pupula	1	0.17%	0.00	
Staurosirella pinnata	8	1.33%	0.00	
Stephanocyclus meneghiniana	2	0.33%	0.00	
Surirella sp.	2	0.33%	0.00	
Surirella ovalis	19	3.17%	0.00	

Taxa Listing

Project ID: PBSJ11CFRP
RAI No.: PBSJ11CFRP003

RAI No.: PBSJ11CFRP003 **Sta. Name:** Clark Fork at Deer Lodge
Client ID: CFR-27H
Date Coll.: 9/2/2011 **No. Jars:** 1 **STORET ID:** 12324200

Taxonomic Name	Count	PRA	Abnorm.	Comment
Synedra acus	4	0.67%	0.00	
Synedra ulna v. contracta	2	0.33%	0.00	
Sample Count	**600**			

Taxa Listing

Project ID: PBSJ11CFRP
RAI No.: PBSJ11CFRP004

RAI No.: PBSJ11CFRP004
Client ID: CFR-42G
Date Coll.: 9/1/2011 **No. Jars:** 1
Sta. Name: Clark Fork above Little Blackfoot River near Garrison
STORET ID: 12324400

Taxonomic Name	Count	PRA	Abnorm.	Comment
Diatoms				
Bacillariophyta				
Achnanthidium minutissimum	9	1.50%	0.00	
Adlafia minuscula	2	0.33%	0.00	
Amphora pediculus	16	2.67%	0.00	
Caloneis bacillum	6	1.00%	0.00	
Cocconeis pediculus	2	0.33%	0.00	
Cocconeis placentula	13	2.17%	0.00	
Cyclotella comensis	1	0.17%	0.00	
Diatoma moniliformis	4	0.67%	0.00	
Diatoma vulgaris	4	0.67%	0.00	
Encyonema minutum	2	0.33%	0.00	
Encyonema silesiacum	38	6.33%	0.00	
Encyonema ventricosum	3	0.50%	0.00	
Eolimna minima	19	3.17%	0.00	
Fragilaria vaucheriae	33	5.50%	0.00	
Geissleria acceptata	1	0.17%	0.00	
Gomphonema sp.	4	0.67%	0.00	
Gomphonema olivaceum	3	0.50%	0.00	
Gomphonema parvulum	9	1.50%	0.00	
Mayamaea agrestis	16	2.67%	0.00	
Mayamaea atomus	7	1.17%	0.00	
Navicula cryptotenella	4	0.67%	0.00	
Nitzschia acicularis	17	2.83%	0.00	
Nitzschia archibaldii	21	3.50%	0.00	
Nitzschia capitellata	2	0.33%	0.00	
Nitzschia dissipata	202	33.67%	0.00	
Nitzschia fonticola	2	0.33%	0.00	
Nitzschia heufleriana	1	0.17%	0.00	
Nitzschia inconspicua	18	3.00%	0.00	
Nitzschia linearis	15	2.50%	0.00	
Nitzschia palea	35	5.83%	0.00	
Nitzschia paleacea	53	8.83%	0.00	
Nitzschia pusilla	8	1.33%	0.00	
Reimeria sinuata	10	1.67%	0.00	
Rhopalodia operculata	1	0.17%	0.00	
Sellaphora pupula	2	0.33%	0.00	
Staurosirella pinnata	4	0.67%	0.00	
Stephanocyclus meneghiniana	4	0.67%	0.00	
Surirella angusta	1	0.17%	0.00	
Surirella brightwellii	1	0.17%	0.00	
Surirella ovalis	7	1.17%	0.00	
Sample Count	**600**			

Taxa Listing

Project ID: PBSJ11CFRP
RAI No.: PBSJ11CFRP005

RAI No.: PBSJ11CFRP005 **Sta. Name:** Clark Fork at Gold Creek
Client ID: CFR-53C
Date Coll.: 9/1/2011 **No. Jars:** 1 **STORET ID:** 12324680

Taxonomic Name	Count	PRA	Abnorm.	Comment
Diatoms				
Bacillariophyta				
Achnanthidium minutissimum	6	1.00%	0.00	
Amphora inariensis	7	1.17%	0.00	
Amphora pediculus	17	2.83%	0.00	
Caloneis bacillum	2	0.33%	0.00	
Cocconeis pediculus	6	1.00%	0.00	
Cocconeis placentula	109	18.17%	1.00	
Cymbella excisa	2	0.33%	0.00	
Diatoma moniliformis	16	2.67%	0.00	
Encyonema silesiacum	18	3.00%	0.00	
Encyonopsis subminuta	2	0.33%	0.00	
Eolimna minima	8	1.33%	0.00	
Epithemia sorex	21	3.50%	0.00	
Fragilaria capucina	5	0.83%	0.00	
Fragilaria vaucheriae	9	1.50%	0.00	
Gomphonema parvulum	2	0.33%	0.00	
Mayamaea agrestis	15	2.50%	0.00	
Mayamaea atomus	3	0.50%	0.00	
Navicula caterva	4	0.67%	0.00	
Navicula cryptotenella	6	1.00%	0.00	
Navicula cryptotenelloides	1	0.17%	0.00	
Navicula tripunctata	2	0.33%	0.00	
Nitzschia sp.	2	0.33%	0.00	
Nitzschia acicularis	12	2.00%	0.00	
Nitzschia archibaldii	21	3.50%	0.00	
Nitzschia dissipata	114	19.00%	0.00	
Nitzschia fonticola	6	1.00%	0.00	
Nitzschia frustulum	2	0.33%	0.00	
Nitzschia heufleriana	2	0.33%	0.00	
Nitzschia inconspicua	26	4.33%	0.00	
Nitzschia linearis	11	1.83%	0.00	
Nitzschia palea	37	6.17%	0.00	
Nitzschia paleacea	39	6.50%	0.00	
Nitzschia pusilla	4	0.67%	0.00	
Nitzschia sociabilis	1	0.17%	0.00	
Planothidium frequentissimum	6	1.00%	0.00	
Reimeria sinuata	22	3.67%	0.00	
Rhoicosphenia abbreviata	4	0.67%	0.00	
Sellaphora pupula	4	0.67%	0.00	
Staurosira construens	2	0.33%	0.00	
Staurosirella pinnata	5	0.83%	0.00	
Stephanocyclus meneghiniana	2	0.33%	0.00	
Surirella ovalis	16	2.67%	0.00	
Synedra ulna v. contracta	1	0.17%	0.00	
Sample Count	**600**			

Taxa Listing

Project ID: PBSJ11CFRP
RAI No.: PBSJ11CFRP006

RAI No.: PBSJ11CFRP006 **Sta. Name:** Clark Fork near Drummond
Client ID: CFR-84F
Date Coll.: 9/1/2011 **No. Jars:** 1 **STORET ID:** 12331800

Taxonomic Name	Count	PRA	Abnorm.	Comment
Diatoms				
Bacillariophyta				
Achnanthidium sp.	2	0.33%	0.00	
Achnanthidium minutissimum	5	0.83%	0.00	
Adlafia minuscula	4	0.67%	0.00	
Amphora pediculus	9	1.50%	0.00	
Aulacoseira sp.	2	0.33%	0.00	
Cocconeis pediculus	79	13.17%	0.00	
Cocconeis placentula	250	41.67%	0.00	
Cymbella excisa	9	1.50%	0.00	
Diatoma moniliformis	20	3.33%	0.00	
Encyonema minutum	6	1.00%	0.00	
Encyonema silesiacum	11	1.83%	0.00	
Eolimna minima	2	0.33%	0.00	
Epithemia sorex	2	0.33%	0.00	
Fragilaria vaucheriae	4	0.67%	0.00	
Gomphonema olivaceum	2	0.33%	0.00	
Mayamaea agrestis	2	0.33%	0.00	
Mayamaea atomus	3	0.50%	0.00	
Melosira varians	1	0.17%	0.00	
Navicula caterva	10	1.67%	0.00	
Navicula cryptotenella	4	0.67%	0.00	
Nitzschia sp.	1	0.17%	0.00	
Nitzschia acicularis	3	0.50%	0.00	
Nitzschia amphibia	1	0.17%	0.00	
Nitzschia archibaldii	8	1.33%	0.00	
Nitzschia dissipata	24	4.00%	0.00	
Nitzschia dissipata v. media	1	0.17%	0.00	
Nitzschia inconspicua	74	12.33%	0.00	
Nitzschia linearis	1	0.17%	0.00	
Nitzschia palea	11	1.83%	0.00	
Nitzschia paleacea	7	1.17%	0.00	
Planothidium frequentissimum	4	0.67%	0.00	
Reimeria sinuata	26	4.33%	0.00	
Rhoicosphenia abbreviata	4	0.67%	0.00	
Staurosirella pinnata	1	0.17%	0.00	
Stephanocyclus meneghiniana	5	0.83%	0.00	
Surirella ovalis	1	0.17%	0.00	
Synedra ulna	1	0.17%	0.00	
Sample Count	**600**			

Taxa Listing

Project ID: PBSJ11CFRP
RAI No.: PBSJ11CFRP007

RAI No.: PBSJ11CFRP007 **Sta. Name:** Clark Fork at Turah
Client ID: CFR-116A
Date Coll.: 9/1/2011 **No. Jars:** 1 **STORET ID:** 12334550

Taxonomic Name	Count	PRA	Abnorm.	Comment
Diatoms				
Bacillariophyta				
Achnanthidium minutissimum	18	3.00%	0.00	
Amphora inariensis	3	0.50%	0.00	
Amphora pediculus	13	2.17%	0.00	
Cocconeis pediculus	34	5.67%	0.00	
Cocconeis placentula	68	11.33%	0.00	
Cymbella excisa	103	17.17%	0.00	
Diatoma moniliformis	99	16.50%	6.00	
Diatoma vulgaris	2	0.33%	0.00	
Encyonema minutum	8	1.33%	0.00	
Encyonema silesiacum	12	2.00%	0.00	
Eolimna minima	4	0.67%	0.00	
Epithemia sorex	79	13.17%	0.00	
Fragilaria capucina	4	0.67%	0.00	
Gomphonema sp.	4	0.67%	0.00	
Gomphonema kobayasii	12	2.00%	0.00	
Gomphonema olivaceoides	4	0.67%	0.00	
Gomphonema olivaceum	3	0.50%	0.00	
Navicula caterva	3	0.50%	0.00	
Navicula cryptotenella	4	0.67%	0.00	
Nitzschia sp.	2	0.33%	0.00	
Nitzschia agnita	2	0.33%	0.00	
Nitzschia archibaldii	10	1.67%	0.00	
Nitzschia dissipata	33	5.50%	0.00	
Nitzschia fonticola	4	0.67%	0.00	
Nitzschia inconspicua	3	0.50%	0.00	
Nitzschia linearis	4	0.67%	0.00	
Nitzschia palea	6	1.00%	0.00	
Nitzschia paleacea	26	4.33%	0.00	
Planothidium lanceolatum	1	0.17%	0.00	
Reimeria sinuata	17	2.83%	0.00	
Stephanocyclus meneghiniana	4	0.67%	0.00	
Synedra acus	1	0.17%	0.00	
Synedra rumpens	2	0.33%	0.00	
Synedra ulna	8	1.33%	0.00	
Sample Count	**600**			

Metrics Report

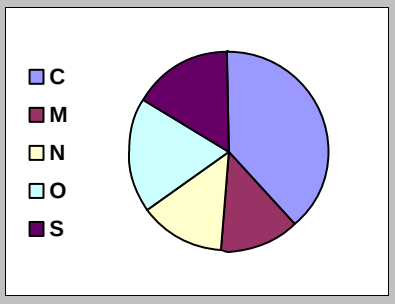
Project ID: PBSJ11CFRP
Sample ID: PBSJ11CFRP001
Station Name: Silver Bow Creek at War
Client ID: SS-25
STORET ID: 12323750
Date Collected: 9/2/2011
Count Of Taxon: 45
Sum Of Count: 600

Table 1 Metrics

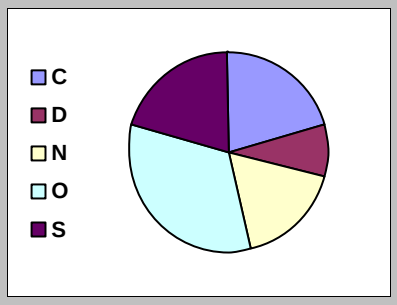
Metric	Value	MTM	MTP
Community Structure			
Shannon H (log2)	4.379	Excellent	Excellent
Species Richness	45	Excellent	Excellent
Native Taxa Percent	4.33%		
Cosmopolitan Taxa Percent	81.50%		
Mountains Rare Taxa Percent	1.00%		
Plains Rare Taxa Percent	3.00%		
Dominant Taxon Percent	17.33%	Excellent	Excellent
Sediment			
Siltation Taxa Percent	34.17%	Good	Excellent
Motile Taxa Percent	38.33%		
Mountains Brackish Taxa Percent	77.50%		
Plains Brackish Taxa Percent	0.00%		
Organic Nutrients			
Pollution Index	2.322	Good	Excellent
Nitrogen Heterotroph Taxa Percent	19.33%		
Polysaprobous Taxa Percent	50.83%		
Low DO Taxa Percent	4.83%		
Inorganic Nutrients			
Nitrogen Autotroph Taxa Percent	66.83%		
Eutraphentic Taxa Percent	51.83%		
Rhopalodiales Percent	1.33%		
Metals			
Disturbance Taxa Percent	1.50%	Excellent	Excellent
Acidophilous Taxa Percent	0.00%		
Metals Tolerant Taxa Percent	34.67%		
Abnormal Cells Percent	0.33%	Good	

Increaser/Decreaser Taxa

Metric	Value	Prob.
Mountains General Increasers Taxa Percent	66.67%	98.38%
Mountains Metals Increasers Taxa Percent	21.83%	33.72%
Mountains Nutrient Increasers Taxa Percent	24.33%	43.64%
Mountains Sediment Increasers Taxa Percent	28.83%	70.88%



Metric	Value	Prob.
Plains General Decreasers Taxa Percent	13.00%	65.91%
Plains General Increasers Taxa Percent	33.83%	51.20%



BioIndex	Description	Rating
MTM	Montana DEQ Mountains (Bahls 1992)	Good
MTP	Montana DEQ Plains (Bahls 1992)	Excellent

Thursday, October 20, 2011

Metrics Report

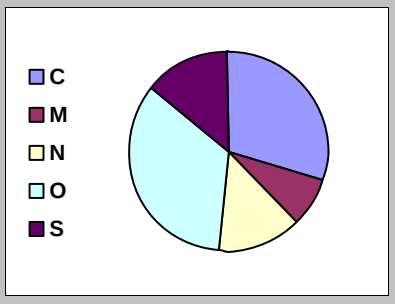
Project ID: PBSJ11CFRP
Sample ID: PBSJ11CFRP002
Station Name: Clark Fork near Galen
Client ID: CFR-03A
STORET ID: 12323800
Date Collected: 9/2/2011
Count Of Taxon: 49
Sum Of Count: 600

Table 1 Metrics

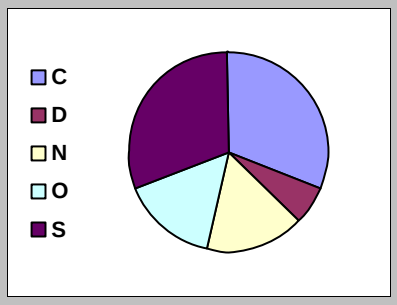
Metric	Value	MTM	MTP
Community Structure			
Shannon H (log2)	4.495	Excellent	Excellent
Species Richness	49	Excellent	Excellent
Native Taxa Percent	0.17%		
Cosmopolitan Taxa Percent	94.00%		
Mountains Rare Taxa Percent	0.00%		
Plains Rare Taxa Percent	0.17%		
Dominant Taxon Percent	17.33%	Excellent	Excellent
Sediment			
Siltation Taxa Percent	50.33%	Fair	Good
Motile Taxa Percent	56.83%		
Mountains Brackish Taxa Percent	79.17%		
Plains Brackish Taxa Percent	0.83%		
Organic Nutrients			
Pollution Index	2.563	Excellent	Excellent
Nitrogen Heterotroph Taxa Percent	13.50%		
Polysaprobous Taxa Percent	26.67%		
Low DO Taxa Percent	4.17%		
Inorganic Nutrients			
Nitrogen Autotroph Taxa Percent	73.33%		
Eutraphentic Taxa Percent	44.33%		
Rhopalodiales Percent	0.33%		
Metals			
Disturbance Taxa Percent	10.33%	Excellent	Excellent
Acidophilous Taxa Percent	0.00%		
Metals Tolerant Taxa Percent	14.17%		
Abnormal Cells Percent	0.00%	Excellent	

Increaser/Decreaser Taxa

Metric	Value	Prob.
Mountains General Increasers Taxa Percent	46.17%	86.21%
Mountains Metals Increasers Taxa Percent	11.83%	13.79%
Mountains Nutrient Increasers Taxa Percent	20.33%	33.72%
Mountains Sediment Increasers Taxa Percent	21.33%	51.60%



Metric	Value	Prob.
Plains General Decreasers Taxa Percent	11.33%	69.85%
Plains General Increasers Taxa Percent	59.33%	96.86%



BioIndex	Description	Rating
MTM	Montana DEQ Mountains (Bahls 1992)	Fair
MTP	Montana DEQ Plains (Bahls 1992)	Good

Thursday, October 20, 2011

Metrics Report

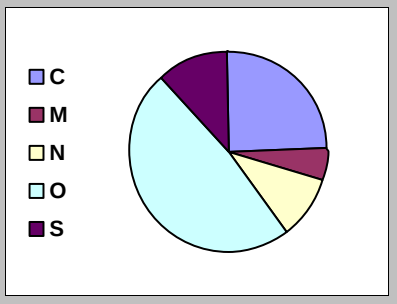
Project ID: PBSJ11CFRP
Sample ID: PBSJ11CFRP003
Station Name: Clark Fork at Deer Lodg
Client ID: CFR-27H
STORET ID: 12324200
Date Collected: 9/2/2011
Count Of Taxon: 47
Sum Of Count: 600

Table 1 Metrics

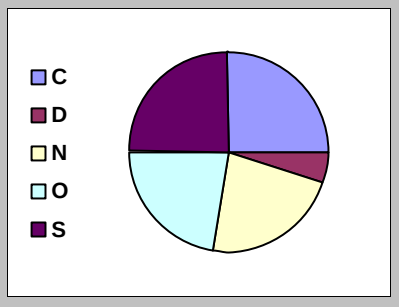
Metric	Value	MTM	MTP
Community Structure			
Shannon H (log2)	4.157	Excellent	Excellent
Species Richness	47	Excellent	Excellent
Native Taxa Percent	0.67%		
Cosmopolitan Taxa Percent	82.67%		
Mountains Rare Taxa Percent	0.00%		
Plains Rare Taxa Percent	0.00%		
Dominant Taxon Percent	33.00%	Good	Good
Sediment			
Siltation Taxa Percent	71.33%	Poor	Fair
Motile Taxa Percent	78.50%		
Mountains Brackish Taxa Percent	76.17%		
Plains Brackish Taxa Percent	1.33%		
Organic Nutrients			
Pollution Index	2.445	Good	Excellent
Nitrogen Heterotroph Taxa Percent	21.50%		
Polysaprobous Taxa Percent	32.67%		
Low DO Taxa Percent	9.67%		
Inorganic Nutrients			
Nitrogen Autotroph Taxa Percent	71.83%		
Eutraphentic Taxa Percent	41.17%		
Rhopalodiales Percent	0.33%		
Metals			
Disturbance Taxa Percent	4.00%	Excellent	Excellent
Acidophilous Taxa Percent	0.00%		
Metals Tolerant Taxa Percent	20.00%		
Abnormal Cells Percent	0.00%	Excellent	

Increaser/Decreaser Taxa

Metric	Value	Prob.
Mountains General Increasers Taxa Percent	34.00%	68.08%
Mountains Metals Increasers Taxa Percent	7.00%	7.93%
Mountains Nutrient Increasers Taxa Percent	13.33%	19.49%
Mountains Sediment Increasers Taxa Percent	16.33%	37.83%



Metric	Value	Prob.
Plains General Decreasers Taxa Percent	9.00%	74.86%
Plains General Increasers Taxa Percent	47.83%	85.08%



BioIndex	Description	Rating
MTM	Montana DEQ Mountains (Bahls 1992)	Poor
MTP	Montana DEQ Plains (Bahls 1992)	Fair

Thursday, October 20, 2011

Metrics Report

Project ID: PBSJ11CFRP
Sample ID: PBSJ11CFRP004
Station Name: Clark Fork above Little B
Client ID: CFR-42G
STORET ID: 12324400
Date Collected: 9/1/2011
Count Of Taxon: 40
Sum Of Count: 600

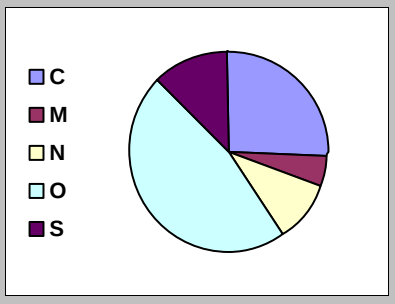
Table 1 Metrics

Metric	Value	MTM	MTP
Community Structure			
Shannon H (log2)	3.918	Excellent	Good
Species Richness	40	Excellent	Excellent
Native Taxa Percent	0.00%		
Cosmopolitan Taxa Percent	86.67%		
Mountains Rare Taxa Percent	0.00%		
Plains Rare Taxa Percent	0.00%		
Dominant Taxon Percent	33.67%	Good	Good
Sediment			
Siltation Taxa Percent	72.33%	Poor	Fair
Motile Taxa Percent	77.83%		
Mountains Brackish Taxa Percent	74.00%		
Plains Brackish Taxa Percent	0.50%		
Organic Nutrients			
Pollution Index	2.292	Good	Excellent
Nitrogen Heterotroph Taxa Percent	27.00%		
Polysaprobous Taxa Percent	42.17%		
Low DO Taxa Percent	15.17%		
Inorganic Nutrients			
Nitrogen Autotroph Taxa Percent	67.50%		
Eutraphentic Taxa Percent	44.00%		
Rhopalodiales Percent	0.17%		
Metals			
Disturbance Taxa Percent	1.50%	Excellent	Excellent
Acidophilous Taxa Percent	0.00%		
Metals Tolerant Taxa Percent	33.17%		
Abnormal Cells Percent	0.00%	Excellent	

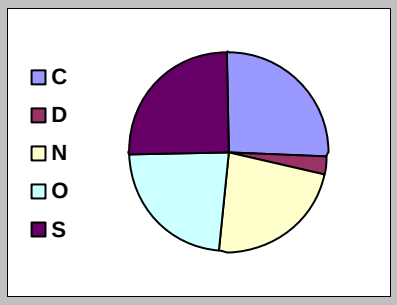
BioIndex	Description	Rating
MTM	Montana DEQ Mountains (Bahls 1992)	Poor
MTP	Montana DEQ Plains (Bahls 1992)	Fair

Increaser/Decreaser Taxa

Metric	Value	Prob.
Mountains General Increasers Taxa Percent	35.83%	71.57%
Mountains Metals Increasers Taxa Percent	6.50%	7.35%
Mountains Nutrient Increasers Taxa Percent	13.50%	19.77%
Mountains Sediment Increasers Taxa Percent	17.17%	40.13%



Metric	Value	Prob.
Plains General Decreasers Taxa Percent	5.33%	81.59%
Plains General Increasers Taxa Percent	50.33%	88.69%



Thursday, October 20, 2011

Metrics Report

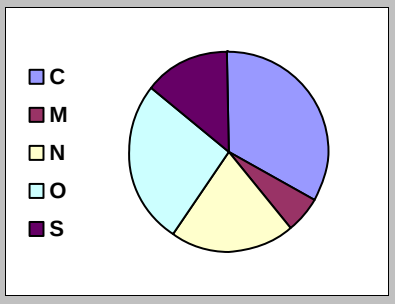
Project ID: PBSJ11CFRP
Sample ID: PBSJ11CFRP005
Station Name: Clark Fork at Gold Cree
Client ID: CFR-53C
STORET ID: 12324680
Date Collected: 9/1/2011
Count Of Taxon: 43
Sum Of Count: 600

Table 1 Metrics

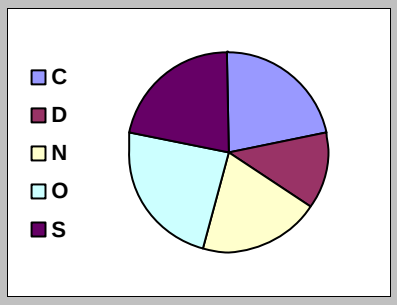
Metric	Value	MTM	MTP
Community Structure			
Shannon H (log2)	4.292	Excellent	Excellent
Species Richness	43	Excellent	Excellent
Native Taxa Percent	0.67%		
Cosmopolitan Taxa Percent	86.33%		
Mountains Rare Taxa Percent	0.00%		
Plains Rare Taxa Percent	0.00%		
Dominant Taxon Percent	19.00%	Excellent	Excellent
Sediment			
Siltation Taxa Percent	56.00%	Fair	Good
Motile Taxa Percent	67.50%		
Mountains Brackish Taxa Percent	71.83%		
Plains Brackish Taxa Percent	0.00%		
Organic Nutrients			
Pollution Index	2.430	Good	Excellent
Nitrogen Heterotroph Taxa Percent	21.83%		
Polysaprobous Taxa Percent	33.17%		
Low DO Taxa Percent	12.83%		
Inorganic Nutrients			
Nitrogen Autotroph Taxa Percent	70.83%		
Eutraphentic Taxa Percent	59.17%		
Rhopalodiales Percent	3.50%		
Metals			
Disturbance Taxa Percent	1.00%	Excellent	Excellent
Acidophilous Taxa Percent	0.00%		
Metals Tolerant Taxa Percent	20.33%		
Abnormal Cells Percent	0.17%	Good	

Increaser/Decreaser Taxa

Metric	Value	Prob.
Mountains General Increasers Taxa Percent	55.00%	93.94%
Mountains Metals Increasers Taxa Percent	9.67%	10.75%
Mountains Nutrient Increasers Taxa Percent	33.17%	65.91%
Mountains Sediment Increasers Taxa Percent	23.17%	56.36%



Metric	Value	Prob.
Plains General Decreasers Taxa Percent	20.67%	46.81%
Plains General Increasers Taxa Percent	38.33%	63.68%



BioIndex	Description	Rating
MTM	Montana DEQ Mountains (Bahls 1992)	Fair
MTP	Montana DEQ Plains (Bahls 1992)	Good

Thursday, October 20, 2011

Metrics Report

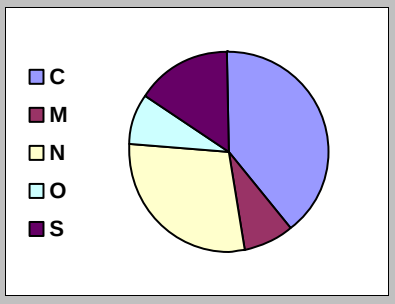
Project ID: PBSJ11CFRP
Sample ID: PBSJ11CFRP006
Station Name: Clark Fork near Drumm
Client ID: CFR-84F
STORET ID: 12331800
Date Collected: 9/1/2011
Count Of Taxon: 37
Sum Of Count: 600

Table 1 Metrics

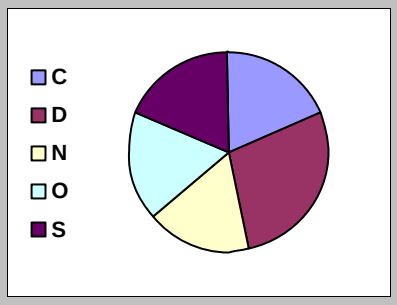
Metric	Value	MTM	MTP
Community Structure			
Shannon H (log2)	3.266	Excellent	Good
Species Richness	37	Excellent	Good
Native Taxa Percent	1.67%		
Cosmopolitan Taxa Percent	94.17%		
Mountains Rare Taxa Percent	0.00%		
Plains Rare Taxa Percent	0.00%		
Dominant Taxon Percent	41.67%	Good	Good
Sediment			
Siltation Taxa Percent	26.17%	Good	Excellent
Motile Taxa Percent	32.33%		
Mountains Brackish Taxa Percent	64.17%		
Plains Brackish Taxa Percent	0.67%		
Organic Nutrients			
Pollution Index	2.663	Excellent	Excellent
Nitrogen Heterotroph Taxa Percent	17.83%		
Polysaprobous Taxa Percent	25.67%		
Low DO Taxa Percent	3.67%		
Inorganic Nutrients			
Nitrogen Autotroph Taxa Percent	77.83%		
Eutraphentic Taxa Percent	82.50%		
Rhopalodiales Percent	0.33%		
Metals			
Disturbance Taxa Percent	0.83%	Excellent	Excellent
Acidophilous Taxa Percent	0.00%		
Metals Tolerant Taxa Percent	8.17%		
Abnormal Cells Percent	0.00%	Excellent	

Increaser/Decreaser Taxa

Metric	Value	Prob.
Mountains General Increasers Taxa Percent	81.67%	99.38%
Mountains Metals Increasers Taxa Percent	17.17%	23.27%
Mountains Nutrient Increasers Taxa Percent	60.33%	98.42%
Mountains Sediment Increasers Taxa Percent	32.50%	78.82%



Metric	Value	Prob.
Plains General Decreasers Taxa Percent	42.67%	6.94%
Plains General Increasers Taxa Percent	29.83%	40.13%



BioIndex	Description	Rating
MTM	Montana DEQ Mountains (Bahls 1992)	Good
MTP	Montana DEQ Plains (Bahls 1992)	Good

Thursday, October 20, 2011

Metrics Report

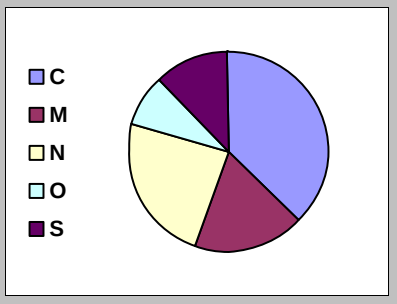
Project ID: PBSJ11CFRP
Sample ID: PBSJ11CFRP007
Station Name: Clark Fork at Turah
Client ID: CFR-116A
STORET ID: 12334550
Date Collected: 9/1/2011
Count Of Taxon: 34
Sum Of Count: 600

Table 1 Metrics

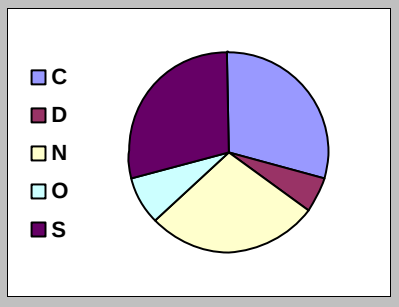
Metric	Value	MTM	MTP
Community Structure			
Shannon H (log2)	3.920	Excellent	Good
Species Richness	34	Excellent	Good
Native Taxa Percent	2.50%		
Cosmopolitan Taxa Percent	92.83%		
Mountains Rare Taxa Percent	0.00%		
Plains Rare Taxa Percent	2.00%		
Dominant Taxon Percent	17.17%	Excellent	Excellent
Sediment			
Siltation Taxa Percent	16.83%	Excellent	Excellent
Motile Taxa Percent	35.50%		
Mountains Brackish Taxa Percent	69.50%		
Plains Brackish Taxa Percent	0.67%		
Organic Nutrients			
Pollution Index	2.642	Excellent	Excellent
Nitrogen Heterotroph Taxa Percent	7.17%		
Polysaprobous Taxa Percent	28.67%		
Low DO Taxa Percent	2.33%		
Inorganic Nutrients			
Nitrogen Autotroph Taxa Percent	86.83%		
Eutraphentic Taxa Percent	75.67%		
Rhopalodiales Percent	13.17%		
Metals			
Disturbance Taxa Percent	3.00%	Excellent	Excellent
Acidophilous Taxa Percent	0.00%		
Metals Tolerant Taxa Percent	11.83%		
Abnormal Cells Percent	1.00%	Good	

Increaser/Decreaser Taxa

Metric	Value	Prob.
Mountains General Increasers Taxa Percent	81.50%	99.38%
Mountains Metals Increasers Taxa Percent	39.50%	77.64%
Mountains Nutrient Increasers Taxa Percent	53.00%	95.35%
Mountains Sediment Increasers Taxa Percent	27.00%	66.64%



Metric	Value	Prob.
Plains General Decreasers Taxa Percent	13.00%	65.91%
Plains General Increasers Taxa Percent	68.50%	99.38%

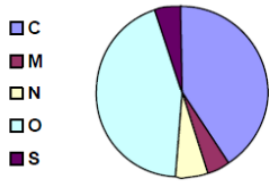


BioIndex	Description	Rating
MTM	Montana DEQ Mountains (Bahls 1992)	Good
MTP	Montana DEQ Plains (Bahls 1992)	Good

Thursday, October 20, 2011

Interpretation of Increaser/Decreaser abundance charts

Mountains



C = Common Increaser Taxa
M = Metals Increaser Taxa
N = Nutrient Increaser Taxa
O = Other Taxa
S = Sediment Increaser Taxa

Plains

C = General Increaser Taxa
D = General Decreaser Taxa
N = Nutrient Increaser Taxa
O = Other Taxa
S = Sediment Increaser Taxa

Non-diatom algae study: PBSJ11CFRP **Determinations by Rhithron Associates, Inc.**

Non-Diatom Algae Data

RAI Sample ID	Client ID	Sample Date	Taxon	Division	RA	RB
PBSJ11CFRP001	SS-25	9/2/2011	Diatoms	Bacillariophyceae	d	1
PBSJ11CFRP001	SS-25	9/2/2011	Stigeoclonium	Chlorophyta	a	2
PBSJ11CFRP001	SS-25	9/2/2011	Cladophora	Chlorophyta	f	3
PBSJ11CFRP001	SS-25	9/2/2011	Ulothrix	Chlorophyta	f	4
PBSJ11CFRP001	SS-25	9/2/2011	Leptolyngbya	Cyanophyta	c	5
PBSJ11CFRP001	SS-25	9/2/2011	Klebsormidium	Chlorophyta	o	6
PBSJ11CFRP001	SS-25	9/2/2011	Pediastrum	Chlorophyta	r	7
PBSJ11CFRP001	SS-25	9/2/2011	Scenedesmus	Chlorophyta	r	8
PBSJ11CFRP002	CFR-03A	9/2/2011	Ulothrix	Chlorophyta	a	1
PBSJ11CFRP002	CFR-03A	9/2/2011	Diatoms	Bacillariophyceae	d	2
PBSJ11CFRP002	CFR-03A	9/2/2011	Cladophora	Chlorophyta	f	3
PBSJ11CFRP002	CFR-03A	9/2/2011	Nostoc	Cyanophyta	c	4
PBSJ11CFRP002	CFR-03A	9/2/2011	Stigeoclonium	Chlorophyta	c	5
PBSJ11CFRP002	CFR-03A	9/2/2011	Oscillatoria	Cyanophyta	o	6
PBSJ11CFRP002	CFR-03A	9/2/2011	Komvophoron	Cyanophyta	o	7
PBSJ11CFRP002	CFR-03A	9/2/2011	Leptolyngbya	Cyanophyta	c	8
PBSJ11CFRP002	CFR-03A	9/2/2011	Phormidium	Cyanophyta	o	9
PBSJ11CFRP002	CFR-03A	9/2/2011	Homeothrix	Cyanophyta	o	10
PBSJ11CFRP002	CFR-03A	9/2/2011	Pediastrum	Chlorophyta	r	11
PBSJ11CFRP003	CFR-27H	9/2/2011	Stigeoclonium	Chlorophyta	a	1
PBSJ11CFRP003	CFR-27H	9/2/2011	Diatoms	Bacillariophyceae	d	2
PBSJ11CFRP003	CFR-27H	9/2/2011	Cladophora	Chlorophyta	f	3
PBSJ11CFRP003	CFR-27H	9/2/2011	Phormidium	Cyanophyta	a	4
PBSJ11CFRP003	CFR-27H	9/2/2011	Homeothrix	Cyanophyta	c	5
PBSJ11CFRP003	CFR-27H	9/2/2011	Leptolyngbya	Cyanophyta	c	6
PBSJ11CFRP003	CFR-27H	9/2/2011	Heteroleibleinia	Cyanophyta	c	7
PBSJ11CFRP003	CFR-27H	9/2/2011	Cosmarium	Chlorophyta	r	8
PBSJ11CFRP004	CFR-42G	9/1/2011	Cladophora	Chlorophyta	f	1
PBSJ11CFRP004	CFR-42G	9/1/2011	Diatoms	Bacillariophyceae	d	2
PBSJ11CFRP004	CFR-42G	9/1/2011	Stigeoclonium	Chlorophyta	a	3
PBSJ11CFRP004	CFR-42G	9/1/2011	Phormidium	Cyanophyta	f	4
PBSJ11CFRP004	CFR-42G	9/1/2011	Leptolyngbya	Cyanophyta	c	5
PBSJ11CFRP004	CFR-42G	9/1/2011	Homeothrix	Cyanophyta	c	6
PBSJ11CFRP004	CFR-42G	9/1/2011	Komvophoron	Cyanophyta	o	7
PBSJ11CFRP004	CFR-42G	9/1/2011	Heribaudiella	Phaeophyta	c	8
PBSJ11CFRP004	CFR-42G	9/1/2011	Cosmarium	Chlorophyta	o	9
PBSJ11CFRP005	CFR-53C	9/1/2011	Cladophora	Chlorophyta	a	1
PBSJ11CFRP005	CFR-53C	9/1/2011	Diatoms	Bacillariophyceae	a	2
PBSJ11CFRP005	CFR-53C	9/1/2011	Phormidium	Cyanophyta	f	3
PBSJ11CFRP005	CFR-53C	9/1/2011	Stigeoclonium	Chlorophyta	c	4

RAI Sample ID	Client ID	Sample Date	Taxon	Division	RA	RB
PBSJ11CFRP005	CFR-53C	9/1/2011	Homeothrix	Cyanophyta	c	5
PBSJ11CFRP005	CFR-53C	9/1/2011	Cosmarium	Chlorophyta	o	6
PBSJ11CFRP005	CFR-53C	9/1/2011	Heteroleibleinia	Cyanophyta	c	7
PBSJ11CFRP005	CFR-53C	9/1/2011	Nostoc	Cyanophyta	o	8
PBSJ11CFRP005	CFR-53C	9/1/2011	Komvophoron	Cyanophyta	o	9
PBSJ11CFRP006	CFR-84F	9/1/2011	Stigeoclonium	Chlorophyta	a	1
PBSJ11CFRP006	CFR-84F	9/1/2011	Cladophora	Chlorophyta	o	2
PBSJ11CFRP006	CFR-84F	9/1/2011	Homeothrix	Cyanophyta	a	3
PBSJ11CFRP006	CFR-84F	9/1/2011	Diatoms	Bacillariophyceae	f	4
PBSJ11CFRP006	CFR-84F	9/1/2011	Nostoc	Cyanophyta	o	5
PBSJ11CFRP006	CFR-84F	9/1/2011	Cosmarium	Chlorophyta	o	6
PBSJ11CFRP007	CFR-116A	9/1/2011	Cladophora	Chlorophyta	a	1
PBSJ11CFRP007	CFR-116A	9/1/2011	Diatoms	Bacillariophyceae	d	2
PBSJ11CFRP007	CFR-116A	9/1/2011	Stigeoclonium	Chlorophyta	c	3
PBSJ11CFRP007	CFR-116A	9/1/2011	Nostoc	Cyanophyta	o	4
PBSJ11CFRP007	CFR-116A	9/1/2011	Ulothrix	Chlorophyta	o	5
PBSJ11CFRP007	CFR-116A	9/1/2011	Homeothrix	Cyanophyta	c	6
PBSJ11CFRP007	CFR-116A	9/1/2011	Heteroleibleinia	Cyanophyta	c	7
PBSJ11CFRP007	CFR-116A	9/1/2011	Cosmarium	Chlorophyta	o	8

APPENDIX F

UPPER CLARK FORK FLOW MONITORING REPORT 2011

Clark Fork River Operable Unit, 2011

August 2012

UPPER CLARK FORK FLOW MONITORING 2011

Prepared for:

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
P.O. Box 200901
Helena, MT 59620-0901

and

MONTANA DEPARTMENT OF JUSTICE
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February 2012

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APPENDICES

F.1.0 Introduction

The objective of this project was to monitor stream stage continuously at two locations on the upper Clark Fork of the Columbia River (Clark Fork) using digital stage recorders during the low flow period of summer and early fall 2011. Periodic streamflow measurements were made throughout the stage recorder deployment period and used to develop ratings describing the stage-discharge relationship at each site. These ratings, in conjunction with the continuous stage data, allowed for the estimation of streamflow at the two monitoring locations. Digital stage recorders were deployed for a period of 13 weeks, from late July through late October, 2011.

F.2.0 Study Design

Two monitoring sites on the upper Clark Fork were selected for this study, located between established continuous-stage recording stations operated by the US Geological Survey (**Figure F.2-1**). The upper site (CFR-F1), at Gem Back Road, is downstream of the USGS station near Galen (**Photo F.2-1**). The lower site (CFR-F2), at Sager Lane, is upstream of the USGS station at Deer Lodge (**Photo F.2-2**). Bridge crossings at both monitoring sites allowed for ease of access and the establishment of stable benchmarks for surveying purposes. At both sites, pool/run reaches approximately 100-150 feet in length downstream of the bridge crossings were selected for installing stage recorders and gauging streamflow. Both reaches had relatively well-defined section controls (i.e., a shallower riffle/run downstream) and channel controls (i.e., moderately-incised near-vertical banks) that would regulate streamflow over the range of stages expected during the monitoring period.

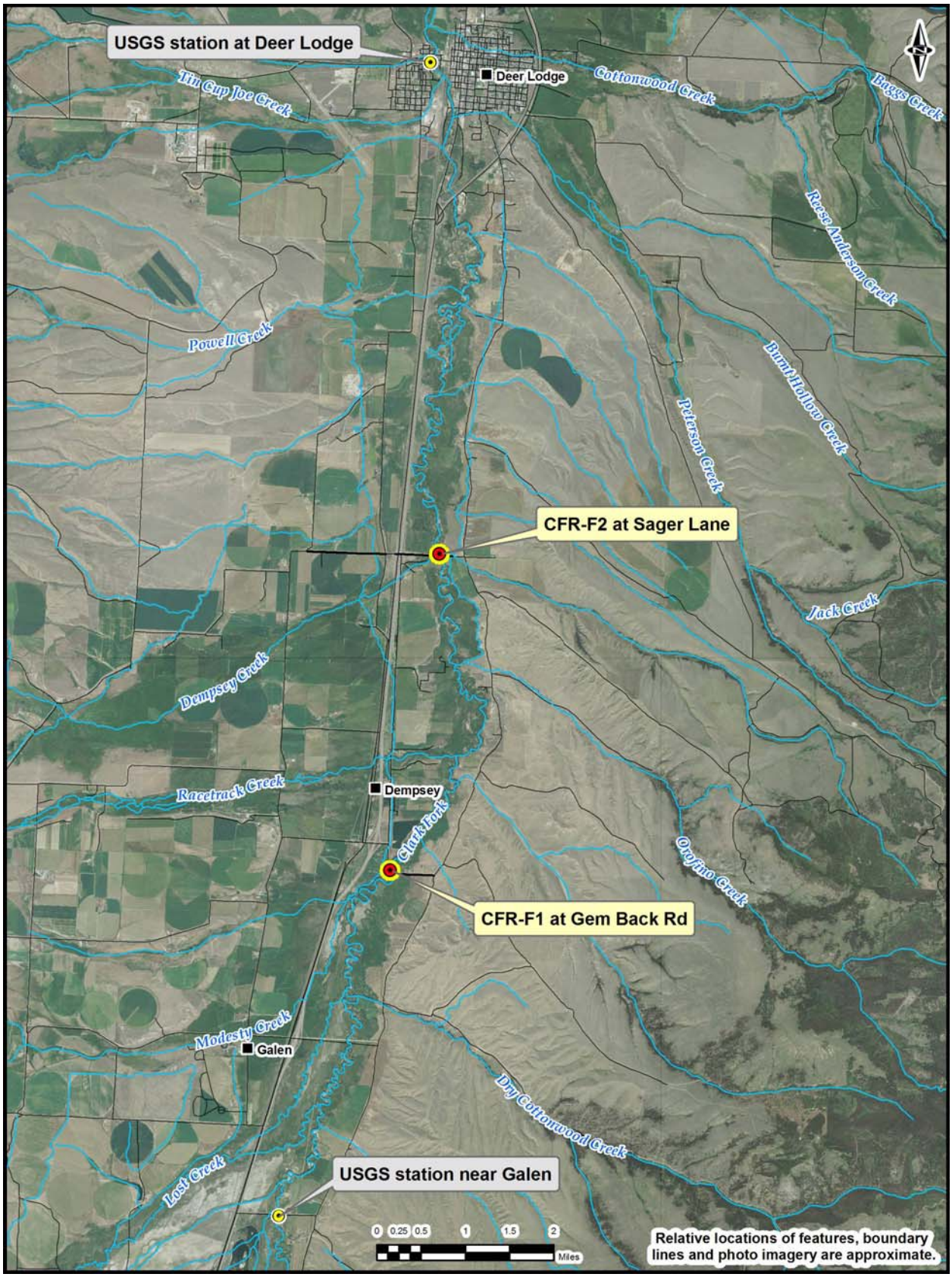


Figure F.2-1. Upper Clark Fork Flow Monitoring Locations 2011

Photo F.2-1. Clark Fork at Gem Back Road (CFR-F1), view downstream on day1 (left) and day 94 (right); staff gauge/stage recorder location is at upper left.

Photo F.2-2. Clark Fork at Sager Lane (CFR-F2), view downstream on day1 (left) and day 94 (right); staff gauge/stage recorder location is at center right.

F.2.1 Data Collection

At each site, stream discharge and water level stage data were collected following methods outlined in *Upper Clark Fork River Flow Monitoring Project 2011: Sampling and Analysis Plan* (Atkins 2011). Due to the unavailability of TruTrack instruments, RuggedTROLL digital stage recorders (InSitu Inc.) were utilized for this study. Additionally, a BaroTROLL continuous barometric pressure recorder was installed at Gem Back Road to permit corrections to water stage data recorded at both sites for fluctuations in atmospheric pressure.

To contain and protect the instruments, stilling wells 5 feet in length were constructed of 1.5-inch UV-resistant PVC pipe, with over-fitting, locking PVC caps. A standard sheet metal staff gauge graduated in hundredths of a foot was screwed to the side of the pipe (**Photo F.2-3**). At

each site, a somewhat protected location was selected outside of the thalweg, 8-10 feet from the streambank and in about 2.5 feet of water at the time of deployment, and a T-type steel fence post 8 feet in length was driven approximately 4 feet into the stream bed. A stilling well/staff gauge assemblage was securely clamped alongside the fence post with the open, bottom end set just above the substrate, and the upper half of the pipe extending above the water surface (**Photo F.2-4**).

The design is a departure from that of the galvanized pipe stilling well described in the MDEQ SOP publication WQPBWQM-007: *Standard Operating Procedure for Digital Stage Recorders*, referenced in the SAP, and was developed through consultation with a hydrological professional experienced with similar designs (Dave Amman, DNRC; personal communication).

Photos F.2-3 and F.2-4. Stilling well/staff gauge assembly, pre-deployment (cable-mounted continuous stage and barometric pressure recorders shown outside of pipe), and post-deployment.

The height of the top of each staff gauge relative to a benchmark established on the nearby bridge deck was determined with a laser level at the time of installation and again at the end of the deployment. These measurements served as controls to determine any vertical shift in the stilling wells and staff gauges over the period of data collection, and are included in **Appendix F-1**.

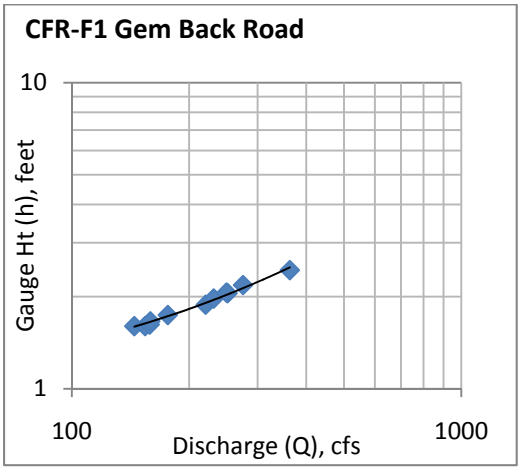
RuggedTROLLs were hung inside the stilling wells using a braided steel cable attached to the inside of the cap, which suspended the instruments fully submerged and just above the stream bottom. In a similar fashion, the single BaroTROLL was hung completely out of the water and near the top of the pipe. RuggedTROLLs were programmed to continuously record water level (thousandths of a foot), barometric pressure (mm Hg) and water temperature (°C) at an interval of one hour.

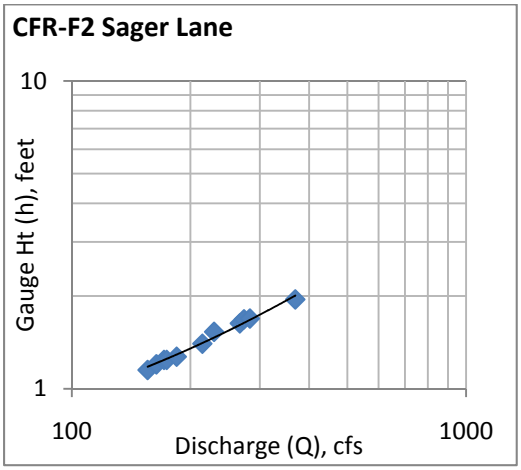
Streamflow was gauged and the corresponding stage was read on the staff gauge at the Gem Back Road and Sager Lane sites at the time of stage recorder deployment and retrieval on 7/26/2011 and 10/27/2011, respectively, and on 9 more occasions between those dates (**Tables F.3-1** and **F.3-2, in Section F.3.0**). The resulting 11 data points exceeded the minimum number of 6 generally recommended for development of a stage-discharge rating (Braca 2008; USGS 2005).

F.2.2 Data Analysis

Stage-discharge relationships were developed for the Clark Fork sites at Gem Back Road and Sager Lane following standard methods (Braca 2008; USGS 2005). For the 11 data points from each site, gauge height (stage) was plotted against the corresponding measured streamflow (discharge) values on a log-log scale in Excel and a best-fit line was determined. The log-log data plots for the Gem Back Road (**Figure F.2-2**) and Sager Lane (**Figure F.2-3**) sites both exhibited upward (concave) curves.

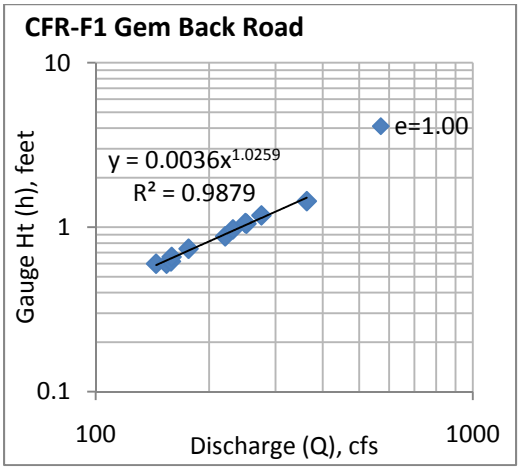
Figures F.2-2 and F.2-3. Log-log plots of gauge height vs. discharge for upper Clark Fork flow monitoring sites.

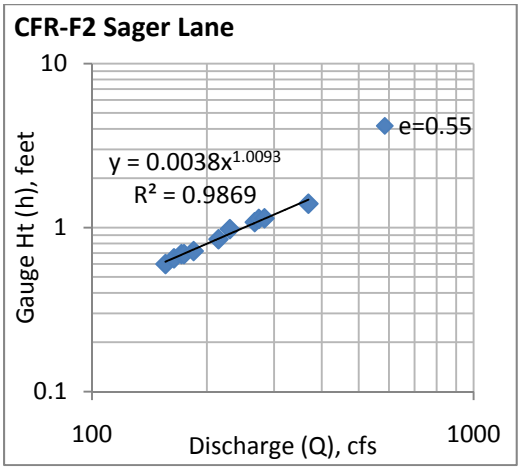




To determine the actual rating for each site, it was necessary to straighten the curved line in the log-log plot. This was accomplished by adjusting stage values for a logarithmic offset (*e*), which actually is an approximation of the stage at zero discharge. For each site a unique value for *e* was determined, that when subtracted from stage values through a process of trial and error, produced a straight line plot on the log-log scale. The power function equations describing these plots are the actual stage-discharge ratings for the for the Clark Fork sites at Gem Back Road **(Figure F.2-4)** and Sager Lane **(Figure F.2-5).**

Figures F.2-4 and F.2-5. Log-log plots of gauge height adjusted for logarithmic offset (*e*) vs. discharge for upper Clark Fork flow monitoring sites, including power function equations (ratings) and R^2 values.





F.3.0 Results

Gauged streamflow (discharge) values and corresponding staff gauge readings at the Clark Fork sites at Gem Back Road (CFR-F1) and Sager Lane (CFR-F2) for 11 dates during the study period are presented in **Tables F.3-1** and **F.3-2**, respectively.

Table F.3-1. External staff gauge and corresponding gauged streamflow (discharge) values for CFR-F1, Clark Fork at Gem Back Road.

Date	Time	Gauge Height (feet)	Flow (cfs)
7/26/2011	12:00 PM	2.44	363.04
8/1/2011	10:45 AM	2.18	275.22
8/12/2011	9:00 AM	1.88	220.60
8/24/2011	2:13 PM	1.60	144.68
9/2/2011	1:15 PM	1.74	176.42
9/8/2011	6:00 PM	1.60	154.25
9/23/2011	8:30 AM	1.62	158.46
10/3/2011	11:00 AM	1.66	159.12
10/14/2011	2:00 PM	1.97	231.32
10/20/2011	3:00 PM	2.06	249.46
10/27/2011	12:00 PM	2.05	251.27

Table F.3-2. External staff gauge and corresponding gauged streamflow(discharge) values for CFR-F2, Clark Fork at Sager Lane.

Date	Time	Gauge Height (feet)	Flow (cfs)
7/26/2011	3:00 PM	1.95	369.03
8/1/2011	11:45 AM	1.68	273.49
8/12/2011	10:00 AM	1.40	214.48
8/24/2011	12:40 PM	1.15	155.74
9/2/2011	2:10 PM	1.27	184.58
9/8/2011	6:40 PM	1.20	163.98
9/23/2011	9:15 AM	1.24	171.44
10/3/2011	10:10 AM	1.24	174.14
10/14/2011	3:00 PM	1.53	229.69
10/20/2011	4:00 PM	1.63	266.90
10/27/2011	1:45 PM	1.69	283.05

It was necessary to correlate TROLL continuous stage recorder data with those determined from co-located external staff gauges at each of the Clark Fork sites before the ratings developed in **Section F.2.2** could be used to calculate estimated streamflows. The mean difference between instrument and staff gauge stage values, recorded on the same dates and times as the 11 streamflow measurements, was determined for the Gem Back Road and Sager Lane sites (**Table F.3-3**), and this adjustment was applied to the respective hourly data from continuous stage recorders at each site.

Table F.3-3. Continuous recorder and staff gauge stage values, and the mean of the differences of these values, for sites CFR-F1 and CFR-F2.

CFR-F1 TROLL	CFR-F1 Staff	Difference
4.78	2.44	2.34
4.45	2.18	2.27
4.18	1.88	2.30
3.91	1.60	2.31
4.01	1.74	2.27
3.96	1.60	2.36
3.96	1.62	2.34
3.94	1.66	2.28
4.27	1.97	2.30
4.36	2.06	2.30
4.32	2.05	2.27
	Mean:	**2.30**

CFR-F2 TROLL	CFR-F2 Staff	Difference
3.72	1.95	1.77
3.45	1.68	1.77
3.19	1.40	1.79
2.96	1.15	1.81
3.08	1.27	1.81
3.03	1.20	1.83
3.06	1.24	1.82
3.01	1.24	1.77
3.32	1.53	1.79
3.45	1.63	1.82
3.40	1.69	1.71
	Mean:	**1.79**

The mean value was used to adjust continuous stage recorder data to correspond to the external staff gauge at each site.

Estimated hourly flow values for Clark Fork sites at Gem Back Road and Sager Lane were calculated using the stage-discharge rating equations determined for each site (**Tables F.3.4** and **F.3.6**) and adjusted hourly stage recorder data, and are included in **Appendix F-2**. Estimated mean daily streamflow values for the monitoring period were calculated from the hourly data, and are presented in **Appendix F-3**, and plotted in **Figures F.3-1** and **F.3-2** for sites CFR-F1 and CFR-F2, respectively. Comparisons of gauged and modeled (estimated) streamflow values for

each site at the 11 gauge heights recorded during the study period, and the relative percent differences between gauged and modeled values, are presented in **Tables F.3-5** and **F.3-7** for sites CFR-F1 and CFR-F2, respectively.

Laser level measurements relative to bridge benchmarks, made to hundredths of a foot at both CFR-F1 and CFR-F2 at the time of stage recorder deployment and again on retrieval, indicated there was no vertical shift at either site over the 2011 monitoring period (**Appendix F-1**).

F.3.1 Clark Fork at Gem Back Road (CFR-F1)

The stage-discharge relationship equation developed for site CFR-F1 is presented in **Table F.3-4** in the form that returns estimated discharge or streamflow *Q*, for a particular stage or gauge height *h*, corrected for the logarithmic offset determined in **Section F.2.2** (-1.00 foot in the case of CFR-F1). Estimated discharge values returned by the rating equation for staff gauge readings recorded at CFR-F1 during 11 flow gauging events are compared to the measured discharge values in **Table F.3-5**. Modeled streamflow values deviated from measured values at CFR-F1 by a minimum of 0.7% and a maximum of 4.0%.

The United States Geological Survey (USGS) has developed criteria for evaluating the accuracy of field measured flow data versus computed results:

"Excellent" indicates that about 95 percent of the daily discharges are within 5 percent of the true value; "good" within 10 percent; and "fair," within 15 percent. "Poor" indicates that daily discharges have less than "fair" accuracy. (USGS 2003).

With all modeled streamflow values within 5% of measured values, the data at Gem Back Road would receive a score of "Excellent" according to the USGS criteria.

Table F.3-4. Stage-discharge relationship for CFR-F1, Clark Fork at Gem Back Road.

Monitoring Period	Rating Equation
7/26/2011 to 10/27/2011	$Q=(277.7778(h-1.00))^{0.9748}$

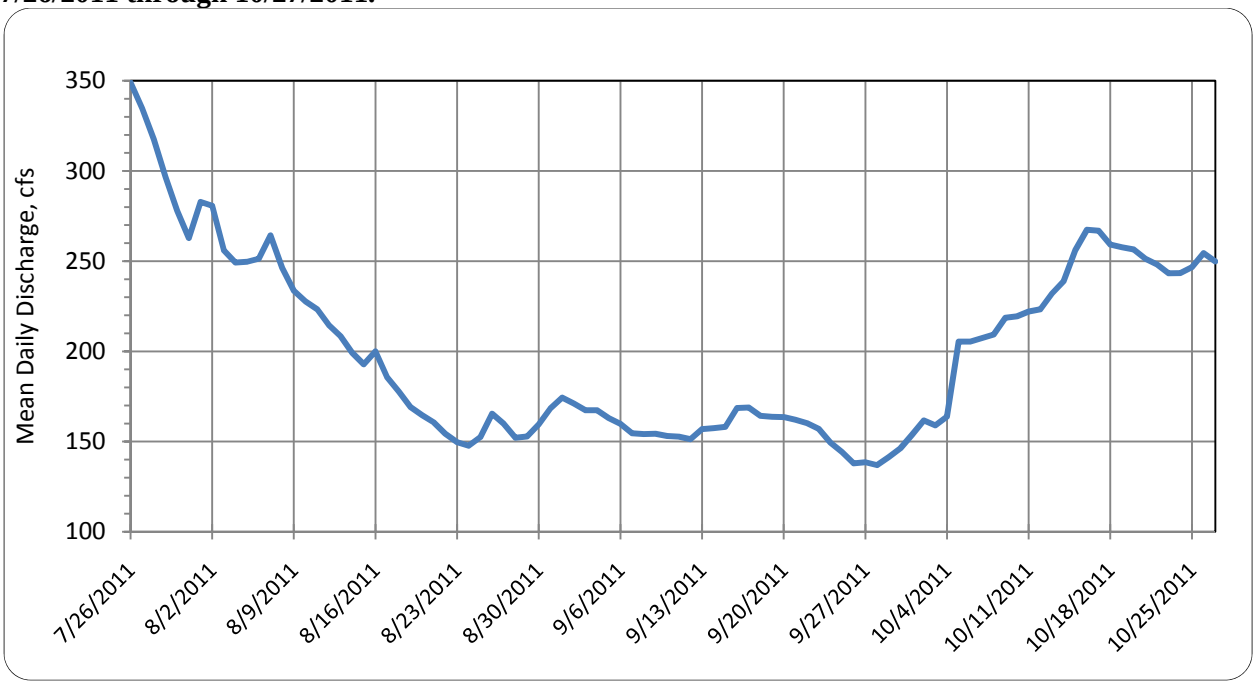
Q = discharge, (cfs); h= stage (ft.)

Table F.3-5. Measured (gauged) and modeled (rating equation) discharge values (Q), and relative percent difference values for CFR-F1, Clark Fork at Gem Back Road.

Measured Q (cfs)	Modeled Q (cfs)	% Difference
144.68	147.93	2.2%
154.25	160.06	3.7%
158.46	161.72	2.0%
159.12	154.83	2.7%
176.42	172.40	2.3%
220.60	211.87	4.0%
231.32	234.71	1.5%
249.46	254.67	2.1%
251.27	246.69	1.8%
275.22	277.18	0.7%
363.04	353.49	2.7%

Estimated mean daily discharge values for CFR-F1, Clark Fork at Gem Back Road, determined using the rating equation in **Table F.3-4** and continuous stage recorder data for the monitoring period 7/26/2011 to 10/27/2011 are plotted in **Figure F.3-1** and are listed in **Appendix F-2**.

Figure F.3-1. Mean daily discharge estimates for Clark Fork at Gem Back Road (CFR-F1), 7/26/2011 through 10/27/2011.



F.3.2 Clark Fork at Sager Lane (CFR-F2)

The stage-discharge relationship equation developed for site CFR-F2 is presented in **Table F.3-6** in the form that returns estimated discharge or streamflow *Q*, for a particular stage or gauge

height *h*, corrected for the logarithmic offset determined in **Section F.2.2** (-0.55 foot in the case of CFR-F2). Estimated discharge values returned by the rating equation for staff gauge readings recorded at CFR-F2 during 11 flow gauging events are compared to the measured discharge values in **Table F.3-7**. Modeled streamflow values deviated from measured values at CFR-F1 by a minimum of 0.3% and a maximum of 6.8%. With all modeled streamflow values within 10% of measured values, the data at Sager Lane would receive a score of "Good" according to the USGS criteria described in **Section F.3.1**.

Table F.3-6. Stage-discharge relationship for CFR-F2, Clark Fork at Sager Lane.

Monitoring Period	Rating Equation
7/26/2011 to 10/27/2011	$Q=(263.1579(h-0.55))^{0.9908}$

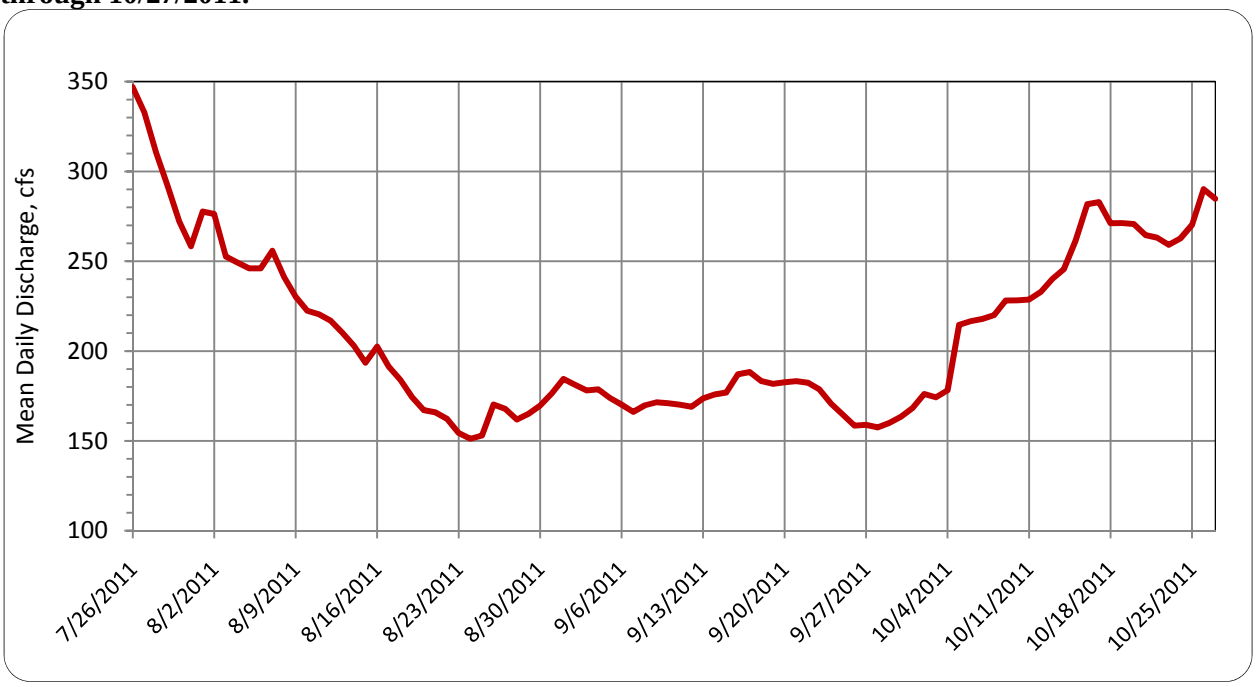
Q = discharge, (cfs); h= stage (ft.)

Table F.3-7. Measured (gauged) and modeled (rating equation) streamflows (Q), and relative percent difference values for CFR-F2, Clark Fork at Sager Lane.

Measured Q (cfs)	Modeled Q (cfs)	% Difference
155.74	154.69	0.7%
163.98	172.60	5.1%
171.44	179.56	4.6%
174.14	167.63	3.8%
184.58	185.27	0.4%
214.48	213.82	0.3%
229.69	244.06	6.1%
266.90	277.98	4.1%
273.49	277.98	1.6%
283.05	264.86	6.6%
369.03	344.73	6.8%

Estimated mean daily discharge values for CFR-F2, Clark Fork at Sager Lane, determined using the rating equation in **Table F.3-6** and continuous stage recorder data for the monitoring period 7/26/2011 to 10/27/2011 are plotted in **Figure F.3-2** and are listed in **Appendix F-2**.

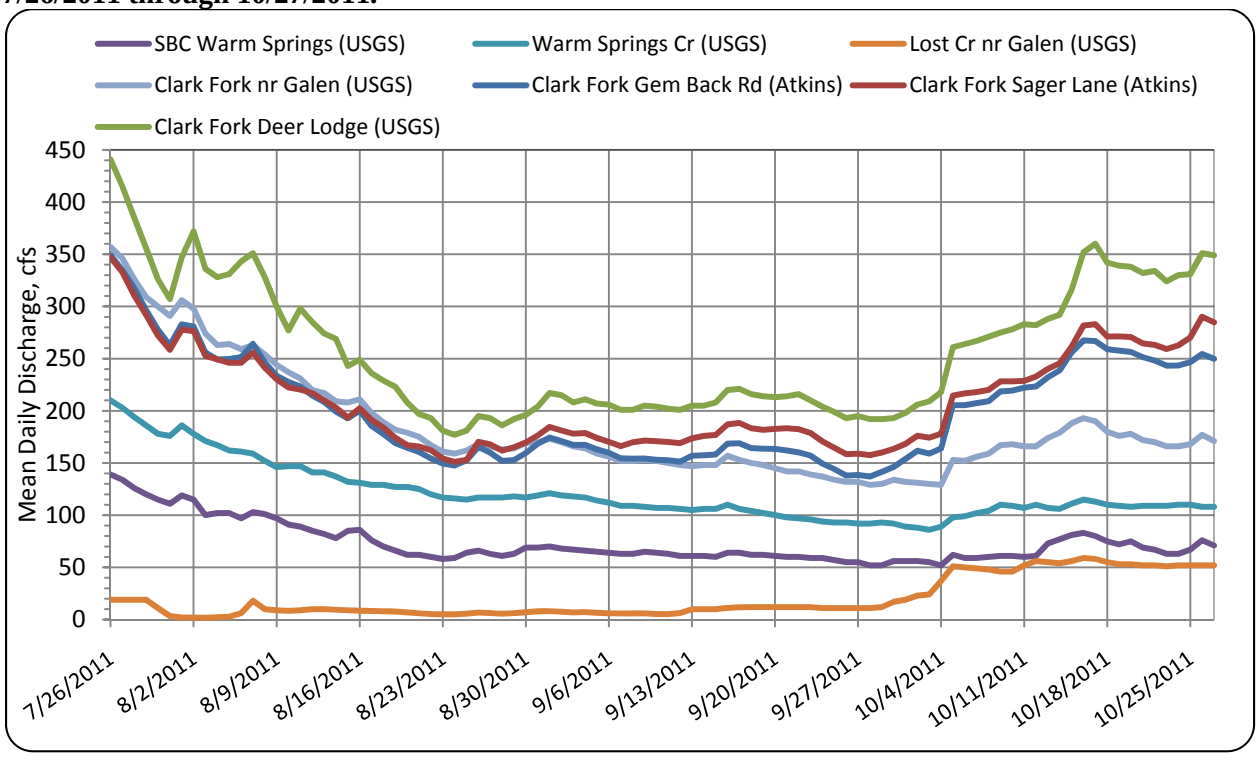
Figure F.3-2. Mean daily discharge estimates for Clark Fork at Sager Lane (CFR-F2), 7/26/2011 through 10/27/2011.



F.4.0 Discussion and Summary

Estimated daily mean discharge values for USGS gauging stations on the upper Clark Fork upstream and downstream of CFR-F1 and CFR-F2, as well as on three principal headwater tributaries (Silver Bow Creek, Warm Springs Creek and Lost Creek), are plotted in **Figure F.4-1**.

Figure F.4-1. Mean daily discharge estimates for upper Clark Fork mainstem and tributary sites, 7/26/2011 through 10/27/2011.



Estimated daily discharge at the four Clark Fork sites demonstrated a generally strong interrelationship throughout the monitoring period (**Figure F.4-1**). Flows contributed by the principal headwater tributaries Silver Bow Creek and Warm Springs Creek were largely responsible for what was present at the Clark Fork sites near Galen, at Gem Back Road and at Sager Lane from late July through early September. Between late August and early October, flows at the three Clark Fork sites downstream of Galen fluctuated significantly but generally mirrored one another, while the site near Galen displayed somewhat less variability.

Beginning on approximately October 1, a relatively sharp increase in the estimated flow contributed by Lost Creek appeared largely responsible for the corresponding jump seen in the Clark Fork at the Gem Back Road, Sager Lane and Deer Lodge sites. It is also apparent that additional sources contributed to estimated flows in the Clark Fork, particularly at farthest downstream site at Deer Lodge, but that the majority of estimated flow at both the Gem Back

Road and Sager Lane sites can be accounted for by summing the three tributaries included in **Figure F.4-1**. Irrigation withdrawals and returns also likely influenced flows in the Clark Fork, and in tributaries such as Lost Creek.

F.5.0 Future Monitoring

Continuous stage recorders and the stilling well/staff gauge assemblies were removed from the Gem Back Road and Sager Lane sites at the end of the monitoring period to protect them from damage or loss, but the fence post was left in place at both sites. As a protective measure, an additional "guard" post was driven about 5 feet upstream of each post to intercept or deflect waterborne debris. This should increase the likelihood that a post survives the spring spate, and permit re-establishment of staff gauges in the summer of 2012.

F.6.0 References

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Appendix F-1

MONITORING SITE SPECIFICATIONS AND STAFF GAUGE SURVEY DATA

Upper Clark Fork Flow Monitoring 2011

APPENDIX F-1

MONITORING SITE SPECIFICATIONS AND STAFF GAUGE SURVEY DATA

SITE ID	SITE NAME	LATITUDE	LONGITUDE	ELEVATION
CFR-F1	Clark Fork at Gem Back Road	46.2652N	112.7443W	4769’

RUGGEDTROLL SERIAL #	BAROTROLL SERIAL #	START DATE/TIME	END DATE / TIME	INITIAL GAGE HT.
181875	191134	7/26/2011 12:00	10/27/2011 12:00	2.44

SURVEYED ELEVATION, FEET:	AT STAFF GAUGE	AT BENCHMARK	DIFFERENCE	VERTICAL SHIFT
Deployment	12.18	4.48	7.70	NA
Recovery	13.05	5.35	7.70	0.00

SITE ID	SITE NAME	LATITUDE	LONGITUDE	ELEVATION
CFR-F2	Clark Fork at Sager Lane	46.3172N	112.7362W	4679’

RUGGEDTROLL SERIAL #	BAROTROLL SERIAL #	START DATE/TIME	END DATE / TIME	INITIAL GAGE HT.
181885	NA	7/26/2011 15:00	10/27/2011 13:00	1.95

SURVEYED ELEVATION, FEET:	AT STAFF GAUGE	AT BENCHMARK	DIFFERENCE	VERTICAL SHIFT
Deployment	14.94	5.28	9.66	NA
Recovery	15.19	5.52	9.67	0.01[1]

[1]measurement made under difficult, windy conditions

Appendix F-2

CONTINUOUS STAGE RECORDER HOURLY DATA

Upper Clark Fork Flow Monitoring 2011

Clark Fork at Gem Back Road (CFR-F1) continuous stage recorder hourly data. ***Elevation is in feet, adjusted to staff gauge (-2.30 feet)***

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
7/26/2011 12:00	2.481	7/29/2011 3:00	2.267	7/31/2011 18:00	2.093	8/3/2011 9:00	2.066	8/6/2011 0:00	2.077
7/26/2011 13:00	2.486	7/29/2011 4:00	2.259	7/31/2011 19:00	2.113	8/3/2011 10:00	2.059	8/6/2011 1:00	2.043
7/26/2011 14:00	2.474	7/29/2011 5:00	2.241	7/31/2011 20:00	2.091	8/3/2011 11:00	2.057	8/6/2011 2:00	2.022
7/26/2011 15:00	2.497	7/29/2011 6:00	2.267	7/31/2011 21:00	2.096	8/3/2011 12:00	2.072	8/6/2011 3:00	2.014
7/26/2011 16:00	2.469	7/29/2011 7:00	2.254	7/31/2011 22:00	2.088	8/3/2011 13:00	2.062	8/6/2011 4:00	2.038
7/26/2011 17:00	2.481	7/29/2011 8:00	2.237	7/31/2011 23:00	2.125	8/3/2011 14:00	2.098	8/6/2011 5:00	2.035
7/26/2011 18:00	2.484	7/29/2011 9:00	2.218	8/1/2011 0:00	2.111	8/3/2011 15:00	2.101	8/6/2011 6:00	2.051
7/26/2011 19:00	2.468	7/29/2011 10:00	2.218	8/1/2011 1:00	2.136	8/3/2011 16:00	2.095	8/6/2011 7:00	2.045
7/26/2011 20:00	2.446	7/29/2011 11:00	2.229	8/1/2011 2:00	2.112	8/3/2011 17:00	2.058	8/6/2011 8:00	2.027
7/26/2011 21:00	2.453	7/29/2011 12:00	2.249	8/1/2011 3:00	2.094	8/3/2011 18:00	2.049	8/6/2011 9:00	2.002
7/26/2011 22:00	2.422	7/29/2011 13:00	2.253	8/1/2011 4:00	2.110	8/3/2011 19:00	2.032	8/6/2011 10:00	2.007
7/26/2011 23:00	2.390	7/29/2011 14:00	2.255	8/1/2011 5:00	2.121	8/3/2011 20:00	2.048	8/6/2011 11:00	2.017
7/27/2011 0:00	2.391	7/29/2011 15:00	2.226	8/1/2011 6:00	2.138	8/3/2011 21:00	2.016	8/6/2011 12:00	2.027
7/27/2011 1:00	2.383	7/29/2011 16:00	2.246	8/1/2011 7:00	2.168	8/3/2011 22:00	2.045	8/6/2011 13:00	2.043
7/27/2011 2:00	2.391	7/29/2011 17:00	2.213	8/1/2011 8:00	2.148	8/3/2011 23:00	2.031	8/6/2011 14:00	2.029
7/27/2011 3:00	2.383	7/29/2011 18:00	2.226	8/1/2011 9:00	2.159	8/4/2011 0:00	2.033	8/6/2011 15:00	2.062
7/27/2011 4:00	2.392	7/29/2011 19:00	2.227	8/1/2011 10:00	2.154	8/4/2011 1:00	2.029	8/6/2011 16:00	2.053
7/27/2011 5:00	2.397	7/29/2011 20:00	2.226	8/1/2011 11:00	2.215	8/4/2011 2:00	2.037	8/6/2011 17:00	2.067
7/27/2011 6:00	2.396	7/29/2011 21:00	2.224	8/1/2011 12:00	2.200	8/4/2011 3:00	2.043	8/6/2011 18:00	2.089
7/27/2011 7:00	2.393	7/29/2011 22:00	2.180	8/1/2011 13:00	2.198	8/4/2011 4:00	2.021	8/6/2011 19:00	2.085
7/27/2011 8:00	2.381	7/29/2011 23:00	2.176	8/1/2011 14:00	2.193	8/4/2011 5:00	2.032	8/6/2011 20:00	2.073
7/27/2011 9:00	2.389	7/30/2011 0:00	2.189	8/1/2011 15:00	2.220	8/4/2011 6:00	2.033	8/6/2011 21:00	2.062
7/27/2011 10:00	2.392	7/30/2011 1:00	2.173	8/1/2011 16:00	2.234	8/4/2011 7:00	2.040	8/6/2011 22:00	2.040
7/27/2011 11:00	2.380	7/30/2011 2:00	2.172	8/1/2011 17:00	2.213	8/4/2011 8:00	2.022	8/6/2011 23:00	2.044
7/27/2011 12:00	2.409	7/30/2011 3:00	2.172	8/1/2011 18:00	2.247	8/4/2011 9:00	2.017	8/7/2011 0:00	2.055
7/27/2011 13:00	2.404	7/30/2011 4:00	2.183	8/1/2011 19:00	2.215	8/4/2011 10:00	2.028	8/7/2011 1:00	2.074
7/27/2011 14:00	2.414	7/30/2011 5:00	2.177	8/1/2011 20:00	2.201	8/4/2011 11:00	2.025	8/7/2011 2:00	2.101
7/27/2011 15:00	2.372	7/30/2011 6:00	2.194	8/1/2011 21:00	2.232	8/4/2011 12:00	2.041	8/7/2011 3:00	2.104
7/27/2011 16:00	2.442	7/30/2011 7:00	2.165	8/1/2011 22:00	2.227	8/4/2011 13:00	2.028	8/7/2011 4:00	2.116
7/27/2011 17:00	2.484	7/30/2011 8:00	2.160	8/1/2011 23:00	2.227	8/4/2011 14:00	2.038	8/7/2011 5:00	2.136
7/27/2011 18:00	2.453	7/30/2011 9:00	2.136	8/2/2011 0:00	2.227	8/4/2011 15:00	2.056	8/7/2011 6:00	2.117
7/27/2011 19:00	2.430	7/30/2011 10:00	2.165	8/2/2011 1:00	2.216	8/4/2011 16:00	2.034	8/7/2011 7:00	2.135
7/27/2011 20:00	2.410	7/30/2011 11:00	2.156	8/2/2011 2:00	2.221	8/4/2011 17:00	2.040	8/7/2011 8:00	2.130
7/27/2011 21:00	2.383	7/30/2011 12:00	2.152	8/2/2011 3:00	2.211	8/4/2011 18:00	2.042	8/7/2011 9:00	2.121
7/27/2011 22:00	2.367	7/30/2011 13:00	2.154	8/2/2011 4:00	2.188	8/4/2011 19:00	2.049	8/7/2011 10:00	2.111
7/27/2011 23:00	2.375	7/30/2011 14:00	2.181	8/2/2011 5:00	2.170	8/4/2011 20:00	2.041	8/7/2011 11:00	2.133
7/28/2011 0:00	2.356	7/30/2011 15:00	2.164	8/2/2011 6:00	2.179	8/4/2011 21:00	2.032	8/7/2011 12:00	2.117
7/28/2011 1:00	2.341	7/30/2011 16:00	2.165	8/2/2011 7:00	2.180	8/4/2011 22:00	2.051	8/7/2011 13:00	2.099
7/28/2011 2:00	2.375	7/30/2011 17:00	2.166	8/2/2011 8:00	2.163	8/4/2011 23:00	2.025	8/7/2011 14:00	2.128
7/28/2011 3:00	2.366	7/30/2011 18:00	2.163	8/2/2011 9:00	2.170	8/5/2011 0:00	2.038	8/7/2011 15:00	2.099
7/28/2011 4:00	2.331	7/30/2011 19:00	2.160	8/2/2011 10:00	2.151	8/5/2011 1:00	2.035	8/7/2011 16:00	2.123
7/28/2011 5:00	2.351	7/30/2011 20:00	2.138	8/2/2011 11:00	2.157	8/5/2011 2:00	2.017	8/7/2011 17:00	2.092
7/28/2011 6:00	2.360	7/30/2011 21:00	2.079	8/2/2011 12:00	2.161	8/5/2011 3:00	2.037	8/7/2011 18:00	2.067
7/28/2011 7:00	2.349	7/30/2011 22:00	2.110	8/2/2011 13:00	2.175	8/5/2011 4:00	2.029	8/7/2011 19:00	2.081
7/28/2011 8:00	2.327	7/30/2011 23:00	2.098	8/2/2011 14:00	2.164	8/5/2011 5:00	2.020	8/7/2011 20:00	2.062
7/28/2011 9:00	2.310	7/31/2011 0:00	2.094	8/2/2011 15:00	2.160	8/5/2011 6:00	2.028	8/7/2011 21:00	2.058
7/28/2011 10:00	2.327	7/31/2011 1:00	2.085	8/2/2011 16:00	2.142	8/5/2011 7:00	2.033	8/7/2011 22:00	2.059
7/28/2011 11:00	2.322	7/31/2011 2:00	2.100	8/2/2011 17:00	2.146	8/5/2011 8:00	2.034	8/7/2011 23:00	2.060
7/28/2011 12:00	2.334	7/31/2011 3:00	2.093	8/2/2011 18:00	2.157	8/5/2011 9:00	2.021	8/8/2011 0:00	2.049
7/28/2011 13:00	2.325	7/31/2011 4:00	2.091	8/2/2011 19:00	2.163	8/5/2011 10:00	2.013	8/8/2011 1:00	2.054
7/28/2011 14:00	2.314	7/31/2011 5:00	2.096	8/2/2011 20:00	2.147	8/5/2011 11:00	2.039	8/8/2011 2:00	2.046
7/28/2011 15:00	2.327	7/31/2011 6:00	2.091	8/2/2011 21:00	2.130	8/5/2011 12:00	2.046	8/8/2011 3:00	2.034
7/28/2011 16:00	2.323	7/31/2011 7:00	2.075	8/2/2011 22:00	2.172	8/5/2011 13:00	2.045	8/8/2011 4:00	2.027
7/28/2011 17:00	2.347	7/31/2011 8:00	2.060	8/2/2011 23:00	2.108	8/5/2011 14:00	2.026	8/8/2011 5:00	2.037
7/28/2011 18:00	2.287	7/31/2011 9:00	2.075	8/3/2011 0:00	2.070	8/5/2011 15:00	2.046	8/8/2011 6:00	2.033
7/28/2011 19:00	2.327	7/31/2011 10:00	2.085	8/3/2011 1:00	2.071	8/5/2011 16:00	2.035	8/8/2011 7:00	2.027
7/28/2011 20:00	2.284	7/31/2011 11:00	2.091	8/3/2011 2:00	2.070	8/5/2011 17:00	2.043	8/8/2011 8:00	2.026
7/28/2011 21:00	2.282	7/31/2011 12:00	2.094	8/3/2011 3:00	2.063	8/5/2011 18:00	2.048	8/8/2011 9:00	2.011
7/28/2011 22:00	2.272	7/31/2011 13:00	2.092	8/3/2011 4:00	2.071	8/5/2011 19:00	2.040	8/8/2011 10:00	2.008
7/28/2011 23:00	2.298	7/31/2011 14:00	2.070	8/3/2011 5:00	2.077	8/5/2011 20:00	2.052	8/8/2011 11:00	2.034
7/29/2011 0:00	2.255	7/31/2011 15:00	2.084	8/3/2011 6:00	2.070	8/5/2011 21:00	2.054	8/8/2011 12:00	2.037
7/29/2011 1:00	2.264	7/31/2011 16:00	2.135	8/3/2011 7:00	2.086	8/5/2011 22:00	2.049	8/8/2011 13:00	2.039
7/29/2011 2:00	2.284	7/31/2011 17:00	2.104	8/3/2011 8:00	2.055	8/5/2011 23:00	2.054	8/8/2011 14:00	2.045

Clark Fork at Gem Back Road (CFR-F1) (continued)

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
8/8/2011 15:00	2.005	8/11/2011 3:00	1.922	8/13/2011 15:00	1.890	8/16/2011 3:00	1.830	8/18/2011 15:00	1.732
8/8/2011 16:00	1.984	8/11/2011 4:00	1.920	8/13/2011 16:00	1.866	8/16/2011 4:00	1.836	8/18/2011 16:00	1.697
8/8/2011 17:00	2.037	8/11/2011 5:00	1.938	8/13/2011 17:00	1.860	8/16/2011 5:00	1.842	8/18/2011 17:00	1.713
8/8/2011 18:00	2.024	8/11/2011 6:00	1.917	8/13/2011 18:00	1.873	8/16/2011 6:00	1.836	8/18/2011 18:00	1.729
8/8/2011 19:00	1.992	8/11/2011 7:00	1.921	8/13/2011 19:00	1.883	8/16/2011 7:00	1.864	8/18/2011 19:00	1.694
8/8/2011 20:00	1.982	8/11/2011 8:00	1.930	8/13/2011 20:00	1.833	8/16/2011 8:00	1.827	8/18/2011 20:00	1.707
8/8/2011 21:00	1.999	8/11/2011 9:00	1.913	8/13/2011 21:00	1.889	8/16/2011 9:00	1.835	8/18/2011 21:00	1.705
8/8/2011 22:00	2.018	8/11/2011 10:00	1.904	8/13/2011 22:00	1.899	8/16/2011 10:00	1.832	8/18/2011 22:00	1.698
8/8/2011 23:00	1.987	8/11/2011 11:00	1.944	8/13/2011 23:00	1.855	8/16/2011 11:00	1.831	8/18/2011 23:00	1.689
8/9/2011 0:00	1.978	8/11/2011 12:00	1.938	8/14/2011 0:00	1.844	8/16/2011 12:00	1.839	8/19/2011 0:00	1.692
8/9/2011 1:00	1.999	8/11/2011 13:00	1.944	8/14/2011 1:00	1.837	8/16/2011 13:00	1.820	8/19/2011 1:00	1.688
8/9/2011 2:00	1.982	8/11/2011 14:00	1.951	8/14/2011 2:00	1.856	8/16/2011 14:00	1.836	8/19/2011 2:00	1.689
8/9/2011 3:00	1.988	8/11/2011 15:00	1.931	8/14/2011 3:00	1.821	8/16/2011 15:00	1.818	8/19/2011 3:00	1.700
8/9/2011 4:00	1.972	8/11/2011 16:00	1.934	8/14/2011 4:00	1.835	8/16/2011 16:00	1.795	8/19/2011 4:00	1.697
8/9/2011 5:00	1.985	8/11/2011 17:00	1.923	8/14/2011 5:00	1.841	8/16/2011 17:00	1.820	8/19/2011 5:00	1.688
8/9/2011 6:00	1.977	8/11/2011 18:00	1.950	8/14/2011 6:00	1.835	8/16/2011 18:00	1.817	8/19/2011 6:00	1.698
8/9/2011 7:00	1.977	8/11/2011 19:00	1.924	8/14/2011 7:00	1.844	8/16/2011 19:00	1.826	8/19/2011 7:00	1.704
8/9/2011 8:00	1.950	8/11/2011 20:00	1.923	8/14/2011 8:00	1.819	8/16/2011 20:00	1.797	8/19/2011 8:00	1.673
8/9/2011 9:00	1.943	8/11/2011 21:00	1.918	8/14/2011 9:00	1.800	8/16/2011 21:00	1.793	8/19/2011 9:00	1.682
8/9/2011 10:00	1.956	8/11/2011 22:00	1.923	8/14/2011 10:00	1.806	8/16/2011 22:00	1.780	8/19/2011 10:00	1.691
8/9/2011 11:00	1.952	8/11/2011 23:00	1.903	8/14/2011 11:00	1.809	8/16/2011 23:00	1.788	8/19/2011 11:00	1.672
8/9/2011 12:00	1.979	8/12/2011 0:00	1.904	8/14/2011 12:00	1.833	8/17/2011 0:00	1.793	8/19/2011 12:00	1.700
8/9/2011 13:00	1.959	8/12/2011 1:00	1.894	8/14/2011 13:00	1.812	8/17/2011 1:00	1.787	8/19/2011 13:00	1.709
8/9/2011 14:00	1.963	8/12/2011 2:00	1.897	8/14/2011 14:00	1.824	8/17/2011 2:00	1.794	8/19/2011 14:00	1.705
8/9/2011 15:00	2.009	8/12/2011 3:00	1.899	8/14/2011 15:00	1.816	8/17/2011 3:00	1.774	8/19/2011 15:00	1.696
8/9/2011 16:00	1.967	8/12/2011 4:00	1.900	8/14/2011 16:00	1.792	8/17/2011 4:00	1.763	8/19/2011 16:00	1.718
8/9/2011 17:00	1.950	8/12/2011 5:00	1.898	8/14/2011 17:00	1.819	8/17/2011 5:00	1.789	8/19/2011 17:00	1.700
8/9/2011 18:00	1.959	8/12/2011 6:00	1.921	8/14/2011 18:00	1.858	8/17/2011 6:00	1.783	8/19/2011 18:00	1.711
8/9/2011 19:00	1.967	8/12/2011 7:00	1.904	8/14/2011 19:00	1.800	8/17/2011 7:00	1.782	8/19/2011 19:00	1.721
8/9/2011 20:00	1.961	8/12/2011 8:00	1.883	8/14/2011 20:00	1.798	8/17/2011 8:00	1.767	8/19/2011 20:00	1.693
8/9/2011 21:00	1.965	8/12/2011 9:00	1.876	8/14/2011 21:00	1.826	8/17/2011 9:00	1.747	8/19/2011 21:00	1.689
8/9/2011 22:00	1.955	8/12/2011 10:00	1.878	8/14/2011 22:00	1.821	8/17/2011 10:00	1.748	8/19/2011 22:00	1.690
8/9/2011 23:00	1.946	8/12/2011 11:00	1.873	8/14/2011 23:00	1.798	8/17/2011 11:00	1.758	8/19/2011 23:00	1.679
8/10/2011 0:00	1.966	8/12/2011 12:00	1.894	8/15/2011 0:00	1.804	8/17/2011 12:00	1.761	8/20/2011 0:00	1.678
8/10/2011 1:00	1.940	8/12/2011 13:00	1.895	8/15/2011 1:00	1.786	8/17/2011 13:00	1.761	8/20/2011 1:00	1.666
8/10/2011 2:00	1.975	8/12/2011 14:00	1.910	8/15/2011 2:00	1.784	8/17/2011 14:00	1.770	8/20/2011 2:00	1.683
8/10/2011 3:00	1.961	8/12/2011 15:00	1.896	8/15/2011 3:00	1.776	8/17/2011 15:00	1.769	8/20/2011 3:00	1.666
8/10/2011 4:00	1.952	8/12/2011 16:00	1.875	8/15/2011 4:00	1.756	8/17/2011 16:00	1.755	8/20/2011 4:00	1.671
8/10/2011 5:00	1.960	8/12/2011 17:00	1.872	8/15/2011 5:00	1.772	8/17/2011 17:00	1.773	8/20/2011 5:00	1.669
8/10/2011 6:00	1.948	8/12/2011 18:00	1.897	8/15/2011 6:00	1.791	8/17/2011 18:00	1.769	8/20/2011 6:00	1.700
8/10/2011 7:00	1.963	8/12/2011 19:00	1.910	8/15/2011 7:00	1.785	8/17/2011 19:00	1.744	8/20/2011 7:00	1.682
8/10/2011 8:00	1.917	8/12/2011 20:00	1.875	8/15/2011 8:00	1.779	8/17/2011 20:00	1.746	8/20/2011 8:00	1.657
8/10/2011 9:00	1.926	8/12/2011 21:00	1.853	8/15/2011 9:00	1.757	8/17/2011 21:00	1.741	8/20/2011 9:00	1.678
8/10/2011 10:00	1.927	8/12/2011 22:00	1.851	8/15/2011 10:00	1.778	8/17/2011 22:00	1.751	8/20/2011 10:00	1.669
8/10/2011 11:00	1.945	8/12/2011 23:00	1.845	8/15/2011 11:00	1.764	8/17/2011 23:00	1.731	8/20/2011 11:00	1.668
8/10/2011 12:00	1.940	8/13/2011 0:00	1.862	8/15/2011 12:00	1.766	8/18/2011 0:00	1.740	8/20/2011 12:00	1.683
8/10/2011 13:00	1.948	8/13/2011 1:00	1.842	8/15/2011 13:00	1.800	8/18/2011 1:00	1.732	8/20/2011 13:00	1.698
8/10/2011 14:00	1.952	8/13/2011 2:00	1.866	8/15/2011 14:00	1.794	8/18/2011 2:00	1.737	8/20/2011 14:00	1.689
8/10/2011 15:00	1.934	8/13/2011 3:00	1.847	8/15/2011 15:00	1.776	8/18/2011 3:00	1.746	8/20/2011 15:00	1.684
8/10/2011 16:00	1.949	8/13/2011 4:00	1.870	8/15/2011 16:00	1.824	8/18/2011 4:00	1.759	8/20/2011 16:00	1.636
8/10/2011 17:00	1.954	8/13/2011 5:00	1.851	8/15/2011 17:00	1.736	8/18/2011 5:00	1.779	8/20/2011 17:00	1.668
8/10/2011 18:00	1.963	8/13/2011 6:00	1.870	8/15/2011 18:00	1.790	8/18/2011 6:00	1.767	8/20/2011 18:00	1.676
8/10/2011 19:00	1.928	8/13/2011 7:00	1.863	8/15/2011 19:00	1.836	8/18/2011 7:00	1.756	8/20/2011 19:00	1.692
8/10/2011 20:00	1.913	8/13/2011 8:00	1.844	8/15/2011 20:00	1.875	8/18/2011 8:00	1.734	8/20/2011 20:00	1.674
8/10/2011 21:00	1.928	8/13/2011 9:00	1.836	8/15/2011 21:00	1.872	8/18/2011 9:00	1.730	8/20/2011 21:00	1.685
8/10/2011 22:00	1.916	8/13/2011 10:00	1.857	8/15/2011 22:00	1.846	8/18/2011 10:00	1.736	8/20/2011 22:00	1.675
8/10/2011 23:00	1.931	8/13/2011 11:00	1.866	8/15/2011 23:00	1.842	8/18/2011 11:00	1.739	8/20/2011 23:00	1.680
8/11/2011 0:00	1.900	8/13/2011 12:00	1.866	8/16/2011 0:00	1.846	8/18/2011 12:00	1.738	8/21/2011 0:00	1.673
8/11/2011 1:00	1.917	8/13/2011 13:00	1.857	8/16/2011 1:00	1.856	8/18/2011 13:00	1.759	8/21/2011 1:00	1.663
8/11/2011 2:00	1.906	8/13/2011 14:00	1.827	8/16/2011 2:00	1.853	8/18/2011 14:00	1.740	8/21/2011 2:00	1.652

Clark Fork at Gem Back Road (CFR-F1) (continued)

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
8/21/2011 3:00	1.645	8/23/2011 15:00	1.624	8/26/2011 3:00	1.694	8/28/2011 15:00	1.640	8/31/2011 3:00	1.675
8/21/2011 4:00	1.665	8/23/2011 16:00	1.617	8/26/2011 4:00	1.675	8/28/2011 16:00	1.593	8/31/2011 4:00	1.683
8/21/2011 5:00	1.662	8/23/2011 17:00	1.630	8/26/2011 5:00	1.683	8/28/2011 17:00	1.606	8/31/2011 5:00	1.689
8/21/2011 6:00	1.659	8/23/2011 18:00	1.602	8/26/2011 6:00	1.689	8/28/2011 18:00	1.627	8/31/2011 6:00	1.699
8/21/2011 7:00	1.662	8/23/2011 19:00	1.607	8/26/2011 7:00	1.702	8/28/2011 19:00	1.630	8/31/2011 7:00	1.722
8/21/2011 8:00	1.663	8/23/2011 20:00	1.632	8/26/2011 8:00	1.689	8/28/2011 20:00	1.614	8/31/2011 8:00	1.700
8/21/2011 9:00	1.655	8/23/2011 21:00	1.620	8/26/2011 9:00	1.672	8/28/2011 21:00	1.666	8/31/2011 9:00	1.668
8/21/2011 10:00	1.660	8/23/2011 22:00	1.581	8/26/2011 10:00	1.672	8/28/2011 22:00	1.653	8/31/2011 10:00	1.691
8/21/2011 11:00	1.648	8/23/2011 23:00	1.628	8/26/2011 11:00	1.683	8/28/2011 23:00	1.638	8/31/2011 11:00	1.678
8/21/2011 12:00	1.661	8/24/2011 0:00	1.604	8/26/2011 12:00	1.674	8/29/2011 0:00	1.625	8/31/2011 12:00	1.686
8/21/2011 13:00	1.664	8/24/2011 1:00	1.600	8/26/2011 13:00	1.685	8/29/2011 1:00	1.629	8/31/2011 13:00	1.698
8/21/2011 14:00	1.644	8/24/2011 2:00	1.616	8/26/2011 14:00	1.679	8/29/2011 2:00	1.597	8/31/2011 14:00	1.705
8/21/2011 15:00	1.656	8/24/2011 3:00	1.621	8/26/2011 15:00	1.654	8/29/2011 3:00	1.618	8/31/2011 15:00	1.698
8/21/2011 16:00	1.671	8/24/2011 4:00	1.614	8/26/2011 16:00	1.682	8/29/2011 4:00	1.633	8/31/2011 16:00	1.698
8/21/2011 17:00	1.657	8/24/2011 5:00	1.614	8/26/2011 17:00	1.675	8/29/2011 5:00	1.631	8/31/2011 17:00	1.701
8/21/2011 18:00	1.654	8/24/2011 6:00	1.617	8/26/2011 18:00	1.670	8/29/2011 6:00	1.642	8/31/2011 18:00	1.712
8/21/2011 19:00	1.657	8/24/2011 7:00	1.601	8/26/2011 19:00	1.676	8/29/2011 7:00	1.661	8/31/2011 19:00	1.715
8/21/2011 20:00	1.659	8/24/2011 8:00	1.590	8/26/2011 20:00	1.681	8/29/2011 8:00	1.627	8/31/2011 20:00	1.709
8/21/2011 21:00	1.675	8/24/2011 9:00	1.601	8/26/2011 21:00	1.663	8/29/2011 9:00	1.632	8/31/2011 21:00	1.698
8/21/2011 22:00	1.676	8/24/2011 10:00	1.576	8/26/2011 22:00	1.695	8/29/2011 10:00	1.638	8/31/2011 22:00	1.698
8/21/2011 23:00	1.649	8/24/2011 11:00	1.585	8/26/2011 23:00	1.669	8/29/2011 11:00	1.631	8/31/2011 23:00	1.700
8/22/2011 0:00	1.653	8/24/2011 12:00	1.608	8/27/2011 0:00	1.654	8/29/2011 12:00	1.630	9/1/2011 0:00	1.692
8/22/2011 1:00	1.649	8/24/2011 13:00	1.606	8/27/2011 1:00	1.640	8/29/2011 13:00	1.624	9/1/2011 1:00	1.691
8/22/2011 2:00	1.624	8/24/2011 14:00	1.610	8/27/2011 2:00	1.652	8/29/2011 14:00	1.641	9/1/2011 2:00	1.717
8/22/2011 3:00	1.646	8/24/2011 15:00	1.610	8/27/2011 3:00	1.668	8/29/2011 15:00	1.625	9/1/2011 3:00	1.714
8/22/2011 4:00	1.637	8/24/2011 16:00	1.617	8/27/2011 4:00	1.673	8/29/2011 16:00	1.626	9/1/2011 4:00	1.725
8/22/2011 5:00	1.648	8/24/2011 17:00	1.609	8/27/2011 5:00	1.663	8/29/2011 17:00	1.608	9/1/2011 5:00	1.726
8/22/2011 6:00	1.654	8/24/2011 18:00	1.596	8/27/2011 6:00	1.680	8/29/2011 18:00	1.559	9/1/2011 6:00	1.720
8/22/2011 7:00	1.648	8/24/2011 19:00	1.604	8/27/2011 7:00	1.674	8/29/2011 19:00	1.576	9/1/2011 7:00	1.723
8/22/2011 8:00	1.659	8/24/2011 20:00	1.603	8/27/2011 8:00	1.684	8/29/2011 20:00	1.633	9/1/2011 8:00	1.712
8/22/2011 9:00	1.645	8/24/2011 21:00	1.624	8/27/2011 9:00	1.650	8/29/2011 21:00	1.643	9/1/2011 9:00	1.715
8/22/2011 10:00	1.638	8/24/2011 22:00	1.584	8/27/2011 10:00	1.650	8/29/2011 22:00	1.655	9/1/2011 10:00	1.725
8/22/2011 11:00	1.627	8/24/2011 23:00	1.605	8/27/2011 11:00	1.634	8/29/2011 23:00	1.654	9/1/2011 11:00	1.723
8/22/2011 12:00	1.624	8/25/2011 0:00	1.611	8/27/2011 12:00	1.651	8/30/2011 0:00	1.663	9/1/2011 12:00	1.718
8/22/2011 13:00	1.618	8/25/2011 1:00	1.611	8/27/2011 13:00	1.681	8/30/2011 1:00	1.660	9/1/2011 13:00	1.722
8/22/2011 14:00	1.659	8/25/2011 2:00	1.611	8/27/2011 14:00	1.652	8/30/2011 2:00	1.652	9/1/2011 14:00	1.744
8/22/2011 15:00	1.657	8/25/2011 3:00	1.594	8/27/2011 15:00	1.650	8/30/2011 3:00	1.673	9/1/2011 15:00	1.718
8/22/2011 16:00	1.634	8/25/2011 4:00	1.619	8/27/2011 16:00	1.669	8/30/2011 4:00	1.669	9/1/2011 16:00	1.710
8/22/2011 17:00	1.625	8/25/2011 5:00	1.600	8/27/2011 17:00	1.653	8/30/2011 5:00	1.668	9/1/2011 17:00	1.722
8/22/2011 18:00	1.601	8/25/2011 6:00	1.607	8/27/2011 18:00	1.665	8/30/2011 6:00	1.662	9/1/2011 18:00	1.724
8/22/2011 19:00	1.617	8/25/2011 7:00	1.612	8/27/2011 19:00	1.643	8/30/2011 7:00	1.655	9/1/2011 19:00	1.707
8/22/2011 20:00	1.623	8/25/2011 8:00	1.616	8/27/2011 20:00	1.662	8/30/2011 8:00	1.663	9/1/2011 20:00	1.713
8/22/2011 21:00	1.587	8/25/2011 9:00	1.639	8/27/2011 21:00	1.655	8/30/2011 9:00	1.637	9/1/2011 21:00	1.723
8/22/2011 22:00	1.607	8/25/2011 10:00	1.593	8/27/2011 22:00	1.633	8/30/2011 10:00	1.646	9/1/2011 22:00	1.718
8/22/2011 23:00	1.604	8/25/2011 11:00	1.604	8/27/2011 23:00	1.607	8/30/2011 11:00	1.655	9/1/2011 23:00	1.717
8/23/2011 0:00	1.583	8/25/2011 12:00	1.611	8/28/2011 0:00	1.605	8/30/2011 12:00	1.660	9/2/2011 0:00	1.713
8/23/2011 1:00	1.590	8/25/2011 13:00	1.599	8/28/2011 1:00	1.626	8/30/2011 13:00	1.669	9/2/2011 1:00	1.710
8/23/2011 2:00	1.616	8/25/2011 14:00	1.631	8/28/2011 2:00	1.620	8/30/2011 14:00	1.654	9/2/2011 2:00	1.716
8/23/2011 3:00	1.605	8/25/2011 15:00	1.643	8/28/2011 3:00	1.623	8/30/2011 15:00	1.630	9/2/2011 3:00	1.719
8/23/2011 4:00	1.616	8/25/2011 16:00	1.631	8/28/2011 4:00	1.624	8/30/2011 16:00	1.650	9/2/2011 4:00	1.722
8/23/2011 5:00	1.615	8/25/2011 17:00	1.645	8/28/2011 5:00	1.610	8/30/2011 17:00	1.674	9/2/2011 5:00	1.704
8/23/2011 6:00	1.615	8/25/2011 18:00	1.628	8/28/2011 6:00	1.634	8/30/2011 18:00	1.656	9/2/2011 6:00	1.694
8/23/2011 7:00	1.611	8/25/2011 19:00	1.627	8/28/2011 7:00	1.618	8/30/2011 19:00	1.658	9/2/2011 7:00	1.710
8/23/2011 8:00	1.632	8/25/2011 20:00	1.711	8/28/2011 8:00	1.616	8/30/2011 20:00	1.637	9/2/2011 8:00	1.706
8/23/2011 9:00	1.609	8/25/2011 21:00	1.652	8/28/2011 9:00	1.618	8/30/2011 21:00	1.632	9/2/2011 9:00	1.720
8/23/2011 10:00	1.584	8/25/2011 22:00	1.637	8/28/2011 10:00	1.619	8/30/2011 22:00	1.644	9/2/2011 10:00	1.709
8/23/2011 11:00	1.614	8/25/2011 23:00	1.669	8/28/2011 11:00	1.619	8/30/2011 23:00	1.653	9/2/2011 11:00	1.725
8/23/2011 12:00	1.624	8/26/2011 0:00	1.666	8/28/2011 12:00	1.599	8/31/2011 0:00	1.662	9/2/2011 12:00	1.739
8/23/2011 13:00	1.613	8/26/2011 1:00	1.680	8/28/2011 13:00	1.635	8/31/2011 1:00	1.664	9/2/2011 13:00	1.709
8/23/2011 14:00	1.644	8/26/2011 2:00	1.705	8/28/2011 14:00	1.630	8/31/2011 2:00	1.663	9/2/2011 14:00	1.723

Clark Fork at Gem Back Road (CFR-F1) (continued)

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
9/2/2011 15:00	1.718	9/5/2011 3:00	1.679	9/7/2011 15:00	1.627	9/10/2011 3:00	1.639	9/12/2011 15:00	1.608
9/2/2011 16:00	1.693	9/5/2011 4:00	1.678	9/7/2011 16:00	1.607	9/10/2011 4:00	1.614	9/12/2011 16:00	1.609
9/2/2011 17:00	1.668	9/5/2011 5:00	1.702	9/7/2011 17:00	1.645	9/10/2011 5:00	1.641	9/12/2011 17:00	1.605
9/2/2011 18:00	1.689	9/5/2011 6:00	1.672	9/7/2011 18:00	1.616	9/10/2011 6:00	1.621	9/12/2011 18:00	1.610
9/2/2011 19:00	1.679	9/5/2011 7:00	1.695	9/7/2011 19:00	1.641	9/10/2011 7:00	1.642	9/12/2011 19:00	1.617
9/2/2011 20:00	1.669	9/5/2011 8:00	1.687	9/7/2011 20:00	1.624	9/10/2011 8:00	1.649	9/12/2011 20:00	1.621
9/2/2011 21:00	1.680	9/5/2011 9:00	1.683	9/7/2011 21:00	1.638	9/10/2011 9:00	1.610	9/12/2011 21:00	1.613
9/2/2011 22:00	1.677	9/5/2011 10:00	1.653	9/7/2011 22:00	1.630	9/10/2011 10:00	1.602	9/12/2011 22:00	1.636
9/2/2011 23:00	1.690	9/5/2011 11:00	1.649	9/7/2011 23:00	1.629	9/10/2011 11:00	1.613	9/12/2011 23:00	1.652
9/3/2011 0:00	1.677	9/5/2011 12:00	1.663	9/8/2011 0:00	1.629	9/10/2011 12:00	1.623	9/13/2011 0:00	1.653
9/3/2011 1:00	1.685	9/5/2011 13:00	1.654	9/8/2011 1:00	1.625	9/10/2011 13:00	1.581	9/13/2011 1:00	1.638
9/3/2011 2:00	1.706	9/5/2011 14:00	1.652	9/8/2011 2:00	1.631	9/10/2011 14:00	1.625	9/13/2011 2:00	1.662
9/3/2011 3:00	1.695	9/5/2011 15:00	1.661	9/8/2011 3:00	1.617	9/10/2011 15:00	1.626	9/13/2011 3:00	1.653
9/3/2011 4:00	1.691	9/5/2011 16:00	1.652	9/8/2011 4:00	1.640	9/10/2011 16:00	1.632	9/13/2011 4:00	1.642
9/3/2011 5:00	1.682	9/5/2011 17:00	1.646	9/8/2011 5:00	1.638	9/10/2011 17:00	1.616	9/13/2011 5:00	1.648
9/3/2011 6:00	1.697	9/5/2011 18:00	1.669	9/8/2011 6:00	1.644	9/10/2011 18:00	1.631	9/13/2011 6:00	1.663
9/3/2011 7:00	1.705	9/5/2011 19:00	1.653	9/8/2011 7:00	1.637	9/10/2011 19:00	1.654	9/13/2011 7:00	1.653
9/3/2011 8:00	1.681	9/5/2011 20:00	1.684	9/8/2011 8:00	1.632	9/10/2011 20:00	1.654	9/13/2011 8:00	1.646
9/3/2011 9:00	1.674	9/5/2011 21:00	1.661	9/8/2011 9:00	1.616	9/10/2011 21:00	1.639	9/13/2011 9:00	1.632
9/3/2011 10:00	1.671	9/5/2011 22:00	1.654	9/8/2011 10:00	1.618	9/10/2011 22:00	1.641	9/13/2011 10:00	1.627
9/3/2011 11:00	1.657	9/5/2011 23:00	1.665	9/8/2011 11:00	1.619	9/10/2011 23:00	1.625	9/13/2011 11:00	1.624
9/3/2011 12:00	1.660	9/6/2011 0:00	1.666	9/8/2011 12:00	1.641	9/11/2011 0:00	1.623	9/13/2011 12:00	1.624
9/3/2011 13:00	1.679	9/6/2011 1:00	1.669	9/8/2011 13:00	1.611	9/11/2011 1:00	1.627	9/13/2011 13:00	1.639
9/3/2011 14:00	1.697	9/6/2011 2:00	1.666	9/8/2011 14:00	1.645	9/11/2011 2:00	1.647	9/13/2011 14:00	1.620
9/3/2011 15:00	1.702	9/6/2011 3:00	1.658	9/8/2011 15:00	1.641	9/11/2011 3:00	1.636	9/13/2011 15:00	1.655
9/3/2011 16:00	1.689	9/6/2011 4:00	1.668	9/8/2011 16:00	1.630	9/11/2011 4:00	1.635	9/13/2011 16:00	1.644
9/3/2011 17:00	1.686	9/6/2011 5:00	1.674	9/8/2011 17:00	1.637	9/11/2011 5:00	1.627	9/13/2011 17:00	1.650
9/3/2011 18:00	1.675	9/6/2011 6:00	1.667	9/8/2011 18:00	1.657	9/11/2011 6:00	1.647	9/13/2011 18:00	1.633
9/3/2011 19:00	1.695	9/6/2011 7:00	1.668	9/8/2011 19:00	1.642	9/11/2011 7:00	1.637	9/13/2011 19:00	1.653
9/3/2011 20:00	1.707	9/6/2011 8:00	1.657	9/8/2011 20:00	1.653	9/11/2011 8:00	1.634	9/13/2011 20:00	1.664
9/3/2011 21:00	1.692	9/6/2011 9:00	1.645	9/8/2011 21:00	1.624	9/11/2011 9:00	1.603	9/13/2011 21:00	1.647
9/3/2011 22:00	1.698	9/6/2011 10:00	1.642	9/8/2011 22:00	1.629	9/11/2011 10:00	1.605	9/13/2011 22:00	1.646
9/3/2011 23:00	1.702	9/6/2011 11:00	1.644	9/8/2011 23:00	1.620	9/11/2011 11:00	1.599	9/13/2011 23:00	1.637
9/4/2011 0:00	1.693	9/6/2011 12:00	1.645	9/9/2011 0:00	1.623	9/11/2011 12:00	1.622	9/14/2011 0:00	1.652
9/4/2011 1:00	1.688	9/6/2011 13:00	1.659	9/9/2011 1:00	1.608	9/11/2011 13:00	1.622	9/14/2011 1:00	1.631
9/4/2011 2:00	1.708	9/6/2011 14:00	1.640	9/9/2011 2:00	1.622	9/11/2011 14:00	1.634	9/14/2011 2:00	1.649
9/4/2011 3:00	1.714	9/6/2011 15:00	1.669	9/9/2011 3:00	1.638	9/11/2011 15:00	1.603	9/14/2011 3:00	1.638
9/4/2011 4:00	1.702	9/6/2011 16:00	1.640	9/9/2011 4:00	1.640	9/11/2011 16:00	1.627	9/14/2011 4:00	1.653
9/4/2011 5:00	1.683	9/6/2011 17:00	1.639	9/9/2011 5:00	1.637	9/11/2011 17:00	1.613	9/14/2011 5:00	1.628
9/4/2011 6:00	1.701	9/6/2011 18:00	1.662	9/9/2011 6:00	1.638	9/11/2011 18:00	1.628	9/14/2011 6:00	1.643
9/4/2011 7:00	1.708	9/6/2011 19:00	1.644	9/9/2011 7:00	1.645	9/11/2011 19:00	1.607	9/14/2011 7:00	1.650
9/4/2011 8:00	1.705	9/6/2011 20:00	1.674	9/9/2011 8:00	1.660	9/11/2011 20:00	1.647	9/14/2011 8:00	1.650
9/4/2011 9:00	1.667	9/6/2011 21:00	1.659	9/9/2011 9:00	1.607	9/11/2011 21:00	1.639	9/14/2011 9:00	1.650
9/4/2011 10:00	1.678	9/6/2011 22:00	1.646	9/9/2011 10:00	1.616	9/11/2011 22:00	1.644	9/14/2011 10:00	1.637
9/4/2011 11:00	1.702	9/6/2011 23:00	1.648	9/9/2011 11:00	1.627	9/11/2011 23:00	1.618	9/14/2011 11:00	1.629
9/4/2011 12:00	1.673	9/7/2011 0:00	1.633	9/9/2011 12:00	1.629	9/12/2011 0:00	1.625	9/14/2011 12:00	1.637
9/4/2011 13:00	1.659	9/7/2011 1:00	1.635	9/9/2011 13:00	1.631	9/12/2011 1:00	1.621	9/14/2011 13:00	1.626
9/4/2011 14:00	1.689	9/7/2011 2:00	1.642	9/9/2011 14:00	1.648	9/12/2011 2:00	1.624	9/14/2011 14:00	1.656
9/4/2011 15:00	1.665	9/7/2011 3:00	1.654	9/9/2011 15:00	1.627	9/12/2011 3:00	1.623	9/14/2011 15:00	1.649
9/4/2011 16:00	1.663	9/7/2011 4:00	1.636	9/9/2011 16:00	1.597	9/12/2011 4:00	1.622	9/14/2011 16:00	1.653
9/4/2011 17:00	1.682	9/7/2011 5:00	1.642	9/9/2011 17:00	1.607	9/12/2011 5:00	1.617	9/14/2011 17:00	1.653
9/4/2011 18:00	1.682	9/7/2011 6:00	1.661	9/9/2011 18:00	1.670	9/12/2011 6:00	1.639	9/14/2011 18:00	1.655
9/4/2011 19:00	1.697	9/7/2011 7:00	1.671	9/9/2011 19:00	1.630	9/12/2011 7:00	1.637	9/14/2011 19:00	1.658
9/4/2011 20:00	1.684	9/7/2011 8:00	1.636	9/9/2011 20:00	1.670	9/12/2011 8:00	1.644	9/14/2011 20:00	1.658
9/4/2011 21:00	1.681	9/7/2011 9:00	1.624	9/9/2011 21:00	1.645	9/12/2011 9:00	1.607	9/14/2011 21:00	1.652
9/4/2011 22:00	1.679	9/7/2011 10:00	1.622	9/9/2011 22:00	1.646	9/12/2011 10:00	1.608	9/14/2011 22:00	1.655
9/4/2011 23:00	1.702	9/7/2011 11:00	1.631	9/9/2011 23:00	1.627	9/12/2011 11:00	1.607	9/14/2011 23:00	1.641
9/5/2011 0:00	1.685	9/7/2011 12:00	1.629	9/10/2011 0:00	1.632	9/12/2011 12:00	1.611	9/15/2011 0:00	1.636
9/5/2011 1:00	1.688	9/7/2011 13:00	1.627	9/10/2011 1:00	1.632	9/12/2011 13:00	1.618	9/15/2011 1:00	1.651
9/5/2011 2:00	1.681	9/7/2011 14:00	1.612	9/10/2011 2:00	1.623	9/12/2011 14:00	1.608	9/15/2011 2:00	1.641

Clark Fork at Gem Back Road (CFR-F1) (continued)

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
9/15/2011 3:00	1.657	9/17/2011 15:00	1.691	9/20/2011 3:00	1.669	9/22/2011 15:00	1.639	9/25/2011 3:00	1.618
9/15/2011 4:00	1.670	9/17/2011 16:00	1.700	9/20/2011 4:00	1.673	9/22/2011 16:00	1.662	9/25/2011 4:00	1.609
9/15/2011 5:00	1.671	9/17/2011 17:00	1.683	9/20/2011 5:00	1.692	9/22/2011 17:00	1.647	9/25/2011 5:00	1.614
9/15/2011 6:00	1.653	9/17/2011 18:00	1.699	9/20/2011 6:00	1.697	9/22/2011 18:00	1.640	9/25/2011 6:00	1.616
9/15/2011 7:00	1.665	9/17/2011 19:00	1.678	9/20/2011 7:00	1.707	9/22/2011 19:00	1.652	9/25/2011 7:00	1.612
9/15/2011 8:00	1.661	9/17/2011 20:00	1.696	9/20/2011 8:00	1.667	9/22/2011 20:00	1.657	9/25/2011 8:00	1.601
9/15/2011 9:00	1.647	9/17/2011 21:00	1.703	9/20/2011 9:00	1.664	9/22/2011 21:00	1.664	9/25/2011 9:00	1.601
9/15/2011 10:00	1.639	9/17/2011 22:00	1.683	9/20/2011 10:00	1.669	9/22/2011 22:00	1.659	9/25/2011 10:00	1.583
9/15/2011 11:00	1.623	9/17/2011 23:00	1.683	9/20/2011 11:00	1.654	9/22/2011 23:00	1.634	9/25/2011 11:00	1.611
9/15/2011 12:00	1.636	9/18/2011 0:00	1.674	9/20/2011 12:00	1.670	9/23/2011 0:00	1.650	9/25/2011 12:00	1.571
9/15/2011 13:00	1.645	9/18/2011 1:00	1.701	9/20/2011 13:00	1.664	9/23/2011 1:00	1.654	9/25/2011 13:00	1.588
9/15/2011 14:00	1.659	9/18/2011 2:00	1.677	9/20/2011 14:00	1.668	9/23/2011 2:00	1.651	9/25/2011 14:00	1.567
9/15/2011 15:00	1.643	9/18/2011 3:00	1.678	9/20/2011 15:00	1.667	9/23/2011 3:00	1.661	9/25/2011 15:00	1.572
9/15/2011 16:00	1.641	9/18/2011 4:00	1.663	9/20/2011 16:00	1.674	9/23/2011 4:00	1.657	9/25/2011 16:00	1.589
9/15/2011 17:00	1.654	9/18/2011 5:00	1.675	9/20/2011 17:00	1.663	9/23/2011 5:00	1.649	9/25/2011 17:00	1.580
9/15/2011 18:00	1.651	9/18/2011 6:00	1.682	9/20/2011 18:00	1.650	9/23/2011 6:00	1.663	9/25/2011 18:00	1.579
9/15/2011 19:00	1.643	9/18/2011 7:00	1.679	9/20/2011 19:00	1.670	9/23/2011 7:00	1.666	9/25/2011 19:00	1.554
9/15/2011 20:00	1.647	9/18/2011 8:00	1.697	9/20/2011 20:00	1.682	9/23/2011 8:00	1.664	9/25/2011 20:00	1.567
9/15/2011 21:00	1.657	9/18/2011 9:00	1.684	9/20/2011 21:00	1.678	9/23/2011 9:00	1.643	9/25/2011 21:00	1.575
9/15/2011 22:00	1.633	9/18/2011 10:00	1.679	9/20/2011 22:00	1.669	9/23/2011 10:00	1.649	9/25/2011 22:00	1.560
9/15/2011 23:00	1.650	9/18/2011 11:00	1.683	9/20/2011 23:00	1.674	9/23/2011 11:00	1.636	9/25/2011 23:00	1.553
9/16/2011 0:00	1.631	9/18/2011 12:00	1.680	9/21/2011 0:00	1.663	9/23/2011 12:00	1.638	9/26/2011 0:00	1.549
9/16/2011 1:00	1.657	9/18/2011 13:00	1.676	9/21/2011 1:00	1.667	9/23/2011 13:00	1.627	9/26/2011 1:00	1.559
9/16/2011 2:00	1.667	9/18/2011 14:00	1.667	9/21/2011 2:00	1.645	9/23/2011 14:00	1.617	9/26/2011 2:00	1.564
9/16/2011 3:00	1.656	9/18/2011 15:00	1.676	9/21/2011 3:00	1.663	9/23/2011 15:00	1.631	9/26/2011 3:00	1.559
9/16/2011 4:00	1.668	9/18/2011 16:00	1.667	9/21/2011 4:00	1.671	9/23/2011 16:00	1.625	9/26/2011 4:00	1.557
9/16/2011 5:00	1.677	9/18/2011 17:00	1.683	9/21/2011 5:00	1.666	9/23/2011 17:00	1.651	9/26/2011 5:00	1.553
9/16/2011 6:00	1.700	9/18/2011 18:00	1.655	9/21/2011 6:00	1.673	9/23/2011 18:00	1.625	9/26/2011 6:00	1.575
9/16/2011 7:00	1.689	9/18/2011 19:00	1.652	9/21/2011 7:00	1.665	9/23/2011 19:00	1.665	9/26/2011 7:00	1.560
9/16/2011 8:00	1.705	9/18/2011 20:00	1.663	9/21/2011 8:00	1.691	9/23/2011 20:00	1.645	9/26/2011 8:00	1.564
9/16/2011 9:00	1.700	9/18/2011 21:00	1.673	9/21/2011 9:00	1.657	9/23/2011 21:00	1.646	9/26/2011 9:00	1.546
9/16/2011 10:00	1.709	9/18/2011 22:00	1.659	9/21/2011 10:00	1.655	9/23/2011 22:00	1.620	9/26/2011 10:00	1.558
9/16/2011 11:00	1.703	9/18/2011 23:00	1.674	9/21/2011 11:00	1.663	9/23/2011 23:00	1.631	9/26/2011 11:00	1.571
9/16/2011 12:00	1.696	9/19/2011 0:00	1.683	9/21/2011 12:00	1.656	9/24/2011 0:00	1.619	9/26/2011 12:00	1.562
9/16/2011 13:00	1.719	9/19/2011 1:00	1.668	9/21/2011 13:00	1.657	9/24/2011 1:00	1.620	9/26/2011 13:00	1.560
9/16/2011 14:00	1.704	9/19/2011 2:00	1.680	9/21/2011 14:00	1.657	9/24/2011 2:00	1.621	9/26/2011 14:00	1.567
9/16/2011 15:00	1.718	9/19/2011 3:00	1.674	9/21/2011 15:00	1.638	9/24/2011 3:00	1.615	9/26/2011 15:00	1.544
9/16/2011 16:00	1.694	9/19/2011 4:00	1.656	9/21/2011 16:00	1.663	9/24/2011 4:00	1.637	9/26/2011 16:00	1.571
9/16/2011 17:00	1.710	9/19/2011 5:00	1.672	9/21/2011 17:00	1.660	9/24/2011 5:00	1.631	9/26/2011 17:00	1.553
9/16/2011 18:00	1.685	9/19/2011 6:00	1.674	9/21/2011 18:00	1.692	9/24/2011 6:00	1.632	9/26/2011 18:00	1.563
9/16/2011 19:00	1.704	9/19/2011 7:00	1.672	9/21/2011 19:00	1.670	9/24/2011 7:00	1.645	9/26/2011 19:00	1.573
9/16/2011 20:00	1.725	9/19/2011 8:00	1.677	9/21/2011 20:00	1.667	9/24/2011 8:00	1.642	9/26/2011 20:00	1.586
9/16/2011 21:00	1.694	9/19/2011 9:00	1.661	9/21/2011 21:00	1.690	9/24/2011 9:00	1.598	9/26/2011 21:00	1.576
9/16/2011 22:00	1.717	9/19/2011 10:00	1.662	9/21/2011 22:00	1.667	9/24/2011 10:00	1.608	9/26/2011 22:00	1.588
9/16/2011 23:00	1.707	9/19/2011 11:00	1.666	9/21/2011 23:00	1.673	9/24/2011 11:00	1.601	9/26/2011 23:00	1.576
9/17/2011 0:00	1.704	9/19/2011 12:00	1.665	9/22/2011 0:00	1.658	9/24/2011 12:00	1.594	9/27/2011 0:00	1.560
9/17/2011 1:00	1.713	9/19/2011 13:00	1.686	9/22/2011 1:00	1.670	9/24/2011 13:00	1.613	9/27/2011 1:00	1.574
9/17/2011 2:00	1.709	9/19/2011 14:00	1.690	9/22/2011 2:00	1.665	9/24/2011 14:00	1.610	9/27/2011 2:00	1.581
9/17/2011 3:00	1.690	9/19/2011 15:00	1.681	9/22/2011 3:00	1.649	9/24/2011 15:00	1.590	9/27/2011 3:00	1.560
9/17/2011 4:00	1.709	9/19/2011 16:00	1.676	9/22/2011 4:00	1.681	9/24/2011 16:00	1.610	9/27/2011 4:00	1.570
9/17/2011 5:00	1.712	9/19/2011 17:00	1.682	9/22/2011 5:00	1.674	9/24/2011 17:00	1.550	9/27/2011 5:00	1.585
9/17/2011 6:00	1.705	9/19/2011 18:00	1.690	9/22/2011 6:00	1.659	9/24/2011 18:00	1.582	9/27/2011 6:00	1.583
9/17/2011 7:00	1.711	9/19/2011 19:00	1.668	9/22/2011 7:00	1.692	9/24/2011 19:00	1.615	9/27/2011 7:00	1.576
9/17/2011 8:00	1.698	9/19/2011 20:00	1.642	9/22/2011 8:00	1.682	9/24/2011 20:00	1.627	9/27/2011 8:00	1.574
9/17/2011 9:00	1.683	9/19/2011 21:00	1.675	9/22/2011 9:00	1.641	9/24/2011 21:00	1.610	9/27/2011 9:00	1.567
9/17/2011 10:00	1.678	9/19/2011 22:00	1.663	9/22/2011 10:00	1.653	9/24/2011 22:00	1.617	9/27/2011 10:00	1.550
9/17/2011 11:00	1.673	9/19/2011 23:00	1.679	9/22/2011 11:00	1.650	9/24/2011 23:00	1.609	9/27/2011 11:00	1.553
9/17/2011 12:00	1.690	9/20/2011 0:00	1.674	9/22/2011 12:00	1.637	9/25/2011 0:00	1.611	9/27/2011 12:00	1.559
9/17/2011 13:00	1.687	9/20/2011 1:00	1.652	9/22/2011 13:00	1.663	9/25/2011 1:00	1.619	9/27/2011 13:00	1.567
9/17/2011 14:00	1.683	9/20/2011 2:00	1.674	9/22/2011 14:00	1.650	9/25/2011 2:00	1.618	9/27/2011 14:00	1.559

Clark Fork at Gem Back Road (CFR-F1) (continued)

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
9/27/2011 15:00	1.571	9/30/2011 3:00	1.593	10/2/2011 15:00	1.664	10/5/2011 3:00	1.826	10/7/2011 15:00	1.852
9/27/2011 16:00	1.556	9/30/2011 4:00	1.576	10/2/2011 16:00	1.649	10/5/2011 4:00	1.854	10/7/2011 16:00	1.862
9/27/2011 17:00	1.579	9/30/2011 5:00	1.587	10/2/2011 17:00	1.653	10/5/2011 5:00	1.863	10/7/2011 17:00	1.854
9/27/2011 18:00	1.569	9/30/2011 6:00	1.604	10/2/2011 18:00	1.663	10/5/2011 6:00	1.896	10/7/2011 18:00	1.864
9/27/2011 19:00	1.578	9/30/2011 7:00	1.610	10/2/2011 19:00	1.667	10/5/2011 7:00	1.861	10/7/2011 19:00	1.858
9/27/2011 20:00	1.560	9/30/2011 8:00	1.602	10/2/2011 20:00	1.675	10/5/2011 8:00	1.853	10/7/2011 20:00	1.860
9/27/2011 21:00	1.576	9/30/2011 9:00	1.596	10/2/2011 21:00	1.662	10/5/2011 9:00	1.863	10/7/2011 21:00	1.851
9/27/2011 22:00	1.538	9/30/2011 10:00	1.580	10/2/2011 22:00	1.666	10/5/2011 10:00	1.868	10/7/2011 22:00	1.869
9/27/2011 23:00	1.554	9/30/2011 11:00	1.590	10/2/2011 23:00	1.656	10/5/2011 11:00	1.855	10/7/2011 23:00	1.881
9/28/2011 0:00	1.557	9/30/2011 12:00	1.644	10/3/2011 0:00	1.653	10/5/2011 12:00	1.839	10/8/2011 0:00	1.864
9/28/2011 1:00	1.549	9/30/2011 13:00	1.595	10/3/2011 1:00	1.657	10/5/2011 13:00	1.839	10/8/2011 1:00	1.875
9/28/2011 2:00	1.561	9/30/2011 14:00	1.560	10/3/2011 2:00	1.665	10/5/2011 14:00	1.834	10/8/2011 2:00	1.871
9/28/2011 3:00	1.557	9/30/2011 15:00	1.594	10/3/2011 3:00	1.658	10/5/2011 15:00	1.843	10/8/2011 3:00	1.878
9/28/2011 4:00	1.563	9/30/2011 16:00	1.605	10/3/2011 4:00	1.666	10/5/2011 16:00	1.846	10/8/2011 4:00	1.873
9/28/2011 5:00	1.548	9/30/2011 17:00	1.608	10/3/2011 5:00	1.669	10/5/2011 17:00	1.847	10/8/2011 5:00	1.878
9/28/2011 6:00	1.576	9/30/2011 18:00	1.626	10/3/2011 6:00	1.669	10/5/2011 18:00	1.869	10/8/2011 6:00	1.875
9/28/2011 7:00	1.547	9/30/2011 19:00	1.617	10/3/2011 7:00	1.657	10/5/2011 19:00	1.879	10/8/2011 7:00	1.887
9/28/2011 8:00	1.544	9/30/2011 20:00	1.613	10/3/2011 8:00	1.637	10/5/2011 20:00	1.881	10/8/2011 8:00	1.874
9/28/2011 9:00	1.548	9/30/2011 21:00	1.619	10/3/2011 9:00	1.649	10/5/2011 21:00	1.866	10/8/2011 9:00	1.899
9/28/2011 10:00	1.560	9/30/2011 22:00	1.600	10/3/2011 10:00	1.639	10/5/2011 22:00	1.883	10/8/2011 10:00	1.865
9/28/2011 11:00	1.550	9/30/2011 23:00	1.604	10/3/2011 11:00	1.635	10/5/2011 23:00	1.846	10/8/2011 11:00	1.859
9/28/2011 12:00	1.559	10/1/2011 0:00	1.602	10/3/2011 12:00	1.624	10/6/2011 0:00	1.857	10/8/2011 12:00	1.855
9/28/2011 13:00	1.557	10/1/2011 1:00	1.599	10/3/2011 13:00	1.646	10/6/2011 1:00	1.864	10/8/2011 13:00	1.862
9/28/2011 14:00	1.564	10/1/2011 2:00	1.591	10/3/2011 14:00	1.640	10/6/2011 2:00	1.854	10/8/2011 14:00	1.848
9/28/2011 15:00	1.565	10/1/2011 3:00	1.599	10/3/2011 15:00	1.627	10/6/2011 3:00	1.858	10/8/2011 15:00	1.856
9/28/2011 16:00	1.587	10/1/2011 4:00	1.598	10/3/2011 16:00	1.631	10/6/2011 4:00	1.857	10/8/2011 16:00	1.836
9/28/2011 17:00	1.558	10/1/2011 5:00	1.604	10/3/2011 17:00	1.659	10/6/2011 5:00	1.840	10/8/2011 17:00	1.855
9/28/2011 18:00	1.570	10/1/2011 6:00	1.612	10/3/2011 18:00	1.666	10/6/2011 6:00	1.861	10/8/2011 18:00	1.864
9/28/2011 19:00	1.562	10/1/2011 7:00	1.606	10/3/2011 19:00	1.673	10/6/2011 7:00	1.874	10/8/2011 19:00	1.856
9/28/2011 20:00	1.565	10/1/2011 8:00	1.603	10/3/2011 20:00	1.659	10/6/2011 8:00	1.853	10/8/2011 20:00	1.844
9/28/2011 21:00	1.558	10/1/2011 9:00	1.650	10/3/2011 21:00	1.658	10/6/2011 9:00	1.832	10/8/2011 21:00	1.854
9/28/2011 22:00	1.569	10/1/2011 10:00	1.640	10/3/2011 22:00	1.656	10/6/2011 10:00	1.823	10/8/2011 22:00	1.859
9/28/2011 23:00	1.565	10/1/2011 11:00	1.612	10/3/2011 23:00	1.662	10/6/2011 11:00	1.842	10/8/2011 23:00	1.874
9/29/2011 0:00	1.576	10/1/2011 12:00	1.623	10/4/2011 0:00	1.652	10/6/2011 12:00	1.827	10/9/2011 0:00	1.881
9/29/2011 1:00	1.589	10/1/2011 13:00	1.630	10/4/2011 1:00	1.637	10/6/2011 13:00	1.826	10/9/2011 1:00	1.870
9/29/2011 2:00	1.575	10/1/2011 14:00	1.646	10/4/2011 2:00	1.630	10/6/2011 14:00	1.840	10/9/2011 2:00	1.886
9/29/2011 3:00	1.578	10/1/2011 15:00	1.653	10/4/2011 3:00	1.618	10/6/2011 15:00	1.855	10/9/2011 3:00	1.892
9/29/2011 4:00	1.557	10/1/2011 16:00	1.659	10/4/2011 4:00	1.634	10/6/2011 16:00	1.839	10/9/2011 4:00	1.916
9/29/2011 5:00	1.584	10/1/2011 17:00	1.661	10/4/2011 5:00	1.621	10/6/2011 17:00	1.851	10/9/2011 5:00	1.902
9/29/2011 6:00	1.583	10/1/2011 18:00	1.656	10/4/2011 6:00	1.628	10/6/2011 18:00	1.831	10/9/2011 6:00	1.926
9/29/2011 7:00	1.608	10/1/2011 19:00	1.664	10/4/2011 7:00	1.642	10/6/2011 19:00	1.861	10/9/2011 7:00	1.927
9/29/2011 8:00	1.583	10/1/2011 20:00	1.663	10/4/2011 8:00	1.644	10/6/2011 20:00	1.835	10/9/2011 8:00	1.935
9/29/2011 9:00	1.582	10/1/2011 21:00	1.653	10/4/2011 9:00	1.683	10/6/2011 21:00	1.860	10/9/2011 9:00	1.924
9/29/2011 10:00	1.551	10/1/2011 22:00	1.663	10/4/2011 10:00	1.670	10/6/2011 22:00	1.864	10/9/2011 10:00	1.907
9/29/2011 11:00	1.568	10/1/2011 23:00	1.652	10/4/2011 11:00	1.669	10/6/2011 23:00	1.863	10/9/2011 11:00	1.878
9/29/2011 12:00	1.573	10/2/2011 0:00	1.647	10/4/2011 12:00	1.675	10/7/2011 0:00	1.876	10/9/2011 12:00	1.881
9/29/2011 13:00	1.562	10/2/2011 1:00	1.646	10/4/2011 13:00	1.653	10/7/2011 1:00	1.876	10/9/2011 13:00	1.905
9/29/2011 14:00	1.577	10/2/2011 2:00	1.660	10/4/2011 14:00	1.667	10/7/2011 2:00	1.870	10/9/2011 14:00	1.903
9/29/2011 15:00	1.603	10/2/2011 3:00	1.666	10/4/2011 15:00	1.683	10/7/2011 3:00	1.868	10/9/2011 15:00	1.896
9/29/2011 16:00	1.557	10/2/2011 4:00	1.663	10/4/2011 16:00	1.693	10/7/2011 4:00	1.853	10/9/2011 16:00	1.904
9/29/2011 17:00	1.560	10/2/2011 5:00	1.677	10/4/2011 17:00	1.704	10/7/2011 5:00	1.829	10/9/2011 17:00	1.891
9/29/2011 18:00	1.563	10/2/2011 6:00	1.681	10/4/2011 18:00	1.723	10/7/2011 6:00	1.831	10/9/2011 18:00	1.906
9/29/2011 19:00	1.577	10/2/2011 7:00	1.679	10/4/2011 19:00	1.717	10/7/2011 7:00	1.854	10/9/2011 19:00	1.927
9/29/2011 20:00	1.581	10/2/2011 8:00	1.672	10/4/2011 20:00	1.708	10/7/2011 8:00	1.850	10/9/2011 20:00	1.903
9/29/2011 21:00	1.602	10/2/2011 9:00	1.668	10/4/2011 21:00	1.705	10/7/2011 9:00	1.851	10/9/2011 21:00	1.921
9/29/2011 22:00	1.601	10/2/2011 10:00	1.662	10/4/2011 22:00	1.729	10/7/2011 10:00	1.853	10/9/2011 22:00	1.905
9/29/2011 23:00	1.595	10/2/2011 11:00	1.668	10/4/2011 23:00	1.766	10/7/2011 11:00	1.848	10/9/2011 23:00	1.925
9/30/2011 0:00	1.583	10/2/2011 12:00	1.671	10/5/2011 0:00	1.777	10/7/2011 12:00	1.842	10/10/2011 0:00	1.924
9/30/2011 1:00	1.578	10/2/2011 13:00	1.662	10/5/2011 1:00	1.788	10/7/2011 13:00	1.845	10/10/2011 1:00	1.910
9/30/2011 2:00	1.591	10/2/2011 14:00	1.654	10/5/2011 2:00	1.795	10/7/2011 14:00	1.865	10/10/2011 2:00	1.924

Clark Fork at Gem Back Road (CFR-F1) (continued)

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
10/10/2011 3:00	1.897	10/12/2011 15:00	1.919	10/15/2011 3:00	2.038	10/17/2011 15:00	2.094	10/20/2011 3:00	2.072
10/10/2011 4:00	1.907	10/12/2011 16:00	1.903	10/15/2011 4:00	2.044	10/17/2011 16:00	2.111	10/20/2011 4:00	2.096
10/10/2011 5:00	1.929	10/12/2011 17:00	1.887	10/15/2011 5:00	2.050	10/17/2011 17:00	2.103	10/20/2011 5:00	2.064
10/10/2011 6:00	1.903	10/12/2011 18:00	1.894	10/15/2011 6:00	2.037	10/17/2011 18:00	2.094	10/20/2011 6:00	2.074
10/10/2011 7:00	1.889	10/12/2011 19:00	1.908	10/15/2011 7:00	2.028	10/17/2011 19:00	2.103	10/20/2011 7:00	2.079
10/10/2011 8:00	1.911	10/12/2011 20:00	1.911	10/15/2011 8:00	2.037	10/17/2011 20:00	2.087	10/20/2011 8:00	2.087
10/10/2011 9:00	1.910	10/12/2011 21:00	1.926	10/15/2011 9:00	2.055	10/17/2011 21:00	2.094	10/20/2011 9:00	2.081
10/10/2011 10:00	1.865	10/12/2011 22:00	1.932	10/15/2011 10:00	2.056	10/17/2011 22:00	2.074	10/20/2011 10:00	2.045
10/10/2011 11:00	1.876	10/12/2011 23:00	1.941	10/15/2011 11:00	2.056	10/17/2011 23:00	2.102	10/20/2011 11:00	2.083
10/10/2011 12:00	1.880	10/13/2011 0:00	1.969	10/15/2011 12:00	2.075	10/18/2011 0:00	2.100	10/20/2011 12:00	2.042
10/10/2011 13:00	1.902	10/13/2011 1:00	1.955	10/15/2011 13:00	2.054	10/18/2011 1:00	2.089	10/20/2011 13:00	2.070
10/10/2011 14:00	1.891	10/13/2011 2:00	1.944	10/15/2011 14:00	2.057	10/18/2011 2:00	2.100	10/20/2011 14:00	2.064
10/10/2011 15:00	1.910	10/13/2011 3:00	1.953	10/15/2011 15:00	2.085	10/18/2011 3:00	2.087	10/20/2011 15:00	2.058
10/10/2011 16:00	1.909	10/13/2011 4:00	1.964	10/15/2011 16:00	2.088	10/18/2011 4:00	2.113	10/20/2011 16:00	2.073
10/10/2011 17:00	1.932	10/13/2011 5:00	1.973	10/15/2011 17:00	2.088	10/18/2011 5:00	2.078	10/20/2011 17:00	2.060
10/10/2011 18:00	1.912	10/13/2011 6:00	1.972	10/15/2011 18:00	2.095	10/18/2011 6:00	2.080	10/20/2011 18:00	2.046
10/10/2011 19:00	1.917	10/13/2011 7:00	1.977	10/15/2011 19:00	2.107	10/18/2011 7:00	2.084	10/20/2011 19:00	2.057
10/10/2011 20:00	1.930	10/13/2011 8:00	1.976	10/15/2011 20:00	2.089	10/18/2011 8:00	2.091	10/20/2011 20:00	2.037
10/10/2011 21:00	1.931	10/13/2011 9:00	1.975	10/15/2011 21:00	2.084	10/18/2011 9:00	2.067	10/20/2011 21:00	2.049
10/10/2011 22:00	1.914	10/13/2011 10:00	1.946	10/15/2011 22:00	2.091	10/18/2011 10:00	2.028	10/20/2011 22:00	2.039
10/10/2011 23:00	1.918	10/13/2011 11:00	1.949	10/15/2011 23:00	2.087	10/18/2011 11:00	2.020	10/20/2011 23:00	2.066
10/11/2011 0:00	1.929	10/13/2011 12:00	1.961	10/16/2011 0:00	2.089	10/18/2011 12:00	2.065	10/21/2011 0:00	2.061
10/11/2011 1:00	1.922	10/13/2011 13:00	1.928	10/16/2011 1:00	2.109	10/18/2011 13:00	2.080	10/21/2011 1:00	2.056
10/11/2011 2:00	1.938	10/13/2011 14:00	1.952	10/16/2011 2:00	2.120	10/18/2011 14:00	2.064	10/21/2011 2:00	2.051
10/11/2011 3:00	1.927	10/13/2011 15:00	1.947	10/16/2011 3:00	2.120	10/18/2011 15:00	2.060	10/21/2011 3:00	2.076
10/11/2011 4:00	1.919	10/13/2011 16:00	1.954	10/16/2011 4:00	2.102	10/18/2011 16:00	2.084	10/21/2011 4:00	2.052
10/11/2011 5:00	1.924	10/13/2011 17:00	1.976	10/16/2011 5:00	2.125	10/18/2011 17:00	2.039	10/21/2011 5:00	2.071
10/11/2011 6:00	1.914	10/13/2011 18:00	1.959	10/16/2011 6:00	2.125	10/18/2011 18:00	2.057	10/21/2011 6:00	2.027
10/11/2011 7:00	1.917	10/13/2011 19:00	1.957	10/16/2011 7:00	2.100	10/18/2011 19:00	2.080	10/21/2011 7:00	2.070
10/11/2011 8:00	1.893	10/13/2011 20:00	1.958	10/16/2011 8:00	2.132	10/18/2011 20:00	2.100	10/21/2011 8:00	2.060
10/11/2011 9:00	1.923	10/13/2011 21:00	1.973	10/16/2011 9:00	2.125	10/18/2011 21:00	2.088	10/21/2011 9:00	2.031
10/11/2011 10:00	1.908	10/13/2011 22:00	1.979	10/16/2011 10:00	2.123	10/18/2011 22:00	2.116	10/21/2011 10:00	2.031
10/11/2011 11:00	1.899	10/13/2011 23:00	1.979	10/16/2011 11:00	2.104	10/18/2011 23:00	2.077	10/21/2011 11:00	2.027
10/11/2011 12:00	1.911	10/14/2011 0:00	1.963	10/16/2011 12:00	2.100	10/19/2011 0:00	2.106	10/21/2011 12:00	2.019
10/11/2011 13:00	1.904	10/14/2011 1:00	1.951	10/16/2011 13:00	2.102	10/19/2011 1:00	2.097	10/21/2011 13:00	2.043
10/11/2011 14:00	1.909	10/14/2011 2:00	1.953	10/16/2011 14:00	2.100	10/19/2011 2:00	2.097	10/21/2011 14:00	2.046
10/11/2011 15:00	1.901	10/14/2011 3:00	1.979	10/16/2011 15:00	2.106	10/19/2011 3:00	2.122	10/21/2011 15:00	2.039
10/11/2011 16:00	1.927	10/14/2011 4:00	1.981	10/16/2011 16:00	2.129	10/19/2011 4:00	2.097	10/21/2011 16:00	2.054
10/11/2011 17:00	1.892	10/14/2011 5:00	1.978	10/16/2011 17:00	2.120	10/19/2011 5:00	2.092	10/21/2011 17:00	2.040
10/11/2011 18:00	1.919	10/14/2011 6:00	1.973	10/16/2011 18:00	2.121	10/19/2011 6:00	2.082	10/21/2011 18:00	2.023
10/11/2011 19:00	1.930	10/14/2011 7:00	1.964	10/16/2011 19:00	2.123	10/19/2011 7:00	2.085	10/21/2011 19:00	2.048
10/11/2011 20:00	1.934	10/14/2011 8:00	1.987	10/16/2011 20:00	2.126	10/19/2011 8:00	2.101	10/21/2011 20:00	2.047
10/11/2011 21:00	1.931	10/14/2011 9:00	1.971	10/16/2011 21:00	2.088	10/19/2011 9:00	2.092	10/21/2011 21:00	2.011
10/11/2011 22:00	1.946	10/14/2011 10:00	1.976	10/16/2011 22:00	2.097	10/19/2011 10:00	2.058	10/21/2011 22:00	2.038
10/11/2011 23:00	1.949	10/14/2011 11:00	1.977	10/16/2011 23:00	2.112	10/19/2011 11:00	2.056	10/21/2011 23:00	2.035
10/12/2011 0:00	1.954	10/14/2011 12:00	1.959	10/17/2011 0:00	2.136	10/19/2011 12:00	2.051	10/22/2011 0:00	2.022
10/12/2011 1:00	1.915	10/14/2011 13:00	1.967	10/17/2011 1:00	2.154	10/19/2011 13:00	2.043	10/22/2011 1:00	2.026
10/12/2011 2:00	1.953	10/14/2011 14:00	1.973	10/17/2011 2:00	2.158	10/19/2011 14:00	2.059	10/22/2011 2:00	2.029
10/12/2011 3:00	1.948	10/14/2011 15:00	1.997	10/17/2011 3:00	2.139	10/19/2011 15:00	2.047	10/22/2011 3:00	2.038
10/12/2011 4:00	1.949	10/14/2011 16:00	1.978	10/17/2011 4:00	2.100	10/19/2011 16:00	2.035	10/22/2011 4:00	2.041
10/12/2011 5:00	1.956	10/14/2011 17:00	1.980	10/17/2011 5:00	2.141	10/19/2011 17:00	2.054	10/22/2011 5:00	2.059
10/12/2011 6:00	1.945	10/14/2011 18:00	1.994	10/17/2011 6:00	2.129	10/19/2011 18:00	2.044	10/22/2011 6:00	2.032
10/12/2011 7:00	1.950	10/14/2011 19:00	2.067	10/17/2011 7:00	2.139	10/19/2011 19:00	2.050	10/22/2011 7:00	2.047
10/12/2011 8:00	1.900	10/14/2011 20:00	2.050	10/17/2011 8:00	2.125	10/19/2011 20:00	2.064	10/22/2011 8:00	2.040
10/12/2011 9:00	1.918	10/14/2011 21:00	2.057	10/17/2011 9:00	2.090	10/19/2011 21:00	2.044	10/22/2011 9:00	2.053
10/12/2011 10:00	1.894	10/14/2011 22:00	2.049	10/17/2011 10:00	2.083	10/19/2011 22:00	2.060	10/22/2011 10:00	2.006
10/12/2011 11:00	1.921	10/14/2011 23:00	2.048	10/17/2011 11:00	2.100	10/19/2011 23:00	2.065	10/22/2011 11:00	2.036
10/12/2011 12:00	1.922	10/15/2011 0:00	2.046	10/17/2011 12:00	2.078	10/20/2011 0:00	2.073	10/22/2011 12:00	2.034
10/12/2011 13:00	1.913	10/15/2011 1:00	2.037	10/17/2011 13:00	2.104	10/20/2011 1:00	2.089	10/22/2011 13:00	2.015
10/12/2011 14:00	1.931	10/15/2011 2:00	2.054	10/17/2011 14:00	2.107	10/20/2011 2:00	2.075	10/22/2011 14:00	2.030

Clark Fork at Gem Back Road (CFR-F1) (continued)

Date and Time	Surface Elev.	Date and Time	Surface Elev.
10/22/2011 15:00	2.031	10/25/2011 3:00	2.043
10/22/2011 16:00	2.024	10/25/2011 4:00	2.034
10/22/2011 17:00	2.013	10/25/2011 5:00	2.043
10/22/2011 18:00	2.015	10/25/2011 6:00	2.045
10/22/2011 19:00	2.036	10/25/2011 7:00	2.047
10/22/2011 20:00	2.016	10/25/2011 8:00	2.033
10/22/2011 21:00	2.030	10/25/2011 9:00	2.038
10/22/2011 22:00	2.023	10/25/2011 10:00	2.000
10/22/2011 23:00	2.029	10/25/2011 11:00	1.988
10/23/2011 0:00	2.007	10/25/2011 12:00	1.986
10/23/2011 1:00	2.011	10/25/2011 13:00	1.972
10/23/2011 2:00	2.004	10/25/2011 14:00	2.017
10/23/2011 3:00	2.002	10/25/2011 15:00	1.986
10/23/2011 4:00	2.009	10/25/2011 16:00	2.006
10/23/2011 5:00	2.011	10/25/2011 17:00	1.998
10/23/2011 6:00	2.008	10/25/2011 18:00	2.017
10/23/2011 7:00	2.028	10/25/2011 19:00	2.015
10/23/2011 8:00	2.020	10/25/2011 20:00	2.053
10/23/2011 9:00	2.008	10/25/2011 21:00	2.055
10/23/2011 10:00	1.998	10/25/2011 22:00	2.057
10/23/2011 11:00	2.007	10/25/2011 23:00	2.069
10/23/2011 12:00	2.006	10/26/2011 0:00	2.044
10/23/2011 13:00	2.008	10/26/2011 1:00	2.051
10/23/2011 14:00	1.999	10/26/2011 2:00	2.071
10/23/2011 15:00	2.021	10/26/2011 3:00	2.081
10/23/2011 16:00	2.003	10/26/2011 4:00	2.067
10/23/2011 17:00	1.958	10/26/2011 5:00	2.067
10/23/2011 18:00	2.023	10/26/2011 6:00	2.062
10/23/2011 19:00	2.008	10/26/2011 7:00	2.092
10/23/2011 20:00	2.026	10/26/2011 8:00	2.065
10/23/2011 21:00	2.013	10/26/2011 9:00	2.080
10/23/2011 22:00	2.011	10/26/2011 10:00	2.057
10/23/2011 23:00	2.036	10/26/2011 11:00	2.032
10/24/2011 0:00	2.018	10/26/2011 12:00	2.039
10/24/2011 1:00	2.016	10/26/2011 13:00	2.045
10/24/2011 2:00	2.015	10/26/2011 14:00	2.053
10/24/2011 3:00	2.018	10/26/2011 15:00	2.041
10/24/2011 4:00	2.012	10/26/2011 16:00	2.056
10/24/2011 5:00	2.010	10/26/2011 17:00	2.069
10/24/2011 6:00	1.991	10/26/2011 18:00	2.047
10/24/2011 7:00	1.997	10/26/2011 19:00	2.076
10/24/2011 8:00	2.004	10/26/2011 20:00	2.062
10/24/2011 9:00	1.979	10/26/2011 21:00	2.054
10/24/2011 10:00	2.016	10/26/2011 22:00	2.022
10/24/2011 11:00	1.982	10/26/2011 23:00	2.034
10/24/2011 12:00	1.975	10/27/2011 0:00	2.060
10/24/2011 13:00	1.989	10/27/2011 1:00	2.046
10/24/2011 14:00	2.010	10/27/2011 2:00	2.031
10/24/2011 15:00	2.005	10/27/2011 3:00	2.017
10/24/2011 16:00	2.024	10/27/2011 4:00	2.023
10/24/2011 17:00	2.018	10/27/2011 5:00	2.042
10/24/2011 18:00	2.028	10/27/2011 6:00	2.026
10/24/2011 19:00	2.024	10/27/2011 7:00	2.047
10/24/2011 20:00	2.031	10/27/2011 8:00	2.052
10/24/2011 21:00	2.030	10/27/2011 9:00	2.061
10/24/2011 22:00	2.019	10/27/2011 10:00	2.036
10/24/2011 23:00	2.024	10/27/2011 11:00	2.020
10/25/2011 0:00	2.030	10/27/2011 12:00	2.024
10/25/2011 1:00	2.004		
10/25/2011 2:00	2.037		

Clark Fork at Sager Lane (CFR-F2) continuous stage recorder hourly data. ***Surface elevation is in feet, adjusted to staff gauge (-1.79feet)***

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
7/26/2011 15:00	1.933	7/29/2011 3:00	1.735	7/31/2011 15:00	1.564	8/3/2011 3:00	1.579	8/5/2011 15:00	1.539
7/26/2011 16:00	1.980	7/29/2011 4:00	1.737	7/31/2011 16:00	1.613	8/3/2011 4:00	1.579	8/5/2011 16:00	1.533
7/26/2011 17:00	1.957	7/29/2011 5:00	1.749	7/31/2011 17:00	1.622	8/3/2011 5:00	1.581	8/5/2011 17:00	1.532
7/26/2011 18:00	1.968	7/29/2011 6:00	1.734	7/31/2011 18:00	1.617	8/3/2011 6:00	1.568	8/5/2011 18:00	1.533
7/26/2011 19:00	1.936	7/29/2011 7:00	1.746	7/31/2011 19:00	1.636	8/3/2011 7:00	1.579	8/5/2011 19:00	1.522
7/26/2011 20:00	1.930	7/29/2011 8:00	1.716	7/31/2011 20:00	1.617	8/3/2011 8:00	1.566	8/5/2011 20:00	1.531
7/26/2011 21:00	1.929	7/29/2011 9:00	1.720	7/31/2011 21:00	1.607	8/3/2011 9:00	1.544	8/5/2011 21:00	1.535
7/26/2011 22:00	1.925	7/29/2011 10:00	1.706	7/31/2011 22:00	1.603	8/3/2011 10:00	1.547	8/5/2011 22:00	1.555
7/26/2011 23:00	1.921	7/29/2011 11:00	1.708	7/31/2011 23:00	1.629	8/3/2011 11:00	1.543	8/5/2011 23:00	1.560
7/27/2011 0:00	1.915	7/29/2011 12:00	1.745	8/1/2011 0:00	1.614	8/3/2011 12:00	1.566	8/6/2011 0:00	1.566
7/27/2011 1:00	1.902	7/29/2011 13:00	1.712	8/1/2011 1:00	1.620	8/3/2011 13:00	1.568	8/6/2011 1:00	1.557
7/27/2011 2:00	1.884	7/29/2011 14:00	1.720	8/1/2011 2:00	1.630	8/3/2011 14:00	1.584	8/6/2011 2:00	1.550
7/27/2011 3:00	1.901	7/29/2011 15:00	1.708	8/1/2011 3:00	1.615	8/3/2011 15:00	1.580	8/6/2011 3:00	1.543
7/27/2011 4:00	1.895	7/29/2011 16:00	1.720	8/1/2011 4:00	1.638	8/3/2011 16:00	1.519	8/6/2011 4:00	1.558
7/27/2011 5:00	1.897	7/29/2011 17:00	1.692	8/1/2011 5:00	1.637	8/3/2011 17:00	1.511	8/6/2011 5:00	1.539
7/27/2011 6:00	1.888	7/29/2011 18:00	1.710	8/1/2011 6:00	1.622	8/3/2011 18:00	1.524	8/6/2011 6:00	1.557
7/27/2011 7:00	1.887	7/29/2011 19:00	1.700	8/1/2011 7:00	1.654	8/3/2011 19:00	1.510	8/6/2011 7:00	1.562
7/27/2011 8:00	1.889	7/29/2011 20:00	1.711	8/1/2011 8:00	1.644	8/3/2011 20:00	1.515	8/6/2011 8:00	1.535
7/27/2011 9:00	1.851	7/29/2011 21:00	1.709	8/1/2011 9:00	1.639	8/3/2011 21:00	1.534	8/6/2011 9:00	1.508
7/27/2011 10:00	1.858	7/29/2011 22:00	1.687	8/1/2011 10:00	1.633	8/3/2011 22:00	1.567	8/6/2011 10:00	1.492
7/27/2011 11:00	1.855	7/29/2011 23:00	1.682	8/1/2011 11:00	1.663	8/3/2011 23:00	1.547	8/6/2011 11:00	1.493
7/27/2011 12:00	1.892	7/30/2011 0:00	1.659	8/1/2011 12:00	1.677	8/4/2011 0:00	1.538	8/6/2011 12:00	1.511
7/27/2011 13:00	1.882	7/30/2011 1:00	1.682	8/1/2011 13:00	1.685	8/4/2011 1:00	1.563	8/6/2011 13:00	1.521
7/27/2011 14:00	1.897	7/30/2011 2:00	1.684	8/1/2011 14:00	1.708	8/4/2011 2:00	1.573	8/6/2011 14:00	1.510
7/27/2011 15:00	1.886	7/30/2011 3:00	1.683	8/1/2011 15:00	1.702	8/4/2011 3:00	1.567	8/6/2011 15:00	1.516
7/27/2011 16:00	1.892	7/30/2011 4:00	1.649	8/1/2011 16:00	1.687	8/4/2011 4:00	1.566	8/6/2011 16:00	1.522
7/27/2011 17:00	1.889	7/30/2011 5:00	1.665	8/1/2011 17:00	1.682	8/4/2011 5:00	1.562	8/6/2011 17:00	1.515
7/27/2011 18:00	1.902	7/30/2011 6:00	1.645	8/1/2011 18:00	1.702	8/4/2011 6:00	1.563	8/6/2011 18:00	1.554
7/27/2011 19:00	1.922	7/30/2011 7:00	1.675	8/1/2011 19:00	1.694	8/4/2011 7:00	1.569	8/6/2011 19:00	1.544
7/27/2011 20:00	1.875	7/30/2011 8:00	1.634	8/1/2011 20:00	1.680	8/4/2011 8:00	1.538	8/6/2011 20:00	1.532
7/27/2011 21:00	1.891	7/30/2011 9:00	1.634	8/1/2011 21:00	1.682	8/4/2011 9:00	1.525	8/6/2011 21:00	1.559
7/27/2011 22:00	1.846	7/30/2011 10:00	1.629	8/1/2011 22:00	1.690	8/4/2011 10:00	1.539	8/6/2011 22:00	1.545
7/27/2011 23:00	1.840	7/30/2011 11:00	1.651	8/1/2011 23:00	1.685	8/4/2011 11:00	1.523	8/6/2011 23:00	1.526
7/28/2011 0:00	1.834	7/30/2011 12:00	1.627	8/2/2011 0:00	1.697	8/4/2011 12:00	1.545	8/7/2011 0:00	1.517
7/28/2011 1:00	1.818	7/30/2011 13:00	1.631	8/2/2011 1:00	1.691	8/4/2011 13:00	1.556	8/7/2011 1:00	1.543
7/28/2011 2:00	1.836	7/30/2011 14:00	1.634	8/2/2011 2:00	1.692	8/4/2011 14:00	1.551	8/7/2011 2:00	1.535
7/28/2011 3:00	1.812	7/30/2011 15:00	1.624	8/2/2011 3:00	1.715	8/4/2011 15:00	1.545	8/7/2011 3:00	1.556
7/28/2011 4:00	1.817	7/30/2011 16:00	1.639	8/2/2011 4:00	1.693	8/4/2011 16:00	1.545	8/7/2011 4:00	1.581
7/28/2011 5:00	1.819	7/30/2011 17:00	1.647	8/2/2011 5:00	1.680	8/4/2011 17:00	1.524	8/7/2011 5:00	1.597
7/28/2011 6:00	1.811	7/30/2011 18:00	1.627	8/2/2011 6:00	1.680	8/4/2011 18:00	1.536	8/7/2011 6:00	1.604
7/28/2011 7:00	1.808	7/30/2011 19:00	1.604	8/2/2011 7:00	1.654	8/4/2011 19:00	1.541	8/7/2011 7:00	1.598
7/28/2011 8:00	1.799	7/30/2011 20:00	1.614	8/2/2011 8:00	1.644	8/4/2011 20:00	1.546	8/7/2011 8:00	1.592
7/28/2011 9:00	1.803	7/30/2011 21:00	1.599	8/2/2011 9:00	1.650	8/4/2011 21:00	1.536	8/7/2011 9:00	1.583
7/28/2011 10:00	1.801	7/30/2011 22:00	1.623	8/2/2011 10:00	1.649	8/4/2011 22:00	1.535	8/7/2011 10:00	1.586
7/28/2011 11:00	1.785	7/30/2011 23:00	1.590	8/2/2011 11:00	1.637	8/4/2011 23:00	1.538	8/7/2011 11:00	1.588
7/28/2011 12:00	1.768	7/31/2011 0:00	1.567	8/2/2011 12:00	1.642	8/5/2011 0:00	1.545	8/7/2011 12:00	1.598
7/28/2011 13:00	1.789	7/31/2011 1:00	1.562	8/2/2011 13:00	1.643	8/5/2011 1:00	1.536	8/7/2011 13:00	1.580
7/28/2011 14:00	1.794	7/31/2011 2:00	1.583	8/2/2011 14:00	1.642	8/5/2011 2:00	1.536	8/7/2011 14:00	1.580
7/28/2011 15:00	1.813	7/31/2011 3:00	1.573	8/2/2011 15:00	1.640	8/5/2011 3:00	1.540	8/7/2011 15:00	1.588
7/28/2011 16:00	1.781	7/31/2011 4:00	1.584	8/2/2011 16:00	1.660	8/5/2011 4:00	1.549	8/7/2011 16:00	1.587
7/28/2011 17:00	1.755	7/31/2011 5:00	1.573	8/2/2011 17:00	1.644	8/5/2011 5:00	1.541	8/7/2011 17:00	1.565
7/28/2011 18:00	1.760	7/31/2011 6:00	1.562	8/2/2011 18:00	1.635	8/5/2011 6:00	1.541	8/7/2011 18:00	1.570
7/28/2011 19:00	1.771	7/31/2011 7:00	1.591	8/2/2011 19:00	1.642	8/5/2011 7:00	1.531	8/7/2011 19:00	1.585
7/28/2011 20:00	1.771	7/31/2011 8:00	1.582	8/2/2011 20:00	1.637	8/5/2011 8:00	1.531	8/7/2011 20:00	1.571
7/28/2011 21:00	1.788	7/31/2011 9:00	1.545	8/2/2011 21:00	1.648	8/5/2011 9:00	1.522	8/7/2011 21:00	1.562
7/28/2011 22:00	1.790	7/31/2011 10:00	1.567	8/2/2011 22:00	1.615	8/5/2011 10:00	1.505	8/7/2011 22:00	1.543
7/28/2011 23:00	1.752	7/31/2011 11:00	1.541	8/2/2011 23:00	1.624	8/5/2011 11:00	1.539	8/7/2011 23:00	1.560
7/29/2011 0:00	1.723	7/31/2011 12:00	1.557	8/3/2011 0:00	1.635	8/5/2011 12:00	1.530	8/8/2011 0:00	1.548
7/29/2011 1:00	1.753	7/31/2011 13:00	1.558	8/3/2011 1:00	1.617	8/5/2011 13:00	1.531	8/8/2011 1:00	1.546
7/29/2011 2:00	1.739	7/31/2011 14:00	1.559	8/3/2011 2:00	1.593	8/5/2011 14:00	1.500	8/8/2011 2:00	1.535

Clark Fork at Sager Lane (CFR-F2) (continued)

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
8/8/2011 3:00	1.539	8/10/2011 15:00	1.408	8/13/2011 3:00	1.367	8/15/2011 15:00	1.317	8/18/2011 3:00	1.287
8/8/2011 4:00	1.517	8/10/2011 16:00	1.433	8/13/2011 4:00	1.401	8/15/2011 16:00	1.324	8/18/2011 4:00	1.300
8/8/2011 5:00	1.539	8/10/2011 17:00	1.442	8/13/2011 5:00	1.386	8/15/2011 17:00	1.306	8/18/2011 5:00	1.309
8/8/2011 6:00	1.520	8/10/2011 18:00	1.447	8/13/2011 6:00	1.413	8/15/2011 18:00	1.304	8/18/2011 6:00	1.302
8/8/2011 7:00	1.531	8/10/2011 19:00	1.445	8/13/2011 7:00	1.427	8/15/2011 19:00	1.302	8/18/2011 7:00	1.312
8/8/2011 8:00	1.512	8/10/2011 20:00	1.435	8/13/2011 8:00	1.393	8/15/2011 20:00	1.307	8/18/2011 8:00	1.304
8/8/2011 9:00	1.484	8/10/2011 21:00	1.436	8/13/2011 9:00	1.375	8/15/2011 21:00	1.362	8/18/2011 9:00	1.283
8/8/2011 10:00	1.458	8/10/2011 22:00	1.420	8/13/2011 10:00	1.387	8/15/2011 22:00	1.394	8/18/2011 10:00	1.289
8/8/2011 11:00	1.508	8/10/2011 23:00	1.425	8/13/2011 11:00	1.374	8/15/2011 23:00	1.378	8/18/2011 11:00	1.286
8/8/2011 12:00	1.503	8/11/2011 0:00	1.422	8/13/2011 12:00	1.392	8/16/2011 0:00	1.362	8/18/2011 12:00	1.259
8/8/2011 13:00	1.515	8/11/2011 1:00	1.412	8/13/2011 13:00	1.382	8/16/2011 1:00	1.362	8/18/2011 13:00	1.308
8/8/2011 14:00	1.519	8/11/2011 2:00	1.422	8/13/2011 14:00	1.373	8/16/2011 2:00	1.367	8/18/2011 14:00	1.291
8/8/2011 15:00	1.494	8/11/2011 3:00	1.428	8/13/2011 15:00	1.419	8/16/2011 3:00	1.348	8/18/2011 15:00	1.289
8/8/2011 16:00	1.510	8/11/2011 4:00	1.410	8/13/2011 16:00	1.384	8/16/2011 4:00	1.348	8/18/2011 16:00	1.269
8/8/2011 17:00	1.506	8/11/2011 5:00	1.430	8/13/2011 17:00	1.380	8/16/2011 5:00	1.373	8/18/2011 17:00	1.259
8/8/2011 18:00	1.499	8/11/2011 6:00	1.412	8/13/2011 18:00	1.389	8/16/2011 6:00	1.384	8/18/2011 18:00	1.264
8/8/2011 19:00	1.503	8/11/2011 7:00	1.421	8/13/2011 19:00	1.387	8/16/2011 7:00	1.380	8/18/2011 19:00	1.273
8/8/2011 20:00	1.529	8/11/2011 8:00	1.421	8/13/2011 20:00	1.381	8/16/2011 8:00	1.368	8/18/2011 20:00	1.286
8/8/2011 21:00	1.525	8/11/2011 9:00	1.422	8/13/2011 21:00	1.381	8/16/2011 9:00	1.348	8/18/2011 21:00	1.245
8/8/2011 22:00	1.501	8/11/2011 10:00	1.416	8/13/2011 22:00	1.400	8/16/2011 10:00	1.356	8/18/2011 22:00	1.271
8/8/2011 23:00	1.513	8/11/2011 11:00	1.438	8/13/2011 23:00	1.381	8/16/2011 11:00	1.383	8/18/2011 23:00	1.264
8/9/2011 0:00	1.482	8/11/2011 12:00	1.423	8/14/2011 0:00	1.389	8/16/2011 12:00	1.385	8/19/2011 0:00	1.248
8/9/2011 1:00	1.506	8/11/2011 13:00	1.424	8/14/2011 1:00	1.376	8/16/2011 13:00	1.355	8/19/2011 1:00	1.255
8/9/2011 2:00	1.497	8/11/2011 14:00	1.455	8/14/2011 2:00	1.389	8/16/2011 14:00	1.350	8/19/2011 2:00	1.264
8/9/2011 3:00	1.480	8/11/2011 15:00	1.450	8/14/2011 3:00	1.390	8/16/2011 15:00	1.362	8/19/2011 3:00	1.266
8/9/2011 4:00	1.466	8/11/2011 16:00	1.438	8/14/2011 4:00	1.383	8/16/2011 16:00	1.333	8/19/2011 4:00	1.262
8/9/2011 5:00	1.500	8/11/2011 17:00	1.438	8/14/2011 5:00	1.375	8/16/2011 17:00	1.363	8/19/2011 5:00	1.267
8/9/2011 6:00	1.492	8/11/2011 18:00	1.442	8/14/2011 6:00	1.373	8/16/2011 18:00	1.340	8/19/2011 6:00	1.268
8/9/2011 7:00	1.494	8/11/2011 19:00	1.444	8/14/2011 7:00	1.386	8/16/2011 19:00	1.351	8/19/2011 7:00	1.271
8/9/2011 8:00	1.454	8/11/2011 20:00	1.442	8/14/2011 8:00	1.359	8/16/2011 20:00	1.336	8/19/2011 8:00	1.245
8/9/2011 9:00	1.474	8/11/2011 21:00	1.447	8/14/2011 9:00	1.350	8/16/2011 21:00	1.354	8/19/2011 9:00	1.254
8/9/2011 10:00	1.461	8/11/2011 22:00	1.457	8/14/2011 10:00	1.348	8/16/2011 22:00	1.350	8/19/2011 10:00	1.252
8/9/2011 11:00	1.437	8/11/2011 23:00	1.426	8/14/2011 11:00	1.349	8/16/2011 23:00	1.346	8/19/2011 11:00	1.242
8/9/2011 12:00	1.462	8/12/2011 0:00	1.468	8/14/2011 12:00	1.356	8/17/2011 0:00	1.358	8/19/2011 12:00	1.217
8/9/2011 13:00	1.452	8/12/2011 1:00	1.433	8/14/2011 13:00	1.354	8/17/2011 1:00	1.331	8/19/2011 13:00	1.228
8/9/2011 14:00	1.469	8/12/2011 2:00	1.441	8/14/2011 14:00	1.348	8/17/2011 2:00	1.343	8/19/2011 14:00	1.248
8/9/2011 15:00	1.480	8/12/2011 3:00	1.440	8/14/2011 15:00	1.334	8/17/2011 3:00	1.323	8/19/2011 15:00	1.231
8/9/2011 16:00	1.456	8/12/2011 4:00	1.419	8/14/2011 16:00	1.321	8/17/2011 4:00	1.317	8/19/2011 16:00	1.214
8/9/2011 17:00	1.445	8/12/2011 5:00	1.449	8/14/2011 17:00	1.342	8/17/2011 5:00	1.339	8/19/2011 17:00	1.230
8/9/2011 18:00	1.467	8/12/2011 6:00	1.455	8/14/2011 18:00	1.368	8/17/2011 6:00	1.364	8/19/2011 18:00	1.229
8/9/2011 19:00	1.478	8/12/2011 7:00	1.435	8/14/2011 19:00	1.349	8/17/2011 7:00	1.348	8/19/2011 19:00	1.235
8/9/2011 20:00	1.468	8/12/2011 8:00	1.426	8/14/2011 20:00	1.352	8/17/2011 8:00	1.309	8/19/2011 20:00	1.254
8/9/2011 21:00	1.460	8/12/2011 9:00	1.395	8/14/2011 21:00	1.357	8/17/2011 9:00	1.292	8/19/2011 21:00	1.241
8/9/2011 22:00	1.445	8/12/2011 10:00	1.404	8/14/2011 22:00	1.353	8/17/2011 10:00	1.289	8/19/2011 22:00	1.233
8/9/2011 23:00	1.455	8/12/2011 11:00	1.392	8/14/2011 23:00	1.355	8/17/2011 11:00	1.300	8/19/2011 23:00	1.227
8/10/2011 0:00	1.448	8/12/2011 12:00	1.407	8/15/2011 0:00	1.357	8/17/2011 12:00	1.288	8/20/2011 0:00	1.212
8/10/2011 1:00	1.450	8/12/2011 13:00	1.394	8/15/2011 1:00	1.336	8/17/2011 13:00	1.293	8/20/2011 1:00	1.213
8/10/2011 2:00	1.457	8/12/2011 14:00	1.437	8/15/2011 2:00	1.335	8/17/2011 14:00	1.310	8/20/2011 2:00	1.204
8/10/2011 3:00	1.447	8/12/2011 15:00	1.406	8/15/2011 3:00	1.323	8/17/2011 15:00	1.305	8/20/2011 3:00	1.199
8/10/2011 4:00	1.455	8/12/2011 16:00	1.421	8/15/2011 4:00	1.332	8/17/2011 16:00	1.295	8/20/2011 4:00	1.204
8/10/2011 5:00	1.455	8/12/2011 17:00	1.402	8/15/2011 5:00	1.317	8/17/2011 17:00	1.300	8/20/2011 5:00	1.218
8/10/2011 6:00	1.465	8/12/2011 18:00	1.395	8/15/2011 6:00	1.326	8/17/2011 18:00	1.312	8/20/2011 6:00	1.213
8/10/2011 7:00	1.453	8/12/2011 19:00	1.409	8/15/2011 7:00	1.298	8/17/2011 19:00	1.305	8/20/2011 7:00	1.214
8/10/2011 8:00	1.430	8/12/2011 20:00	1.401	8/15/2011 8:00	1.309	8/17/2011 20:00	1.315	8/20/2011 8:00	1.215
8/10/2011 9:00	1.427	8/12/2011 21:00	1.390	8/15/2011 9:00	1.309	8/17/2011 21:00	1.305	8/20/2011 9:00	1.195
8/10/2011 10:00	1.436	8/12/2011 22:00	1.383	8/15/2011 10:00	1.300	8/17/2011 22:00	1.303	8/20/2011 10:00	1.195
8/10/2011 11:00	1.427	8/12/2011 23:00	1.394	8/15/2011 11:00	1.286	8/17/2011 23:00	1.273	8/20/2011 11:00	1.202
8/10/2011 12:00	1.426	8/13/2011 0:00	1.393	8/15/2011 12:00	1.307	8/18/2011 0:00	1.284	8/20/2011 12:00	1.218
8/10/2011 13:00	1.419	8/13/2011 1:00	1.400	8/15/2011 13:00	1.308	8/18/2011 1:00	1.292	8/20/2011 13:00	1.228
8/10/2011 14:00	1.445	8/13/2011 2:00	1.383	8/15/2011 14:00	1.294	8/18/2011 2:00	1.281	8/20/2011 14:00	1.230

Clark Fork at Sager Lane (CFR-F2) (continued)

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
8/20/2011 15:00	1.212	8/23/2011 3:00	1.172	8/25/2011 15:00	1.185	8/28/2011 3:00	1.188	8/30/2011 15:00	1.218
8/20/2011 16:00	1.206	8/23/2011 4:00	1.166	8/25/2011 16:00	1.183	8/28/2011 4:00	1.190	8/30/2011 16:00	1.221
8/20/2011 17:00	1.202	8/23/2011 5:00	1.165	8/25/2011 17:00	1.183	8/28/2011 5:00	1.212	8/30/2011 17:00	1.231
8/20/2011 18:00	1.201	8/23/2011 6:00	1.181	8/25/2011 18:00	1.194	8/28/2011 6:00	1.204	8/30/2011 18:00	1.230
8/20/2011 19:00	1.233	8/23/2011 7:00	1.169	8/25/2011 19:00	1.187	8/28/2011 7:00	1.208	8/30/2011 19:00	1.227
8/20/2011 20:00	1.238	8/23/2011 8:00	1.164	8/25/2011 20:00	1.219	8/28/2011 8:00	1.187	8/30/2011 20:00	1.208
8/20/2011 21:00	1.244	8/23/2011 9:00	1.149	8/25/2011 21:00	1.208	8/28/2011 9:00	1.187	8/30/2011 21:00	1.216
8/20/2011 22:00	1.241	8/23/2011 10:00	1.127	8/25/2011 22:00	1.207	8/28/2011 10:00	1.188	8/30/2011 22:00	1.225
8/20/2011 23:00	1.245	8/23/2011 11:00	1.143	8/25/2011 23:00	1.206	8/28/2011 11:00	1.182	8/30/2011 23:00	1.228
8/21/2011 0:00	1.239	8/23/2011 12:00	1.162	8/26/2011 0:00	1.196	8/28/2011 12:00	1.158	8/31/2011 0:00	1.212
8/21/2011 1:00	1.246	8/23/2011 13:00	1.150	8/26/2011 1:00	1.202	8/28/2011 13:00	1.184	8/31/2011 1:00	1.212
8/21/2011 2:00	1.220	8/23/2011 14:00	1.145	8/26/2011 2:00	1.234	8/28/2011 14:00	1.186	8/31/2011 2:00	1.224
8/21/2011 3:00	1.197	8/23/2011 15:00	1.171	8/26/2011 3:00	1.232	8/28/2011 15:00	1.190	8/31/2011 3:00	1.237
8/21/2011 4:00	1.232	8/23/2011 16:00	1.160	8/26/2011 4:00	1.260	8/28/2011 16:00	1.171	8/31/2011 4:00	1.231
8/21/2011 5:00	1.217	8/23/2011 17:00	1.173	8/26/2011 5:00	1.222	8/28/2011 17:00	1.160	8/31/2011 5:00	1.246
8/21/2011 6:00	1.207	8/23/2011 18:00	1.165	8/26/2011 6:00	1.245	8/28/2011 18:00	1.210	8/31/2011 6:00	1.259
8/21/2011 7:00	1.212	8/23/2011 19:00	1.179	8/26/2011 7:00	1.254	8/28/2011 19:00	1.195	8/31/2011 7:00	1.260
8/21/2011 8:00	1.225	8/23/2011 20:00	1.195	8/26/2011 8:00	1.241	8/28/2011 20:00	1.222	8/31/2011 8:00	1.253
8/21/2011 9:00	1.210	8/23/2011 21:00	1.161	8/26/2011 9:00	1.218	8/28/2011 21:00	1.221	8/31/2011 9:00	1.249
8/21/2011 10:00	1.203	8/23/2011 22:00	1.184	8/26/2011 10:00	1.234	8/28/2011 22:00	1.211	8/31/2011 10:00	1.257
8/21/2011 11:00	1.211	8/23/2011 23:00	1.174	8/26/2011 11:00	1.224	8/28/2011 23:00	1.200	8/31/2011 11:00	1.238
8/21/2011 12:00	1.216	8/24/2011 0:00	1.163	8/26/2011 12:00	1.226	8/29/2011 0:00	1.198	8/31/2011 12:00	1.244
8/21/2011 13:00	1.215	8/24/2011 1:00	1.157	8/26/2011 13:00	1.229	8/29/2011 1:00	1.201	8/31/2011 13:00	1.279
8/21/2011 14:00	1.195	8/24/2011 2:00	1.186	8/26/2011 14:00	1.191	8/29/2011 2:00	1.202	8/31/2011 14:00	1.280
8/21/2011 15:00	1.192	8/24/2011 3:00	1.178	8/26/2011 15:00	1.227	8/29/2011 3:00	1.213	8/31/2011 15:00	1.263
8/21/2011 16:00	1.204	8/24/2011 4:00	1.188	8/26/2011 16:00	1.243	8/29/2011 4:00	1.212	8/31/2011 16:00	1.270
8/21/2011 17:00	1.196	8/24/2011 5:00	1.163	8/26/2011 17:00	1.221	8/29/2011 5:00	1.217	8/31/2011 17:00	1.264
8/21/2011 18:00	1.194	8/24/2011 6:00	1.180	8/26/2011 18:00	1.235	8/29/2011 6:00	1.213	8/31/2011 18:00	1.283
8/21/2011 19:00	1.207	8/24/2011 7:00	1.167	8/26/2011 19:00	1.221	8/29/2011 7:00	1.248	8/31/2011 19:00	1.270
8/21/2011 20:00	1.208	8/24/2011 8:00	1.165	8/26/2011 20:00	1.221	8/29/2011 8:00	1.205	8/31/2011 20:00	1.276
8/21/2011 21:00	1.220	8/24/2011 9:00	1.159	8/26/2011 21:00	1.239	8/29/2011 9:00	1.223	8/31/2011 21:00	1.254
8/21/2011 22:00	1.202	8/24/2011 10:00	1.129	8/26/2011 22:00	1.247	8/29/2011 10:00	1.221	8/31/2011 22:00	1.259
8/21/2011 23:00	1.193	8/24/2011 11:00	1.138	8/26/2011 23:00	1.224	8/29/2011 11:00	1.208	8/31/2011 23:00	1.262
8/22/2011 0:00	1.203	8/24/2011 12:00	1.166	8/27/2011 0:00	1.221	8/29/2011 12:00	1.215	9/1/2011 0:00	1.268
8/22/2011 1:00	1.215	8/24/2011 13:00	1.162	8/27/2011 1:00	1.216	8/29/2011 13:00	1.208	9/1/2011 1:00	1.271
8/22/2011 2:00	1.203	8/24/2011 14:00	1.142	8/27/2011 2:00	1.217	8/29/2011 14:00	1.231	9/1/2011 2:00	1.281
8/22/2011 3:00	1.204	8/24/2011 15:00	1.109	8/27/2011 3:00	1.230	8/29/2011 15:00	1.218	9/1/2011 3:00	1.271
8/22/2011 4:00	1.198	8/24/2011 16:00	1.114	8/27/2011 4:00	1.228	8/29/2011 16:00	1.205	9/1/2011 4:00	1.292
8/22/2011 5:00	1.205	8/24/2011 17:00	1.133	8/27/2011 5:00	1.218	8/29/2011 17:00	1.192	9/1/2011 5:00	1.301
8/22/2011 6:00	1.220	8/24/2011 18:00	1.125	8/27/2011 6:00	1.231	8/29/2011 18:00	1.199	9/1/2011 6:00	1.282
8/22/2011 7:00	1.207	8/24/2011 19:00	1.127	8/27/2011 7:00	1.234	8/29/2011 19:00	1.212	9/1/2011 7:00	1.295
8/22/2011 8:00	1.225	8/24/2011 20:00	1.147	8/27/2011 8:00	1.248	8/29/2011 20:00	1.184	9/1/2011 8:00	1.283
8/22/2011 9:00	1.197	8/24/2011 21:00	1.157	8/27/2011 9:00	1.223	8/29/2011 21:00	1.175	9/1/2011 9:00	1.292
8/22/2011 10:00	1.200	8/24/2011 22:00	1.143	8/27/2011 10:00	1.205	8/29/2011 22:00	1.177	9/1/2011 10:00	1.278
8/22/2011 11:00	1.203	8/24/2011 23:00	1.146	8/27/2011 11:00	1.211	8/29/2011 23:00	1.207	9/1/2011 11:00	1.281
8/22/2011 12:00	1.168	8/25/2011 0:00	1.152	8/27/2011 12:00	1.206	8/30/2011 0:00	1.245	9/1/2011 12:00	1.287
8/22/2011 13:00	1.190	8/25/2011 1:00	1.141	8/27/2011 13:00	1.216	8/30/2011 1:00	1.220	9/1/2011 13:00	1.289
8/22/2011 14:00	1.194	8/25/2011 2:00	1.130	8/27/2011 14:00	1.216	8/30/2011 2:00	1.236	9/1/2011 14:00	1.299
8/22/2011 15:00	1.203	8/25/2011 3:00	1.135	8/27/2011 15:00	1.204	8/30/2011 3:00	1.254	9/1/2011 15:00	1.301
8/22/2011 16:00	1.194	8/25/2011 4:00	1.142	8/27/2011 16:00	1.210	8/30/2011 4:00	1.246	9/1/2011 16:00	1.280
8/22/2011 17:00	1.186	8/25/2011 5:00	1.137	8/27/2011 17:00	1.211	8/30/2011 5:00	1.243	9/1/2011 17:00	1.291
8/22/2011 18:00	1.182	8/25/2011 6:00	1.131	8/27/2011 18:00	1.230	8/30/2011 6:00	1.243	9/1/2011 18:00	1.289
8/22/2011 19:00	1.178	8/25/2011 7:00	1.136	8/27/2011 19:00	1.190	8/30/2011 7:00	1.237	9/1/2011 19:00	1.275
8/22/2011 20:00	1.191	8/25/2011 8:00	1.133	8/27/2011 20:00	1.230	8/30/2011 8:00	1.223	9/1/2011 20:00	1.271
8/22/2011 21:00	1.186	8/25/2011 9:00	1.140	8/27/2011 21:00	1.224	8/30/2011 9:00	1.207	9/1/2011 21:00	1.293
8/22/2011 22:00	1.192	8/25/2011 10:00	1.109	8/27/2011 22:00	1.208	8/30/2011 10:00	1.218	9/1/2011 22:00	1.297
8/22/2011 23:00	1.174	8/25/2011 11:00	1.129	8/27/2011 23:00	1.225	8/30/2011 11:00	1.213	9/1/2011 23:00	1.295
8/23/2011 0:00	1.162	8/25/2011 12:00	1.165	8/28/2011 0:00	1.209	8/30/2011 12:00	1.204	9/2/2011 0:00	1.286
8/23/2011 1:00	1.167	8/25/2011 13:00	1.139	8/28/2011 1:00	1.203	8/30/2011 13:00	1.216	9/2/2011 1:00	1.291
8/23/2011 2:00	1.173	8/25/2011 14:00	1.132	8/28/2011 2:00	1.216	8/30/2011 14:00	1.217	9/2/2011 2:00	1.284

Clark Fork at Sager Lane (CFR-F2) (continued)

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
9/2/2011 3:00	1.276	9/4/2011 15:00	1.253	9/7/2011 3:00	1.232	9/9/2011 15:00	1.219	9/12/2011 3:00	1.243
9/2/2011 4:00	1.272	9/4/2011 16:00	1.216	9/7/2011 4:00	1.212	9/9/2011 16:00	1.224	9/12/2011 4:00	1.224
9/2/2011 5:00	1.272	9/4/2011 17:00	1.268	9/7/2011 5:00	1.220	9/9/2011 17:00	1.248	9/12/2011 5:00	1.217
9/2/2011 6:00	1.273	9/4/2011 18:00	1.248	9/7/2011 6:00	1.239	9/9/2011 18:00	1.232	9/12/2011 6:00	1.240
9/2/2011 7:00	1.240	9/4/2011 19:00	1.257	9/7/2011 7:00	1.247	9/9/2011 19:00	1.238	9/12/2011 7:00	1.240
9/2/2011 8:00	1.264	9/4/2011 20:00	1.264	9/7/2011 8:00	1.220	9/9/2011 20:00	1.240	9/12/2011 8:00	1.245
9/2/2011 9:00	1.289	9/4/2011 21:00	1.253	9/7/2011 9:00	1.202	9/9/2011 21:00	1.251	9/12/2011 9:00	1.217
9/2/2011 10:00	1.261	9/4/2011 22:00	1.260	9/7/2011 10:00	1.214	9/9/2011 22:00	1.255	9/12/2011 10:00	1.213
9/2/2011 11:00	1.284	9/4/2011 23:00	1.278	9/7/2011 11:00	1.206	9/9/2011 23:00	1.240	9/12/2011 11:00	1.225
9/2/2011 12:00	1.290	9/5/2011 0:00	1.256	9/7/2011 12:00	1.218	9/10/2011 0:00	1.234	9/12/2011 12:00	1.212
9/2/2011 13:00	1.283	9/5/2011 1:00	1.267	9/7/2011 13:00	1.199	9/10/2011 1:00	1.262	9/12/2011 13:00	1.207
9/2/2011 14:00	1.289	9/5/2011 2:00	1.266	9/7/2011 14:00	1.191	9/10/2011 2:00	1.248	9/12/2011 14:00	1.205
9/2/2011 15:00	1.279	9/5/2011 3:00	1.259	9/7/2011 15:00	1.210	9/10/2011 3:00	1.240	9/12/2011 15:00	1.224
9/2/2011 16:00	1.281	9/5/2011 4:00	1.268	9/7/2011 16:00	1.189	9/10/2011 4:00	1.238	9/12/2011 16:00	1.202
9/2/2011 17:00	1.287	9/5/2011 5:00	1.284	9/7/2011 17:00	1.207	9/10/2011 5:00	1.240	9/12/2011 17:00	1.187
9/2/2011 18:00	1.273	9/5/2011 6:00	1.242	9/7/2011 18:00	1.186	9/10/2011 6:00	1.248	9/12/2011 18:00	1.217
9/2/2011 19:00	1.273	9/5/2011 7:00	1.275	9/7/2011 19:00	1.191	9/10/2011 7:00	1.234	9/12/2011 19:00	1.222
9/2/2011 20:00	1.237	9/5/2011 8:00	1.260	9/7/2011 20:00	1.210	9/10/2011 8:00	1.240	9/12/2011 20:00	1.228
9/2/2011 21:00	1.247	9/5/2011 9:00	1.265	9/7/2011 21:00	1.215	9/10/2011 9:00	1.215	9/12/2011 21:00	1.234
9/2/2011 22:00	1.264	9/5/2011 10:00	1.241	9/7/2011 22:00	1.223	9/10/2011 10:00	1.224	9/12/2011 22:00	1.248
9/2/2011 23:00	1.248	9/5/2011 11:00	1.231	9/7/2011 23:00	1.211	9/10/2011 11:00	1.231	9/12/2011 23:00	1.227
9/3/2011 0:00	1.253	9/5/2011 12:00	1.242	9/8/2011 0:00	1.220	9/10/2011 12:00	1.217	9/13/2011 0:00	1.232
9/3/2011 1:00	1.253	9/5/2011 13:00	1.215	9/8/2011 1:00	1.237	9/10/2011 13:00	1.173	9/13/2011 1:00	1.231
9/3/2011 2:00	1.285	9/5/2011 14:00	1.232	9/8/2011 2:00	1.235	9/10/2011 14:00	1.231	9/13/2011 2:00	1.248
9/3/2011 3:00	1.273	9/5/2011 15:00	1.226	9/8/2011 3:00	1.220	9/10/2011 15:00	1.210	9/13/2011 3:00	1.242
9/3/2011 4:00	1.268	9/5/2011 16:00	1.217	9/8/2011 4:00	1.227	9/10/2011 16:00	1.221	9/13/2011 4:00	1.250
9/3/2011 5:00	1.271	9/5/2011 17:00	1.224	9/8/2011 5:00	1.229	9/10/2011 17:00	1.213	9/13/2011 5:00	1.246
9/3/2011 6:00	1.277	9/5/2011 18:00	1.235	9/8/2011 6:00	1.227	9/10/2011 18:00	1.234	9/13/2011 6:00	1.253
9/3/2011 7:00	1.277	9/5/2011 19:00	1.217	9/8/2011 7:00	1.237	9/10/2011 19:00	1.252	9/13/2011 7:00	1.255
9/3/2011 8:00	1.258	9/5/2011 20:00	1.234	9/8/2011 8:00	1.232	9/10/2011 20:00	1.240	9/13/2011 8:00	1.257
9/3/2011 9:00	1.259	9/5/2011 21:00	1.227	9/8/2011 9:00	1.222	9/10/2011 21:00	1.236	9/13/2011 9:00	1.237
9/3/2011 10:00	1.253	9/5/2011 22:00	1.216	9/8/2011 10:00	1.208	9/10/2011 22:00	1.245	9/13/2011 10:00	1.217
9/3/2011 11:00	1.243	9/5/2011 23:00	1.244	9/8/2011 11:00	1.221	9/10/2011 23:00	1.228	9/13/2011 11:00	1.223
9/3/2011 12:00	1.244	9/6/2011 0:00	1.238	9/8/2011 12:00	1.243	9/11/2011 0:00	1.227	9/13/2011 12:00	1.236
9/3/2011 13:00	1.244	9/6/2011 1:00	1.232	9/8/2011 13:00	1.211	9/11/2011 1:00	1.235	9/13/2011 13:00	1.245
9/3/2011 14:00	1.256	9/6/2011 2:00	1.248	9/8/2011 14:00	1.217	9/11/2011 2:00	1.236	9/13/2011 14:00	1.209
9/3/2011 15:00	1.252	9/6/2011 3:00	1.218	9/8/2011 15:00	1.199	9/11/2011 3:00	1.260	9/13/2011 15:00	1.261
9/3/2011 16:00	1.250	9/6/2011 4:00	1.245	9/8/2011 16:00	1.217	9/11/2011 4:00	1.234	9/13/2011 16:00	1.234
9/3/2011 17:00	1.241	9/6/2011 5:00	1.247	9/8/2011 17:00	1.228	9/11/2011 5:00	1.249	9/13/2011 17:00	1.243
9/3/2011 18:00	1.243	9/6/2011 6:00	1.228	9/8/2011 18:00	1.238	9/11/2011 6:00	1.246	9/13/2011 18:00	1.242
9/3/2011 19:00	1.266	9/6/2011 7:00	1.243	9/8/2011 19:00	1.243	9/11/2011 7:00	1.237	9/13/2011 19:00	1.247
9/3/2011 20:00	1.278	9/6/2011 8:00	1.233	9/8/2011 20:00	1.238	9/11/2011 8:00	1.236	9/13/2011 20:00	1.258
9/3/2011 21:00	1.260	9/6/2011 9:00	1.225	9/8/2011 21:00	1.221	9/11/2011 9:00	1.214	9/13/2011 21:00	1.253
9/3/2011 22:00	1.263	9/6/2011 10:00	1.238	9/8/2011 22:00	1.245	9/11/2011 10:00	1.218	9/13/2011 22:00	1.256
9/3/2011 23:00	1.275	9/6/2011 11:00	1.201	9/8/2011 23:00	1.226	9/11/2011 11:00	1.216	9/13/2011 23:00	1.242
9/4/2011 0:00	1.283	9/6/2011 12:00	1.207	9/9/2011 0:00	1.233	9/11/2011 12:00	1.228	9/14/2011 0:00	1.242
9/4/2011 1:00	1.272	9/6/2011 13:00	1.235	9/9/2011 1:00	1.218	9/11/2011 13:00	1.225	9/14/2011 1:00	1.232
9/4/2011 2:00	1.270	9/6/2011 14:00	1.192	9/9/2011 2:00	1.229	9/11/2011 14:00	1.220	9/14/2011 2:00	1.260
9/4/2011 3:00	1.293	9/6/2011 15:00	1.222	9/9/2011 3:00	1.236	9/11/2011 15:00	1.195	9/14/2011 3:00	1.242
9/4/2011 4:00	1.287	9/6/2011 16:00	1.212	9/9/2011 4:00	1.224	9/11/2011 16:00	1.223	9/14/2011 4:00	1.257
9/4/2011 5:00	1.262	9/6/2011 17:00	1.187	9/9/2011 5:00	1.231	9/11/2011 17:00	1.223	9/14/2011 5:00	1.244
9/4/2011 6:00	1.275	9/6/2011 18:00	1.227	9/9/2011 6:00	1.241	9/11/2011 18:00	1.217	9/14/2011 6:00	1.260
9/4/2011 7:00	1.283	9/6/2011 19:00	1.231	9/9/2011 7:00	1.249	9/11/2011 19:00	1.226	9/14/2011 7:00	1.257
9/4/2011 8:00	1.276	9/6/2011 20:00	1.255	9/9/2011 8:00	1.250	9/11/2011 20:00	1.232	9/14/2011 8:00	1.249
9/4/2011 9:00	1.240	9/6/2011 21:00	1.239	9/9/2011 9:00	1.219	9/11/2011 21:00	1.226	9/14/2011 9:00	1.238
9/4/2011 10:00	1.244	9/6/2011 22:00	1.238	9/9/2011 10:00	1.224	9/11/2011 22:00	1.225	9/14/2011 10:00	1.242
9/4/2011 11:00	1.264	9/6/2011 23:00	1.241	9/9/2011 11:00	1.214	9/11/2011 23:00	1.228	9/14/2011 11:00	1.242
9/4/2011 12:00	1.251	9/7/2011 0:00	1.229	9/9/2011 12:00	1.228	9/12/2011 0:00	1.226	9/14/2011 12:00	1.249
9/4/2011 13:00	1.242	9/7/2011 1:00	1.208	9/9/2011 13:00	1.228	9/12/2011 1:00	1.222	9/14/2011 13:00	1.225
9/4/2011 14:00	1.265	9/7/2011 2:00	1.215	9/9/2011 14:00	1.237	9/12/2011 2:00	1.245	9/14/2011 14:00	1.260

Clark Fork at Sager Lane (CFR-F2) (continued)

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
9/14/2011 15:00	1.261	9/17/2011 3:00	1.313	9/19/2011 15:00	1.261	9/22/2011 3:00	1.283	9/24/2011 15:00	1.203
9/14/2011 16:00	1.256	9/17/2011 4:00	1.306	9/19/2011 16:00	1.252	9/22/2011 4:00	1.299	9/24/2011 16:00	1.211
9/14/2011 17:00	1.258	9/17/2011 5:00	1.303	9/19/2011 17:00	1.293	9/22/2011 5:00	1.304	9/24/2011 17:00	1.193
9/14/2011 18:00	1.234	9/17/2011 6:00	1.305	9/19/2011 18:00	1.305	9/22/2011 6:00	1.273	9/24/2011 18:00	1.217
9/14/2011 19:00	1.264	9/17/2011 7:00	1.309	9/19/2011 19:00	1.281	9/22/2011 7:00	1.295	9/24/2011 19:00	1.230
9/14/2011 20:00	1.263	9/17/2011 8:00	1.310	9/19/2011 20:00	1.274	9/22/2011 8:00	1.300	9/24/2011 20:00	1.240
9/14/2011 21:00	1.271	9/17/2011 9:00	1.298	9/19/2011 21:00	1.271	9/22/2011 9:00	1.264	9/24/2011 21:00	1.223
9/14/2011 22:00	1.264	9/17/2011 10:00	1.284	9/19/2011 22:00	1.264	9/22/2011 10:00	1.277	9/24/2011 22:00	1.222
9/14/2011 23:00	1.262	9/17/2011 11:00	1.294	9/19/2011 23:00	1.293	9/22/2011 11:00	1.289	9/24/2011 23:00	1.230
9/15/2011 0:00	1.266	9/17/2011 12:00	1.292	9/20/2011 0:00	1.276	9/22/2011 12:00	1.250	9/25/2011 0:00	1.218
9/15/2011 1:00	1.265	9/17/2011 13:00	1.298	9/20/2011 1:00	1.270	9/22/2011 13:00	1.272	9/25/2011 1:00	1.219
9/15/2011 2:00	1.257	9/17/2011 14:00	1.290	9/20/2011 2:00	1.271	9/22/2011 14:00	1.257	9/25/2011 2:00	1.252
9/15/2011 3:00	1.261	9/17/2011 15:00	1.305	9/20/2011 3:00	1.270	9/22/2011 15:00	1.253	9/25/2011 3:00	1.231
9/15/2011 4:00	1.258	9/17/2011 16:00	1.292	9/20/2011 4:00	1.285	9/22/2011 16:00	1.268	9/25/2011 4:00	1.215
9/15/2011 5:00	1.264	9/17/2011 17:00	1.295	9/20/2011 5:00	1.292	9/22/2011 17:00	1.257	9/25/2011 5:00	1.238
9/15/2011 6:00	1.259	9/17/2011 18:00	1.300	9/20/2011 6:00	1.285	9/22/2011 18:00	1.265	9/25/2011 6:00	1.230
9/15/2011 7:00	1.275	9/17/2011 19:00	1.296	9/20/2011 7:00	1.296	9/22/2011 19:00	1.263	9/25/2011 7:00	1.215
9/15/2011 8:00	1.258	9/17/2011 20:00	1.307	9/20/2011 8:00	1.278	9/22/2011 20:00	1.280	9/25/2011 8:00	1.213
9/15/2011 9:00	1.272	9/17/2011 21:00	1.321	9/20/2011 9:00	1.280	9/22/2011 21:00	1.287	9/25/2011 9:00	1.220
9/15/2011 10:00	1.233	9/17/2011 22:00	1.277	9/20/2011 10:00	1.277	9/22/2011 22:00	1.273	9/25/2011 10:00	1.190
9/15/2011 11:00	1.248	9/17/2011 23:00	1.282	9/20/2011 11:00	1.266	9/22/2011 23:00	1.261	9/25/2011 11:00	1.234
9/15/2011 12:00	1.226	9/18/2011 0:00	1.282	9/20/2011 12:00	1.278	9/23/2011 0:00	1.269	9/25/2011 12:00	1.170
9/15/2011 13:00	1.270	9/18/2011 1:00	1.293	9/20/2011 13:00	1.278	9/23/2011 1:00	1.259	9/25/2011 13:00	1.176
9/15/2011 14:00	1.264	9/18/2011 2:00	1.295	9/20/2011 14:00	1.276	9/23/2011 2:00	1.271	9/25/2011 14:00	1.188
9/15/2011 15:00	1.251	9/18/2011 3:00	1.277	9/20/2011 15:00	1.286	9/23/2011 3:00	1.276	9/25/2011 15:00	1.193
9/15/2011 16:00	1.263	9/18/2011 4:00	1.270	9/20/2011 16:00	1.272	9/23/2011 4:00	1.269	9/25/2011 16:00	1.193
9/15/2011 17:00	1.255	9/18/2011 5:00	1.270	9/20/2011 17:00	1.265	9/23/2011 5:00	1.290	9/25/2011 17:00	1.184
9/15/2011 18:00	1.246	9/18/2011 6:00	1.283	9/20/2011 18:00	1.272	9/23/2011 6:00	1.281	9/25/2011 18:00	1.186
9/15/2011 19:00	1.219	9/18/2011 7:00	1.267	9/20/2011 19:00	1.274	9/23/2011 7:00	1.260	9/25/2011 19:00	1.191
9/15/2011 20:00	1.253	9/18/2011 8:00	1.297	9/20/2011 20:00	1.291	9/23/2011 8:00	1.302	9/25/2011 20:00	1.205
9/15/2011 21:00	1.256	9/18/2011 9:00	1.287	9/20/2011 21:00	1.279	9/23/2011 9:00	1.266	9/25/2011 21:00	1.208
9/15/2011 22:00	1.251	9/18/2011 10:00	1.281	9/20/2011 22:00	1.296	9/23/2011 10:00	1.252	9/25/2011 22:00	1.190
9/15/2011 23:00	1.259	9/18/2011 11:00	1.286	9/20/2011 23:00	1.273	9/23/2011 11:00	1.260	9/25/2011 23:00	1.186
9/16/2011 0:00	1.279	9/18/2011 12:00	1.281	9/21/2011 0:00	1.271	9/23/2011 12:00	1.256	9/26/2011 0:00	1.195
9/16/2011 1:00	1.251	9/18/2011 13:00	1.286	9/21/2011 1:00	1.290	9/23/2011 13:00	1.254	9/26/2011 1:00	1.180
9/16/2011 2:00	1.265	9/18/2011 14:00	1.263	9/21/2011 2:00	1.285	9/23/2011 14:00	1.242	9/26/2011 2:00	1.190
9/16/2011 3:00	1.255	9/18/2011 15:00	1.273	9/21/2011 3:00	1.282	9/23/2011 15:00	1.235	9/26/2011 3:00	1.193
9/16/2011 4:00	1.267	9/18/2011 16:00	1.297	9/21/2011 4:00	1.276	9/23/2011 16:00	1.257	9/26/2011 4:00	1.192
9/16/2011 5:00	1.277	9/18/2011 17:00	1.288	9/21/2011 5:00	1.291	9/23/2011 17:00	1.241	9/26/2011 5:00	1.173
9/16/2011 6:00	1.294	9/18/2011 18:00	1.274	9/21/2011 6:00	1.282	9/23/2011 18:00	1.253	9/26/2011 6:00	1.185
9/16/2011 7:00	1.296	9/18/2011 19:00	1.282	9/21/2011 7:00	1.288	9/23/2011 19:00	1.268	9/26/2011 7:00	1.192
9/16/2011 8:00	1.315	9/18/2011 20:00	1.281	9/21/2011 8:00	1.295	9/23/2011 20:00	1.256	9/26/2011 8:00	1.184
9/16/2011 9:00	1.310	9/18/2011 21:00	1.290	9/21/2011 9:00	1.267	9/23/2011 21:00	1.271	9/26/2011 9:00	1.153
9/16/2011 10:00	1.299	9/18/2011 22:00	1.275	9/21/2011 10:00	1.253	9/23/2011 22:00	1.243	9/26/2011 10:00	1.169
9/16/2011 11:00	1.301	9/18/2011 23:00	1.264	9/21/2011 11:00	1.267	9/23/2011 23:00	1.266	9/26/2011 11:00	1.178
9/16/2011 12:00	1.303	9/19/2011 0:00	1.274	9/21/2011 12:00	1.270	9/24/2011 0:00	1.249	9/26/2011 12:00	1.164
9/16/2011 13:00	1.300	9/19/2011 1:00	1.277	9/21/2011 13:00	1.275	9/24/2011 1:00	1.246	9/26/2011 13:00	1.173
9/16/2011 14:00	1.308	9/19/2011 2:00	1.285	9/21/2011 14:00	1.272	9/24/2011 2:00	1.232	9/26/2011 14:00	1.169
9/16/2011 15:00	1.316	9/19/2011 3:00	1.277	9/21/2011 15:00	1.259	9/24/2011 3:00	1.240	9/26/2011 15:00	1.176
9/16/2011 16:00	1.310	9/19/2011 4:00	1.277	9/21/2011 16:00	1.283	9/24/2011 4:00	1.254	9/26/2011 16:00	1.162
9/16/2011 17:00	1.312	9/19/2011 5:00	1.286	9/21/2011 17:00	1.276	9/24/2011 5:00	1.234	9/26/2011 17:00	1.189
9/16/2011 18:00	1.309	9/19/2011 6:00	1.276	9/21/2011 18:00	1.294	9/24/2011 6:00	1.278	9/26/2011 18:00	1.163
9/16/2011 19:00	1.303	9/19/2011 7:00	1.260	9/21/2011 19:00	1.291	9/24/2011 7:00	1.252	9/26/2011 19:00	1.185
9/16/2011 20:00	1.325	9/19/2011 8:00	1.272	9/21/2011 20:00	1.280	9/24/2011 8:00	1.243	9/26/2011 20:00	1.194
9/16/2011 21:00	1.301	9/19/2011 9:00	1.249	9/21/2011 21:00	1.295	9/24/2011 9:00	1.232	9/26/2011 21:00	1.189
9/16/2011 22:00	1.303	9/19/2011 10:00	1.269	9/21/2011 22:00	1.300	9/24/2011 10:00	1.220	9/26/2011 22:00	1.206
9/16/2011 23:00	1.309	9/19/2011 11:00	1.264	9/21/2011 23:00	1.302	9/24/2011 11:00	1.218	9/26/2011 23:00	1.200
9/17/2011 0:00	1.328	9/19/2011 12:00	1.274	9/22/2011 0:00	1.299	9/24/2011 12:00	1.211	9/27/2011 0:00	1.190
9/17/2011 1:00	1.327	9/19/2011 13:00	1.278	9/22/2011 1:00	1.295	9/24/2011 13:00	1.221	9/27/2011 1:00	1.203
9/17/2011 2:00	1.305	9/19/2011 14:00	1.281	9/22/2011 2:00	1.296	9/24/2011 14:00	1.227	9/27/2011 2:00	1.191

Clark Fork at Sager Lane (CFR-F2) (continued)

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
9/27/2011 3:00	1.195	9/29/2011 15:00	1.203	10/2/2011 3:00	1.251	10/4/2011 15:00	1.287	10/7/2011 3:00	1.442
9/27/2011 4:00	1.214	9/29/2011 16:00	1.179	10/2/2011 4:00	1.252	10/4/2011 16:00	1.279	10/7/2011 4:00	1.440
9/27/2011 5:00	1.198	9/29/2011 17:00	1.174	10/2/2011 5:00	1.252	10/4/2011 17:00	1.277	10/7/2011 5:00	1.402
9/27/2011 6:00	1.196	9/29/2011 18:00	1.170	10/2/2011 6:00	1.252	10/4/2011 18:00	1.292	10/7/2011 6:00	1.424
9/27/2011 7:00	1.196	9/29/2011 19:00	1.187	10/2/2011 7:00	1.272	10/4/2011 19:00	1.300	10/7/2011 7:00	1.423
9/27/2011 8:00	1.204	9/29/2011 20:00	1.189	10/2/2011 8:00	1.271	10/4/2011 20:00	1.315	10/7/2011 8:00	1.417
9/27/2011 9:00	1.185	9/29/2011 21:00	1.206	10/2/2011 9:00	1.261	10/4/2011 21:00	1.312	10/7/2011 9:00	1.404
9/27/2011 10:00	1.178	9/29/2011 22:00	1.219	10/2/2011 10:00	1.259	10/4/2011 22:00	1.338	10/7/2011 10:00	1.431
9/27/2011 11:00	1.167	9/29/2011 23:00	1.204	10/2/2011 11:00	1.264	10/4/2011 23:00	1.319	10/7/2011 11:00	1.426
9/27/2011 12:00	1.154	9/30/2011 0:00	1.177	10/2/2011 12:00	1.252	10/5/2011 0:00	1.353	10/7/2011 12:00	1.418
9/27/2011 13:00	1.168	9/30/2011 1:00	1.196	10/2/2011 13:00	1.244	10/5/2011 1:00	1.344	10/7/2011 13:00	1.422
9/27/2011 14:00	1.160	9/30/2011 2:00	1.194	10/2/2011 14:00	1.220	10/5/2011 2:00	1.358	10/7/2011 14:00	1.410
9/27/2011 15:00	1.170	9/30/2011 3:00	1.212	10/2/2011 15:00	1.262	10/5/2011 3:00	1.364	10/7/2011 15:00	1.420
9/27/2011 16:00	1.161	9/30/2011 4:00	1.199	10/2/2011 16:00	1.245	10/5/2011 4:00	1.378	10/7/2011 16:00	1.407
9/27/2011 17:00	1.172	9/30/2011 5:00	1.205	10/2/2011 17:00	1.220	10/5/2011 5:00	1.399	10/7/2011 17:00	1.402
9/27/2011 18:00	1.181	9/30/2011 6:00	1.206	10/2/2011 18:00	1.246	10/5/2011 6:00	1.405	10/7/2011 18:00	1.414
9/27/2011 19:00	1.189	9/30/2011 7:00	1.208	10/2/2011 19:00	1.246	10/5/2011 7:00	1.418	10/7/2011 19:00	1.417
9/27/2011 20:00	1.186	9/30/2011 8:00	1.200	10/2/2011 20:00	1.253	10/5/2011 8:00	1.432	10/7/2011 20:00	1.438
9/27/2011 21:00	1.195	9/30/2011 9:00	1.197	10/2/2011 21:00	1.260	10/5/2011 9:00	1.435	10/7/2011 21:00	1.431
9/27/2011 22:00	1.170	9/30/2011 10:00	1.185	10/2/2011 22:00	1.280	10/5/2011 10:00	1.425	10/7/2011 22:00	1.425
9/27/2011 23:00	1.174	9/30/2011 11:00	1.180	10/2/2011 23:00	1.248	10/5/2011 11:00	1.434	10/7/2011 23:00	1.425
9/28/2011 0:00	1.177	9/30/2011 12:00	1.235	10/3/2011 0:00	1.256	10/5/2011 12:00	1.414	10/8/2011 0:00	1.432
9/28/2011 1:00	1.176	9/30/2011 13:00	1.177	10/3/2011 1:00	1.256	10/5/2011 13:00	1.424	10/8/2011 1:00	1.431
9/28/2011 2:00	1.170	9/30/2011 14:00	1.144	10/3/2011 2:00	1.267	10/5/2011 14:00	1.422	10/8/2011 2:00	1.415
9/28/2011 3:00	1.171	9/30/2011 15:00	1.200	10/3/2011 3:00	1.253	10/5/2011 15:00	1.375	10/8/2011 3:00	1.443
9/28/2011 4:00	1.173	9/30/2011 16:00	1.194	10/3/2011 4:00	1.263	10/5/2011 16:00	1.391	10/8/2011 4:00	1.439
9/28/2011 5:00	1.164	9/30/2011 17:00	1.219	10/3/2011 5:00	1.261	10/5/2011 17:00	1.398	10/8/2011 5:00	1.430
9/28/2011 6:00	1.200	9/30/2011 18:00	1.213	10/3/2011 6:00	1.251	10/5/2011 18:00	1.393	10/8/2011 6:00	1.427
9/28/2011 7:00	1.176	9/30/2011 19:00	1.203	10/3/2011 7:00	1.250	10/5/2011 19:00	1.432	10/8/2011 7:00	1.433
9/28/2011 8:00	1.181	9/30/2011 20:00	1.233	10/3/2011 8:00	1.254	10/5/2011 20:00	1.431	10/8/2011 8:00	1.440
9/28/2011 9:00	1.174	9/30/2011 21:00	1.244	10/3/2011 9:00	1.242	10/5/2011 21:00	1.431	10/8/2011 9:00	1.455
9/28/2011 10:00	1.167	9/30/2011 22:00	1.216	10/3/2011 10:00	1.218	10/5/2011 22:00	1.471	10/8/2011 10:00	1.406
9/28/2011 11:00	1.152	9/30/2011 23:00	1.198	10/3/2011 11:00	1.221	10/5/2011 23:00	1.445	10/8/2011 11:00	1.416
9/28/2011 12:00	1.155	10/1/2011 0:00	1.209	10/3/2011 12:00	1.238	10/6/2011 0:00	1.435	10/8/2011 12:00	1.408
9/28/2011 13:00	1.171	10/1/2011 1:00	1.204	10/3/2011 13:00	1.242	10/6/2011 1:00	1.448	10/8/2011 13:00	1.418
9/28/2011 14:00	1.178	10/1/2011 2:00	1.194	10/3/2011 14:00	1.225	10/6/2011 2:00	1.414	10/8/2011 14:00	1.422
9/28/2011 15:00	1.180	10/1/2011 3:00	1.216	10/3/2011 15:00	1.211	10/6/2011 3:00	1.414	10/8/2011 15:00	1.431
9/28/2011 16:00	1.190	10/1/2011 4:00	1.184	10/3/2011 16:00	1.219	10/6/2011 4:00	1.426	10/8/2011 16:00	1.413
9/28/2011 17:00	1.177	10/1/2011 5:00	1.201	10/3/2011 17:00	1.242	10/6/2011 5:00	1.411	10/8/2011 17:00	1.425
9/28/2011 18:00	1.186	10/1/2011 6:00	1.211	10/3/2011 18:00	1.212	10/6/2011 6:00	1.418	10/8/2011 18:00	1.416
9/28/2011 19:00	1.194	10/1/2011 7:00	1.205	10/3/2011 19:00	1.245	10/6/2011 7:00	1.425	10/8/2011 19:00	1.441
9/28/2011 20:00	1.184	10/1/2011 8:00	1.216	10/3/2011 20:00	1.258	10/6/2011 8:00	1.400	10/8/2011 20:00	1.425
9/28/2011 21:00	1.184	10/1/2011 9:00	1.193	10/3/2011 21:00	1.269	10/6/2011 9:00	1.411	10/8/2011 21:00	1.428
9/28/2011 22:00	1.185	10/1/2011 10:00	1.183	10/3/2011 22:00	1.271	10/6/2011 10:00	1.395	10/8/2011 22:00	1.454
9/28/2011 23:00	1.189	10/1/2011 11:00	1.187	10/3/2011 23:00	1.249	10/6/2011 11:00	1.411	10/8/2011 23:00	1.451
9/29/2011 0:00	1.183	10/1/2011 12:00	1.194	10/4/2011 0:00	1.232	10/6/2011 12:00	1.416	10/9/2011 0:00	1.447
9/29/2011 1:00	1.183	10/1/2011 13:00	1.211	10/4/2011 1:00	1.236	10/6/2011 13:00	1.383	10/9/2011 1:00	1.433
9/29/2011 2:00	1.188	10/1/2011 14:00	1.232	10/4/2011 2:00	1.233	10/6/2011 14:00	1.410	10/9/2011 2:00	1.426
9/29/2011 3:00	1.207	10/1/2011 15:00	1.229	10/4/2011 3:00	1.235	10/6/2011 15:00	1.425	10/9/2011 3:00	1.434
9/29/2011 4:00	1.195	10/1/2011 16:00	1.213	10/4/2011 4:00	1.217	10/6/2011 16:00	1.409	10/9/2011 4:00	1.463
9/29/2011 5:00	1.194	10/1/2011 17:00	1.249	10/4/2011 5:00	1.219	10/6/2011 17:00	1.416	10/9/2011 5:00	1.485
9/29/2011 6:00	1.192	10/1/2011 18:00	1.260	10/4/2011 6:00	1.210	10/6/2011 18:00	1.422	10/9/2011 6:00	1.469
9/29/2011 7:00	1.212	10/1/2011 19:00	1.261	10/4/2011 7:00	1.213	10/6/2011 19:00	1.424	10/9/2011 7:00	1.481
9/29/2011 8:00	1.188	10/1/2011 20:00	1.270	10/4/2011 8:00	1.221	10/6/2011 20:00	1.417	10/9/2011 8:00	1.479
9/29/2011 9:00	1.187	10/1/2011 21:00	1.242	10/4/2011 9:00	1.236	10/6/2011 21:00	1.432	10/9/2011 9:00	1.467
9/29/2011 10:00	1.157	10/1/2011 22:00	1.270	10/4/2011 10:00	1.231	10/6/2011 22:00	1.414	10/9/2011 10:00	1.448
9/29/2011 11:00	1.162	10/1/2011 23:00	1.262	10/4/2011 11:00	1.237	10/6/2011 23:00	1.399	10/9/2011 11:00	1.452
9/29/2011 12:00	1.170	10/2/2011 0:00	1.251	10/4/2011 12:00	1.270	10/7/2011 0:00	1.418	10/9/2011 12:00	1.448
9/29/2011 13:00	1.167	10/2/2011 1:00	1.240	10/4/2011 13:00	1.249	10/7/2011 1:00	1.421	10/9/2011 13:00	1.472
9/29/2011 14:00	1.180	10/2/2011 2:00	1.251	10/4/2011 14:00	1.292	10/7/2011 2:00	1.414	10/9/2011 14:00	1.453

Clark Fork at Sager Lane (CFR-F2) (continued)

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
10/9/2011 15:00	1.461	10/12/2011 3:00	1.491	10/14/2011 15:00	1.526	10/17/2011 3:00	1.710	10/19/2011 15:00	1.605
10/9/2011 16:00	1.459	10/12/2011 4:00	1.468	10/14/2011 16:00	1.528	10/17/2011 4:00	1.703	10/19/2011 16:00	1.613
10/9/2011 17:00	1.441	10/12/2011 5:00	1.476	10/14/2011 17:00	1.510	10/17/2011 5:00	1.703	10/19/2011 17:00	1.594
10/9/2011 18:00	1.462	10/12/2011 6:00	1.498	10/14/2011 18:00	1.533	10/17/2011 6:00	1.687	10/19/2011 18:00	1.618
10/9/2011 19:00	1.484	10/12/2011 7:00	1.487	10/14/2011 19:00	1.545	10/17/2011 7:00	1.715	10/19/2011 19:00	1.627
10/9/2011 20:00	1.454	10/12/2011 8:00	1.491	10/14/2011 20:00	1.545	10/17/2011 8:00	1.713	10/19/2011 20:00	1.622
10/9/2011 21:00	1.496	10/12/2011 9:00	1.494	10/14/2011 21:00	1.535	10/17/2011 9:00	1.668	10/19/2011 21:00	1.618
10/9/2011 22:00	1.476	10/12/2011 10:00	1.472	10/14/2011 22:00	1.593	10/17/2011 10:00	1.662	10/19/2011 22:00	1.645
10/9/2011 23:00	1.496	10/12/2011 11:00	1.466	10/14/2011 23:00	1.592	10/17/2011 11:00	1.672	10/19/2011 23:00	1.625
10/10/2011 0:00	1.494	10/12/2011 12:00	1.464	10/15/2011 0:00	1.559	10/17/2011 12:00	1.680	10/20/2011 0:00	1.648
10/10/2011 1:00	1.479	10/12/2011 13:00	1.469	10/15/2011 1:00	1.560	10/17/2011 13:00	1.677	10/20/2011 1:00	1.638
10/10/2011 2:00	1.474	10/12/2011 14:00	1.492	10/15/2011 2:00	1.561	10/17/2011 14:00	1.681	10/20/2011 2:00	1.649
10/10/2011 3:00	1.476	10/12/2011 15:00	1.480	10/15/2011 3:00	1.571	10/17/2011 15:00	1.622	10/20/2011 3:00	1.650
10/10/2011 4:00	1.467	10/12/2011 16:00	1.473	10/15/2011 4:00	1.590	10/17/2011 16:00	1.660	10/20/2011 4:00	1.644
10/10/2011 5:00	1.485	10/12/2011 17:00	1.468	10/15/2011 5:00	1.573	10/17/2011 17:00	1.677	10/20/2011 5:00	1.627
10/10/2011 6:00	1.478	10/12/2011 18:00	1.473	10/15/2011 6:00	1.549	10/17/2011 18:00	1.678	10/20/2011 6:00	1.663
10/10/2011 7:00	1.469	10/12/2011 19:00	1.484	10/15/2011 7:00	1.554	10/17/2011 19:00	1.683	10/20/2011 7:00	1.642
10/10/2011 8:00	1.489	10/12/2011 20:00	1.487	10/15/2011 8:00	1.554	10/17/2011 20:00	1.678	10/20/2011 8:00	1.644
10/10/2011 9:00	1.468	10/12/2011 21:00	1.495	10/15/2011 9:00	1.582	10/17/2011 21:00	1.719	10/20/2011 9:00	1.642
10/10/2011 10:00	1.435	10/12/2011 22:00	1.465	10/15/2011 10:00	1.578	10/17/2011 22:00	1.672	10/20/2011 10:00	1.614
10/10/2011 11:00	1.435	10/12/2011 23:00	1.464	10/15/2011 11:00	1.582	10/17/2011 23:00	1.684	10/20/2011 11:00	1.646
10/10/2011 12:00	1.417	10/13/2011 0:00	1.506	10/15/2011 12:00	1.610	10/18/2011 0:00	1.653	10/20/2011 12:00	1.614
10/10/2011 13:00	1.444	10/13/2011 1:00	1.501	10/15/2011 13:00	1.579	10/18/2011 1:00	1.635	10/20/2011 13:00	1.626
10/10/2011 14:00	1.436	10/13/2011 2:00	1.481	10/15/2011 14:00	1.615	10/18/2011 2:00	1.676	10/20/2011 14:00	1.624
10/10/2011 15:00	1.446	10/13/2011 3:00	1.509	10/15/2011 15:00	1.613	10/18/2011 3:00	1.645	10/20/2011 15:00	1.630
10/10/2011 16:00	1.449	10/13/2011 4:00	1.507	10/15/2011 16:00	1.620	10/18/2011 4:00	1.665	10/20/2011 16:00	1.616
10/10/2011 17:00	1.455	10/13/2011 5:00	1.516	10/15/2011 17:00	1.629	10/18/2011 5:00	1.643	10/20/2011 17:00	1.635
10/10/2011 18:00	1.463	10/13/2011 6:00	1.509	10/15/2011 18:00	1.626	10/18/2011 6:00	1.626	10/20/2011 18:00	1.643
10/10/2011 19:00	1.457	10/13/2011 7:00	1.504	10/15/2011 19:00	1.631	10/18/2011 7:00	1.637	10/20/2011 19:00	1.632
10/10/2011 20:00	1.479	10/13/2011 8:00	1.501	10/15/2011 20:00	1.635	10/18/2011 8:00	1.661	10/20/2011 20:00	1.634
10/10/2011 21:00	1.484	10/13/2011 9:00	1.540	10/15/2011 21:00	1.636	10/18/2011 9:00	1.637	10/20/2011 21:00	1.608
10/10/2011 22:00	1.463	10/13/2011 10:00	1.515	10/15/2011 22:00	1.648	10/18/2011 10:00	1.618	10/20/2011 22:00	1.616
10/10/2011 23:00	1.453	10/13/2011 11:00	1.510	10/15/2011 23:00	1.655	10/18/2011 11:00	1.589	10/20/2011 23:00	1.621
10/11/2011 0:00	1.467	10/13/2011 12:00	1.529	10/16/2011 0:00	1.665	10/18/2011 12:00	1.619	10/21/2011 0:00	1.617
10/11/2011 1:00	1.456	10/13/2011 13:00	1.494	10/16/2011 1:00	1.664	10/18/2011 13:00	1.600	10/21/2011 1:00	1.639
10/11/2011 2:00	1.484	10/13/2011 14:00	1.508	10/16/2011 2:00	1.676	10/18/2011 14:00	1.618	10/21/2011 2:00	1.628
10/11/2011 3:00	1.485	10/13/2011 15:00	1.504	10/16/2011 3:00	1.675	10/18/2011 15:00	1.635	10/21/2011 3:00	1.623
10/11/2011 4:00	1.461	10/13/2011 16:00	1.505	10/16/2011 4:00	1.672	10/18/2011 16:00	1.642	10/21/2011 4:00	1.617
10/11/2011 5:00	1.475	10/13/2011 17:00	1.516	10/16/2011 5:00	1.693	10/18/2011 17:00	1.606	10/21/2011 5:00	1.640
10/11/2011 6:00	1.456	10/13/2011 18:00	1.495	10/16/2011 6:00	1.671	10/18/2011 18:00	1.625	10/21/2011 6:00	1.610
10/11/2011 7:00	1.449	10/13/2011 19:00	1.527	10/16/2011 7:00	1.665	10/18/2011 19:00	1.643	10/21/2011 7:00	1.637
10/11/2011 8:00	1.459	10/13/2011 20:00	1.518	10/16/2011 8:00	1.707	10/18/2011 20:00	1.620	10/21/2011 8:00	1.613
10/11/2011 9:00	1.475	10/13/2011 21:00	1.523	10/16/2011 9:00	1.685	10/18/2011 21:00	1.650	10/21/2011 9:00	1.589
10/11/2011 10:00	1.452	10/13/2011 22:00	1.517	10/16/2011 10:00	1.691	10/18/2011 22:00	1.655	10/21/2011 10:00	1.595
10/11/2011 11:00	1.439	10/13/2011 23:00	1.511	10/16/2011 11:00	1.659	10/18/2011 23:00	1.652	10/21/2011 11:00	1.602
10/11/2011 12:00	1.448	10/14/2011 0:00	1.517	10/16/2011 12:00	1.665	10/19/2011 0:00	1.647	10/21/2011 12:00	1.564
10/11/2011 13:00	1.454	10/14/2011 1:00	1.512	10/16/2011 13:00	1.680	10/19/2011 1:00	1.651	10/21/2011 13:00	1.592
10/11/2011 14:00	1.467	10/14/2011 2:00	1.527	10/16/2011 14:00	1.684	10/19/2011 2:00	1.663	10/21/2011 14:00	1.600
10/11/2011 15:00	1.442	10/14/2011 3:00	1.525	10/16/2011 15:00	1.662	10/19/2011 3:00	1.680	10/21/2011 15:00	1.586
10/11/2011 16:00	1.463	10/14/2011 4:00	1.526	10/16/2011 16:00	1.719	10/19/2011 4:00	1.667	10/21/2011 16:00	1.604
10/11/2011 17:00	1.462	10/14/2011 5:00	1.520	10/16/2011 17:00	1.698	10/19/2011 5:00	1.666	10/21/2011 17:00	1.610
10/11/2011 18:00	1.457	10/14/2011 6:00	1.527	10/16/2011 18:00	1.693	10/19/2011 6:00	1.655	10/21/2011 18:00	1.597
10/11/2011 19:00	1.467	10/14/2011 7:00	1.528	10/16/2011 19:00	1.685	10/19/2011 7:00	1.631	10/21/2011 19:00	1.608
10/11/2011 20:00	1.469	10/14/2011 8:00	1.541	10/16/2011 20:00	1.702	10/19/2011 8:00	1.661	10/21/2011 20:00	1.629
10/11/2011 21:00	1.477	10/14/2011 9:00	1.517	10/16/2011 21:00	1.660	10/19/2011 9:00	1.658	10/21/2011 21:00	1.612
10/11/2011 22:00	1.498	10/14/2011 10:00	1.530	10/16/2011 22:00	1.647	10/19/2011 10:00	1.634	10/21/2011 22:00	1.597
10/11/2011 23:00	1.471	10/14/2011 11:00	1.527	10/16/2011 23:00	1.660	10/19/2011 11:00	1.626	10/21/2011 23:00	1.606
10/12/2011 0:00	1.512	10/14/2011 12:00	1.507	10/17/2011 0:00	1.678	10/19/2011 12:00	1.629	10/22/2011 0:00	1.585
10/12/2011 1:00	1.466	10/14/2011 13:00	1.546	10/17/2011 1:00	1.665	10/19/2011 13:00	1.614	10/22/2011 1:00	1.599
10/12/2011 2:00	1.506	10/14/2011 14:00	1.517	10/17/2011 2:00	1.703	10/19/2011 14:00	1.615	10/22/2011 2:00	1.606

Clark Fork at Sager Lane (CFR-F2), (continued)

Date and Time	Surface Elev.	Date and Time	Surface Elev.	Date and Time	Surface Elev.
10/22/2011 3:00	1.606	10/24/2011 15:00	1.569	10/27/2011 3:00	1.690
10/22/2011 4:00	1.610	10/24/2011 16:00	1.597	10/27/2011 4:00	1.696
10/22/2011 5:00	1.621	10/24/2011 17:00	1.606	10/27/2011 5:00	1.690
10/22/2011 6:00	1.615	10/24/2011 18:00	1.596	10/27/2011 6:00	1.701
10/22/2011 7:00	1.630	10/24/2011 19:00	1.614	10/27/2011 7:00	1.694
10/22/2011 8:00	1.631	10/24/2011 20:00	1.619	10/27/2011 8:00	1.717
10/22/2011 9:00	1.616	10/24/2011 21:00	1.632	10/27/2011 9:00	1.715
10/22/2011 10:00	1.579	10/24/2011 22:00	1.635	10/27/2011 10:00	1.691
10/22/2011 11:00	1.596	10/24/2011 23:00	1.637	10/27/2011 11:00	1.667
10/22/2011 12:00	1.604	10/25/2011 0:00	1.634	10/27/2011 12:00	1.685
10/22/2011 13:00	1.594	10/25/2011 1:00	1.618	10/27/2011 13:00	1.610
10/22/2011 14:00	1.576	10/25/2011 2:00	1.644		
10/22/2011 15:00	1.577	10/25/2011 3:00	1.651		
10/22/2011 16:00	1.606	10/25/2011 4:00	1.641		
10/22/2011 17:00	1.592	10/25/2011 5:00	1.663		
10/22/2011 18:00	1.591	10/25/2011 6:00	1.649		
10/22/2011 19:00	1.617	10/25/2011 7:00	1.668		
10/22/2011 20:00	1.574	10/25/2011 8:00	1.636		
10/22/2011 21:00	1.602	10/25/2011 9:00	1.617		
10/22/2011 22:00	1.625	10/25/2011 10:00	1.616		
10/22/2011 23:00	1.625	10/25/2011 11:00	1.609		
10/23/2011 0:00	1.587	10/25/2011 12:00	1.622		
10/23/2011 1:00	1.602	10/25/2011 13:00	1.613		
10/23/2011 2:00	1.593	10/25/2011 14:00	1.599		
10/23/2011 3:00	1.587	10/25/2011 15:00	1.567		
10/23/2011 4:00	1.591	10/25/2011 16:00	1.617		
10/23/2011 5:00	1.576	10/25/2011 17:00	1.607		
10/23/2011 6:00	1.578	10/25/2011 18:00	1.629		
10/23/2011 7:00	1.559	10/25/2011 19:00	1.629		
10/23/2011 8:00	1.585	10/25/2011 20:00	1.665		
10/23/2011 9:00	1.579	10/25/2011 21:00	1.645		
10/23/2011 10:00	1.549	10/25/2011 22:00	1.663		
10/23/2011 11:00	1.589	10/25/2011 23:00	1.662		
10/23/2011 12:00	1.576	10/26/2011 0:00	1.671		
10/23/2011 13:00	1.581	10/26/2011 1:00	1.704		
10/23/2011 14:00	1.570	10/26/2011 2:00	1.718		
10/23/2011 15:00	1.606	10/26/2011 3:00	1.744		
10/23/2011 16:00	1.595	10/26/2011 4:00	1.731		
10/23/2011 17:00	1.566	10/26/2011 5:00	1.726		
10/23/2011 18:00	1.605	10/26/2011 6:00	1.728		
10/23/2011 19:00	1.589	10/26/2011 7:00	1.743		
10/23/2011 20:00	1.603	10/26/2011 8:00	1.740		
10/23/2011 21:00	1.607	10/26/2011 9:00	1.750		
10/23/2011 22:00	1.607	10/26/2011 10:00	1.691		
10/23/2011 23:00	1.610	10/26/2011 11:00	1.693		
10/24/2011 0:00	1.578	10/26/2011 12:00	1.710		
10/24/2011 1:00	1.591	10/26/2011 13:00	1.681		
10/24/2011 2:00	1.594	10/26/2011 14:00	1.693		
10/24/2011 3:00	1.615	10/26/2011 15:00	1.677		
10/24/2011 4:00	1.613	10/26/2011 16:00	1.701		
10/24/2011 5:00	1.604	10/26/2011 17:00	1.699		
10/24/2011 6:00	1.613	10/26/2011 18:00	1.700		
10/24/2011 7:00	1.586	10/26/2011 19:00	1.740		
10/24/2011 8:00	1.610	10/26/2011 20:00	1.732		
10/24/2011 9:00	1.587	10/26/2011 21:00	1.741		
10/24/2011 10:00	1.579	10/26/2011 22:00	1.699		
10/24/2011 11:00	1.595	10/26/2011 23:00	1.679		
10/24/2011 12:00	1.593	10/27/2011 0:00	1.699		
10/24/2011 13:00	1.576	10/27/2011 1:00	1.714		
10/24/2011 14:00	1.593	10/27/2011 2:00	1.700		

Appendix F-3

ESTIMATED MEAN DAILY DISCHARGE DATA

Upper Clark Fork Flow Monitoring 2011

Estimated mean daily discharge, cubic feet per second (cfs)

Date	Silver Bow Cr. at Warm Springs (USGS 12323750)	Warm Springs Cr. at Warm Springs (USGS 12323770)	Lost Cr. near Galen (USGS 12323850)	Clark Fork near Galen (USGS 12323800)	**Clark Fork at Gem Back Road (Atkins)**	**Clark Fork at Sager Lane (Atkins)**	Clark Fork at Deer Lodge (USGS 12324200)
7/26/2011	139	210	19	357	**349**	**347**	441
7/27/2011	134	203	19	346	**335**	**333**	415
7/28/2011	126	194	19	326	**317**	**311**	385
7/29/2011	120	186	19	309	**297**	**292**	356
7/30/2011	115	178	11	300	**278**	**272**	326
7/31/2011	111	176	3	291	**263**	**258**	307
8/1/2011	119	186	2	306	**283**	**278**	347
8/2/2011	115	178	2	298	**281**	**276**	372
8/3/2011	100	171	2	274	**256**	**253**	336
8/4/2011	102	167	2	263	**249**	**249**	328
8/5/2011	102	162	3	264	**250**	**246**	331
8/6/2011	97	161	6	259	**251**	**246**	343
8/7/2011	103	159	18	263	**264**	**256**	351
8/8/2011	101	152	10	254	**246**	**241**	328
8/9/2011	97	146	9	244	**234**	**230**	300
8/10/2011	91	147	8	237	**228**	**222**	277
8/11/2011	89	147	9	231	**223**	**220**	298
8/12/2011	85	141	10	220	**215**	**217**	285
8/13/2011	82	141	10	217	**208**	**210**	274
8/14/2011	78	137	9	209	**199**	**203**	269
8/15/2011	85	132	9	208	**193**	**193**	243
8/16/2011	86	131	9	211	**200**	**203**	249
8/17/2011	76	129	8	198	**186**	**191**	236
8/18/2011	70	129	8	189	**178**	**184**	229
8/19/2011	66	127	8	182	**169**	**174**	223
8/20/2011	62	127	7	179	**165**	**167**	208
8/21/2011	62	125	6	175	**161**	**166**	197
8/22/2011	60	120	5	167	**154**	**162**	193
8/23/2011	58	117	5	161	**150**	**154**	181
8/24/2011	59	116	5	159	**148**	**151**	177
8/25/2011	64	115	6	162	**152**	**153**	181
8/26/2011	66	117	7	168	**165**	**170**	195
8/27/2011	63	117	6	166	**160**	**168**	193
8/28/2011	61	117	6	163	**152**	**162**	186
8/29/2011	63	118	6	164	**153**	**165**	192
8/30/2011	69	117	7	169	**160**	**170**	196
8/31/2011	69	119	8	170	**168**	**176**	204
9/1/2011	70	121	8	173	**174**	**185**	217
9/2/2011	68	119	8	170	**171**	**181**	215
9/3/2011	67	118	7	166	**167**	**178**	208
9/4/2011	66	117	7	164	**167**	**179**	211
9/5/2011	65	114	7	159	**163**	**174**	207
9/6/2011	64	112	6	156	**160**	**170**	206
9/7/2011	63	109	6	152	**155**	**166**	201
9/8/2011	63	109	6	152	**154**	**170**	201
9/9/2011	65	108	6	153	**154**	**172**	205
9/10/2011	64	107	5	152	**153**	**171**	204
9/11/2011	63	107	5	150	**153**	**170**	202
9/12/2011	61	106	6	148	**151**	**169**	201

Estimated mean daily discharge, cubic feet per second (cfs), (continued)

Date	Silver Bow Cr. at Warm Springs (USGS 12323750)	Warm Springs Cr. at Warm Springs (USGS 12323770)	Lost Cr. near Galen (USGS 12323850)	Clark Fork near Galen (USGS 12323800)	**Clark Fork at Gem Back Road (Atkins)**	**Clark Fork at Sager Lane (Atkins)**	Clark Fork at Deer Lodge (USGS 12324200)
9/13/2011	61	105	10	147	**157**	**174**	205
9/14/2011	61	106	10	148	**157**	**176**	205
9/15/2011	60	106	10	148	**158**	**177**	208
9/16/2011	64	110	11	157	**169**	**187**	220
9/17/2011	64	106	12	153	**169**	**188**	221
9/18/2011	62	104	12	150	**164**	**183**	216
9/19/2011	62	102	12	148	**164**	**182**	214
9/20/2011	61	100	12	145	**164**	**183**	213
9/21/2011	60	98	12	142	**162**	**183**	214
9/22/2011	60	97	12	142	**160**	**182**	216
9/23/2011	59	96	12	139	**157**	**179**	210
9/24/2011	59	94	11	137	**149**	**171**	204
9/25/2011	57	93	11	134	**144**	**165**	199
9/26/2011	55	93	11	132	**138**	**159**	193
9/27/2011	55	92	11	132	**139**	**159**	195
9/28/2011	52	92	11	129	**137**	**157**	192
9/29/2011	52	93	12	130	**141**	**160**	192
9/30/2011	56	92	17	134	**146**	**164**	193
10/1/2011	56p	89p	19p	132p	**154**	**168**	198p
10/2/2011	56p	88p	23p	131p	**162**	**176**	206p
10/3/2011	55p	86p	24p	130p	**159**	**174**	209p
10/4/2011	52p	89p	37p	129p	**164**	**178**	218p
10/5/2011	62p	98p	51p	153p	**205**	**215**	261p
10/6/2011	59p	99p	50p	152p	**205**	**217**	264p
10/7/2011	59p	102p	49p	156p	**207**	**218**	267p
10/8/2011	60p	104p	48p	159p	**209**	**220**	271p
10/9/2011	61p	110p	46p	167p	**219**	**228**	275p
10/10/2011	61p	109p	46p	168p	**219**	**228**	278p
10/11/2011	60p	107p	52p	166p	**222**	**229**	283p
10/18/2011	61p	110p	56p	166p	**223**	**233**	282p
10/18/2011	73p	107p	55p	174p	**232**	**240**	288p
10/18/2011	77p	106p	54p	179p	**239**	**246**	292p
10/18/2011	81p	111p	56p	188p	**256**	**261**	316p
10/18/2011	83p	115p	59p	193p	**267**	**282**	352p
10/18/2011	80p	113p	58p	190p	**267**	**283**	360p
10/18/2011	75p	110p	55p	180p	**259**	**271**	342p
10/19/2011	72p	109p	53p	176p	**258**	**271**	339p
10/20/2011	75p	108p	53p	178p	**257**	**271**	338p
10/21/2011	69p	109p	52p	172p	**251**	**265**	332p
10/22/2011	67p	109p	52p	170p	**248**	**263**	334p
10/23/2011	63p	109p	51p	166p	**243**	**259**	324p
10/24/2011	63p	110p	52p	166p	**243**	**263**	330p
10/25/2011	67p	110p	52p	168p	**247**	**270**	331p
10/26/2011	76p	108p	52p	177p	**254**	**290**	351p
10/27/2011	71p	108p	52p	171p	**250**	**285**	349p

p = provisional data subject to change

APPENDIX G

GROUNDWATER MONITORING

Clark Fork River Operable Unit, 2011

August 2012

G.1 INTRODUCTION

Groundwater monitoring was conducted in Reach A of the Clark Fork River Operable Unit (CFROU) on November 9th and 10th, 2011 at a network of fourteen wells established by Montana Tech in 2009 (Montana Tech 2010). Following protocols established by Montana Tech, the wells are organized in three clusters: 1) east side of the Governor's Reach, 2) west side of Governor's Reach, and 3) Clark Fork Coalition (CFC) Ranch. The Governor's Reach refers to a portion of Reach A that was partially remediated in the early 1990's. The monitoring locations on the CFC Ranch have not been remediated. The locations of the wells on the east and west sides of the Governor's Reach are shown in Figure G-1, and wells from the CFC Ranch are shown in Figure G-2. An overview of the entire project area is presented in Figure G-3. Additional location information is provided for all wells in Table G-1.

Monitoring included field measurements, selected common ions, and dissolved arsenic, cadmium, copper, lead, and zinc. Well purging, sample collection and preservation, and laboratory analysis followed SOPs developed for the Clark Fork River Superfund sites (ARCO 1992). The 2011 groundwater data are included as Appendix G1. Results from the analytical laboratory are included in Appendix G2.

G.2 RESULTS AND DISCUSSION

G.2.1 Field Parameters

Chemical parameters measured in the field from purged groundwater wells are presented in Table G-2. No field parameters could be measured at well LM-1 due to insufficient recharge. In general, the wells exhibited circum-neutral pH values, ranging from 6.92 to 7.76. Water temperatures were between 6.7 and 9.4 degrees. Conductivity was noticeably higher in wells from the west side of the Governor's Reach cluster that at the other well clusters, with a reading at well ML-1 of 1,559 uS/cm, nearly twice as high as the next highest reading. Dissolved oxygen concentrations were low, typically in the 2.0 to 3.5 mg/L range (Table G-2).

G.2.2 Common Ions

As was the case in Montana Tech's study, the most common cations in decreasing order of abundance were calcium, sodium, magnesium, and potassium, with concentrations of all four noticeable higher at well ML-1 on the west side of the Governors Reach than at other wells. Concentrations of alkalinity, bicarbonate, sulfate, and chloride were also higher at well ML-1, as was hardness (Table G-3).

G.2.2.1 Metals/Metalloids

Arsenic

Arsenic exceeded the state groundwater standard of 0.010 mg/L at 8 of the 13 wells from which samples could be collected. In the well cluster on the east side of the Governor's Reach, arsenic exceeded the standard at 3 of 6 wells, ranging from 0.018 at WST-3 to 0.043 mg/L at WST-1 (Table G-2). Arsenic was below detection at the remaining 3 east side wells. On the west side of the Governor's Reach, arsenic concentrations were below detection at all wells. At the CFC Ranch well cluster, arsenic concentrations exceeded state groundwater standards at all wells and in the duplicate taken at well CFR-5, ranging from 0.016 mg/L at well CFR-5 to 0.122 mg/L at well CFR-4 (Table G-4).

Cadmium, Copper, Lead, and Zinc

The concentration of lead was below state groundwater standards at all wells, and the concentrations of cadmium, copper, and zinc were below standards at all wells except LM-2 on the CFC Ranch, where the standards were exceeded by a wide margin. Well LM-2 is a shallow (<4 ft) hand-dug well that was installed by Montana Tech in what appears to be a portion of the floodplain covered in deposited mine waste, which may explain the high concentrations of metals at this location. However, well LM-1 is also a shallow, hand-dug well, in close proximity to LM-2, and it did not produce similarly high metals concentrations. During the 2011 sampling event, as was the case during the Montana Tech study, wells LM-1 and LM-2 would not produce sufficient flow rates to allow for proper purging of the wells, which may have influenced the results (Table G-4).

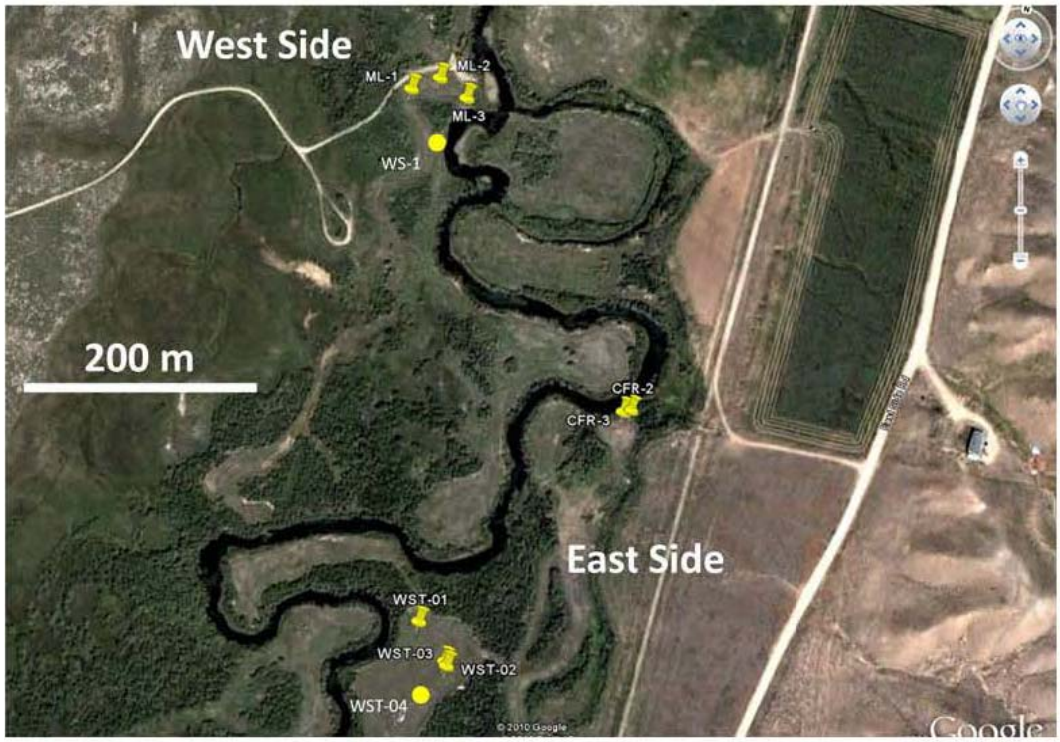

Figure G-1. Locations of the wells on the east and west sides of the Governor's Reach

Photo Courtesy of Montana Tech Geological Engineering Department

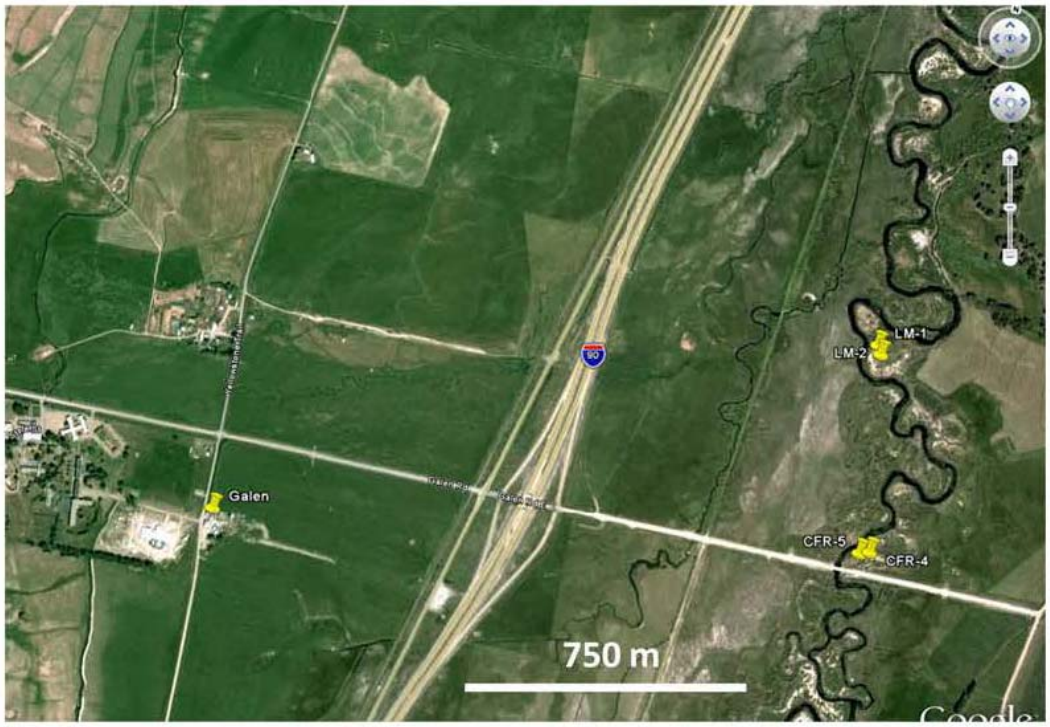

Figure G-2. Locations of wells from the CFC Ranch

Photo Courtesy of Montana Tech Geological Engineering Department

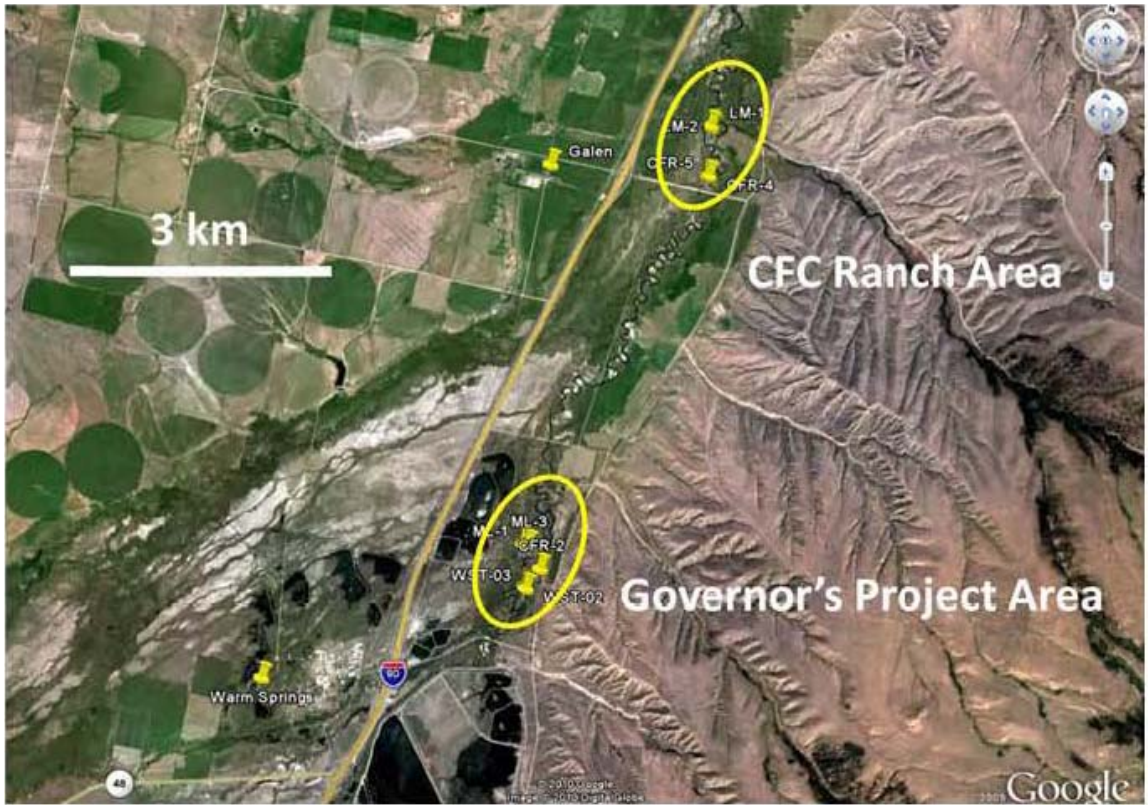

Figure G-3. Overview of the entire project area

Photo Courtesy of Montana Tech Geological Engineering Department

Table G-1. Specifications for wells in Reach A of CFROU monitored in November 2011 (Montana Tech 2010).

Well	GWIC ID	Northing	Easting	Depth (feet)	Location[1]
WST-1	253584	725268.23	1141676.26	10	ESGR
WST-2	253585	725159.21	1141775.15	20	ESGR
WST-3	253586	725153.5	1141780.60	10	ESGR
WST-4	253630	725039.05	1141769.64	10	ESGR
CFR-2	NA	725938.88	1142091.70	60	ESGR
CFR-3	NA	725944.80	1142076.82	shallow	ESGR
ML-1	253631	726800.48	1141410.02	10	WSGR
ML-2	253632	726839.63	1141490.23	10	WSGR
ML-3	253633	726795.72	1141565.33	10	WSGR
WS-1	NA	726659.77	1141537.85	unknown	WSGR
LM-1	253631	743649.69	1145924.77	3.1	CFC
LM-2	253632	743571.75	1145969.80	3.9	CFC
CFR-4	253633	741821.76	1146300.59	10	CFC
CFR-5	NA	741780.87	1146065.97	10.62	CFC

1. ESGR: East Side Governor's Reach. WSGR: West Side Governor's Reach. CFR: Clark Fork Coalition Ranch. Table courtesy of Montana Tech.

Table G-2. Field Parameters, November 2011.

Well	pH	Temperature (C)	Conductivity (uS/Cm)	Dissolved Oxygen (mg/L)	Location[1]
WST-1	7.73	9.2	282	2.58	ESGR
WST-2	7.68	9.2	402	2.39	ESGR
WST-3	7.43	9.1	406	2.00	ESGR
WST-4	7.35	9.4	417	2.04	ESGR
CFR-2	7.76	8.8	250	2.90	ESGR
CFR-3	7.32	9.5	542	2.11	ESGR
ML-1	6.92	8.1	1,559	2.87	WSGR
ML-2	7.10	8.6	864	3.14	WSGR
ML-3	7.18	8.3	680	2.85	WSGR
WS-1	See note	See note	See note	See note	WSGR
LM-1	na	na	na	na	CFC
LM-2	7.24	6.7	589	2.53	CFC
CFR-4	7.26	7.2	437	2.13	CFC
CFR-5	7.24	9.4	380	3.56	CFC

NA: Not available. Too little recharge for field measurements

Note: Well WS-1 was located on an eroding bank of the Clark Fork River and was about to fall into the river in November 2011. No samples could be collected at this well.

1. ESGR: East Side Governor's Reach. WSGR: West Side Governor's Reach. CFR: Clark Fork Coalition Ranch. Table courtesy of Montana Tech.

Table G-3. Common Ions, November 2011.

Well	Alkalinity	Bicarb.	Chloride	Sulfate	Hardness	Calcium	Magnesium	Potassium	Sodium	Location[1]
WST-1	150	180	8	75	205	61	13	4	18	ESGR
WST-2	170	210	22	140	284	83	19	4	30	ESGR
WST-3	170	210	22	140	306	91	19	5	30	ESGR
WST-4	180	210	23	150	309	91	20	5	32	ESGR
CFR-2	170	210	5	38	187	55	12	4	15	ESGR
CFR-3	220	270	33	220	420	123	28	5	33	ESGR
ML-1	370	450	170	1000	1190	369	66	15	233	WSGR
ML-2	250	300	64	490	647	200	36	8	64	WSGR
ML-3	240	290	53	430	586	181	32	8	68	WSGR
WS-1	See note	See note	See note	See note	See note	See note	See note	See note	See note	WSGR
LM-1	230	280	12	270	435	117	35	7	30	CFC
LM-2	120	140	17	500	469	98	58	9	53	CFC
CFR-4	230	280	17	170	374	100	30	4	29	CFC
CFR-5	130	160	10	180	269	79	17	5	18	CFC
CFR-5-DUP	130	160	9	180	297	88	19	6	19	CFC

Note: Well WS-1 was located on an eroding bank of the Clark Fork River and was about to fall into the river in November 2011. No samples could be collected at this well.

1. ESGR: East Side Governor's Reach. WSGR: West Side Governor's Reach. CFR: Clark Fork Coalition Ranch. Table courtesy of Montana Tech.

Table G-4. Metals and metalloids, November 2011 (Bold text indicates exceedance of standard).

Well	Arsenic	Cadmium	Copper	Lead	Zinc	Location[1]
WST-1	**0.043**	0.00015	0.062	0.0064	0.13	ESGR
WST-2	<0.005	0.00015	0.006	<0.0005	<0.01	ESGR
WST-3	**0.018**	0.00024	0.013	<0.0005	0.04	ESGR
WST-4	**0.022**	0.00016	0.086	0.0064	0.04	ESGR
CFR-2	<0.005	<0.00008	<0.001	<0.0005	<0.01	ESGR
CFR-3	<0.005	0.00260	0.184	0.0006	0.31	ESGR
ML-1	<0.005	0.00059	0.757	0.0005	0.08	WSGR
ML-2	<0.005	<0.00008	<0.001	<0.0005	0.01	WSGR
ML-3	<0.005	<0.00008	0.015	0.0015	0.20	WSGR
WS-1	See note	See note	See note	See note	See note	WSGR
LM-1	**0.036**	0.00260	0.294	0.0080	1.13	CFC
LM-2	**0.023**	**0.0296**	**1.96**	0.0030	**16.2**	CFC
CFR-4	**0.122**	0.00290	0.501	0.0006	0.71	CFC
CFR-5	**0.016**	0.00233	0.134	<0.0005	0.60	CFC
CFR-5-DUP	**0.022**	0.00310	0.239	<0.0005	0.87	CFC
GW Standard	0.010	0.005	1.3	0.015	2.0	

Note: Well WS-1 was located on an eroding bank of the Clark Fork River and was about to fall into the river in November 2011. No samples could be collected at this well.

1. ESGR: East Side Governor's Reach. WSGR: West Side Governor's Reach. CFR: Clark Fork Coalition Ranch. Table courtesy of Montana Tech.

G.3 REFERENCES

ARCO. 1992. Clark Fork River Superfund Site Investigations Standard Operating Field Procedures (SOPs). ARCO, Anaconda, Montana, March, 1992.

Dutton, A., C. Gammons, L. Gordon (Montana Tech). 2010. Monitoring Groundwater in Remediated vs. Unremediated Floodplain Sediments along the Upper Clark Fork River.

APPENDIX H

SYNOPTIC WATER QUALITY MONITORING BELOW WARM SPRINGS PONDS REPORT 2011

Clark Fork River Operable Unit, 2011

August 2012

H.1 INTRODUCTION

The following discussion provides an overview of synoptic water quality monitoring that was conducted on August 30th and 31st, 2011 at 11 sites in the upper Clark Fork River between Warm Springs Ponds and the Galen Bridge. The objectives of this monitoring were to 1) evaluate pollutant loading to the upper Clark Fork River from Warm Springs Ponds; 2) identify potential tributary and/or near-stream sources of pollutant loading to the upper Clark Fork; and 3) help explain recent reductions in fish populations in this section of the river.

Stations monitored during this event included SS-25:Silver Bow Creek at Warm Springs, located at the upper end of the monitoring reach, and CFR-03A:Clark Fork near Galen, located at the lower end, both of which are part of DEQ's standard network of water quality monitoring sites for the Clark Fork River. In between these locations, 9 temporary monitoring locations (SYN-01 to SYN-09) were established with an emphasis on bracketing potential sources – tributaries, seeps, irrigation return flows, etc. (Figure H-1).

Sampling activities included field parameter measurements and collection of depth- and width-integrated water samples for analysis of total recoverable (TR) and dissolved metals, algal nutrients, total suspended sediment, and selected common ions. Instantaneous and daily mean streamflow figures were acquired from published records of the USGS for co-located gauging stations at SS-25 and CFR-03A, and were measured in the field at the other locations. Water samples were collected with the use of a handheld DH-81 depth integrating sampler. Bulk samples from depth integration were split into separate samples for analysis with the aid of a sample churn splitter.

H.2 MONITORING RESULTS

H.2.1 Field Measurements

Measurement of field variables showed seasonally appropriate cold and well oxygenated water with basic pH levels; although stations SS-25 and SYN-09, both upstream of Warm Springs Creek confluence, had water temperatures in excess of 17C (Table H-1). Water temperatures and dissolved oxygen concentrations were influenced in part by the time of day when measurements were taken. Conductivity measurements ranged from 301-385 µS/cm reflecting moderate levels of dissolved solids during a typically low, base flow time of year. However, streamflow levels determined from readings at the Galen USGS gaging station (CFR-03A) were above average for the date of sampling based on long-term records (Figure H-2). Turbidity field readings ranged from a low of 1.98 at synoptic monitoring site SYN-08 to a high of 3.73 at SYN-05. Most stations had low levels of turbidity and TSS associated with seasonal low flows

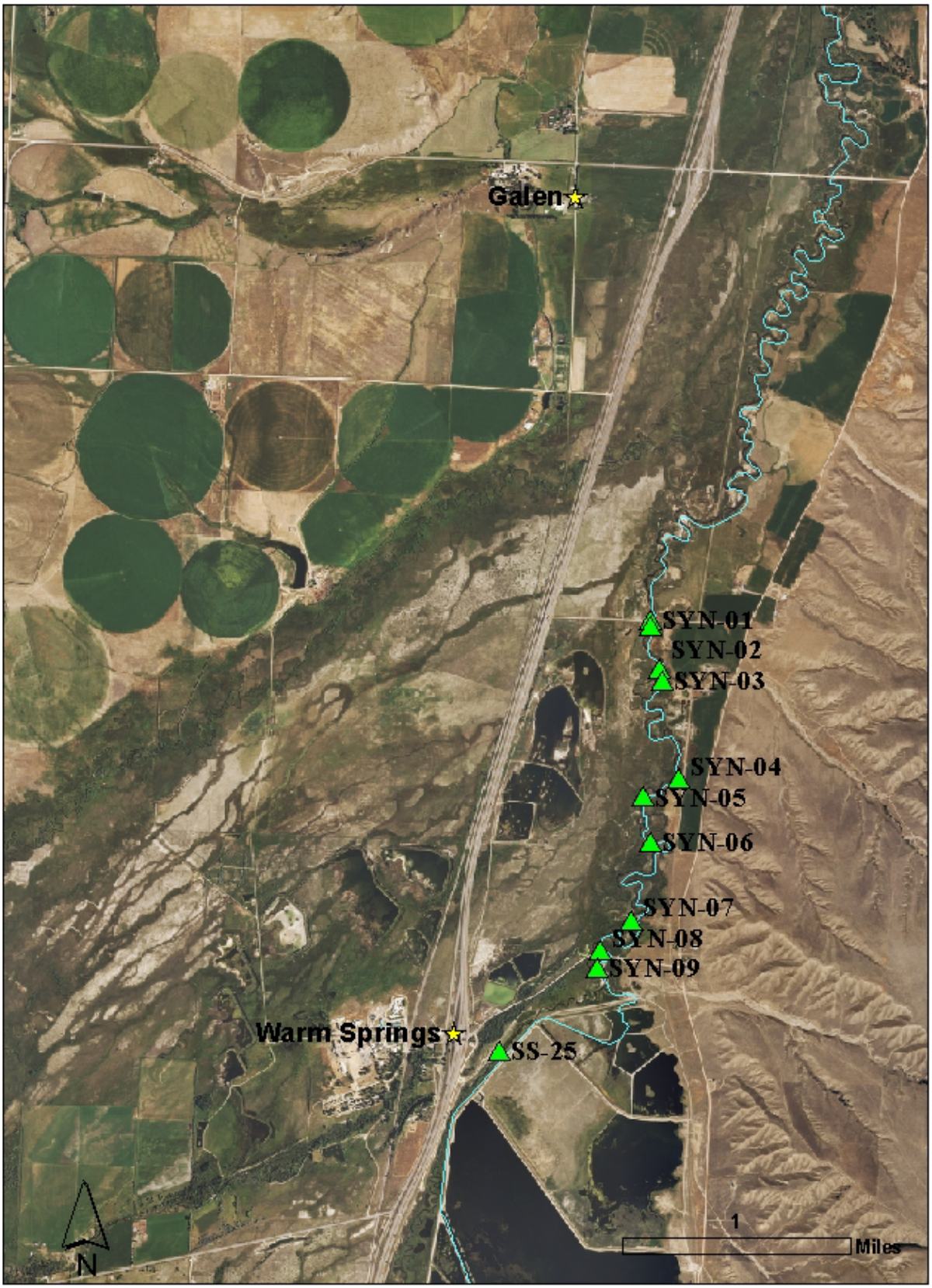

Figure H-1. Upper Clark Fork Synoptic Water Monitoring Sites.

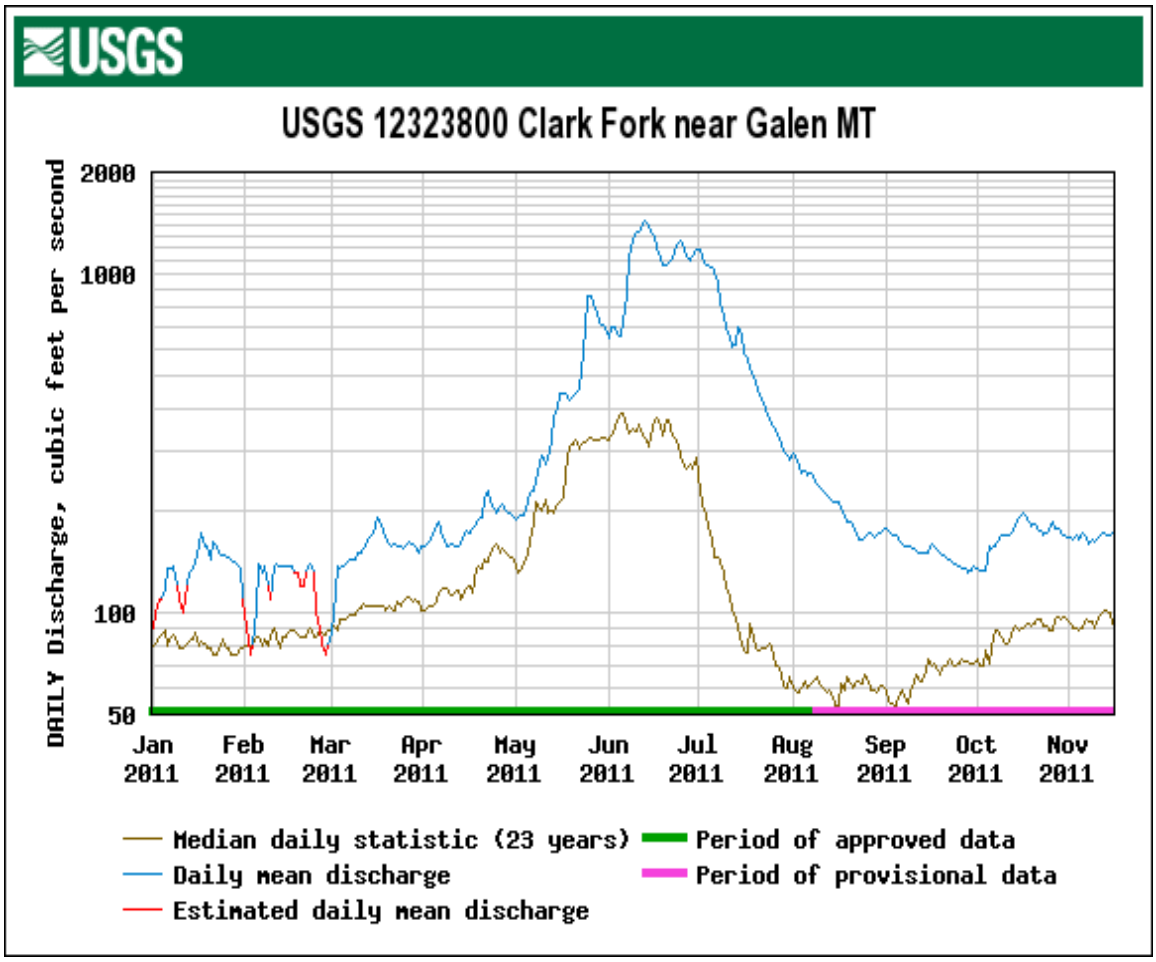

Figure H-2. USGS hydrograph for upper Clark Fork River near Galen

Table H-1. Field measurement results for the upper Clark Fork River during the third quarter 2011 (August 30-31, 2011) synoptic monitoring event.

Station	Date	Location (NAD 83)	pH	Water Temp (Deg C)	Dissolved Oxygen (mg/L)	EC (uS/cm)	Turbidity	Flow (cfs)
CFR-03A	8/30/11	46.20863 112.76752	8.68	13.19	8.98	320	Slight	169[1]
SYN-01	8/30/11	46.20827 112.76749	8.81	13.59	9.71	310	2.48	149.83
SYN-02	8/30/11	46.20560 112.76659	8.91	14.53	10.05	307	2.56	154.15
SYN-03	8/30/11	46.20488 112.76631	8.93	15.04	10.31	306	2.98	154.16
SYN-04	8/30/11	46.19861 112.76442	8.98	15.86	9.58	304	2.06	154.20
SYN-05	8/30/11	46.19738 112.76761	8.99	16.23	9.27	301	3.73	164.90
SYN-06	8/31/11	46.19456 112.76673	8.72	11.93	9.13	307	3.13	126.79
SYN-07	8/31/11	46.18950 112.76814	8.89	12.29	9.75	304	2.96	164.19
SYN-08	8/31/11	46.18748 112.77095	8.93	13.02	10.07	302	1.98	171.47
SYN-09	8/31/11	46.18634 112.77120	9.55	17.72	10.98	368	2.75	48.74
SS-25	8/31/11	46.18083 112.77985	9.25	17.70	10.37	385	2.77	69[1]

1: Flow at CFR-03A and SS-25 obtained from co-located USGS stations. All others measured in the field.

H.2.2 Suspended Sediment

Total suspended sediment (TSS) is an important variable that strongly influences heavy metals concentrations in the upper Clark Fork River, particularly during spring high flows. TSS concentrations ranged from not detectable (ND) at eight monitoring stations (Table H-2 and Figure H-3) to a high of 6 mg/L at stations SYN-05 and SYN-03.

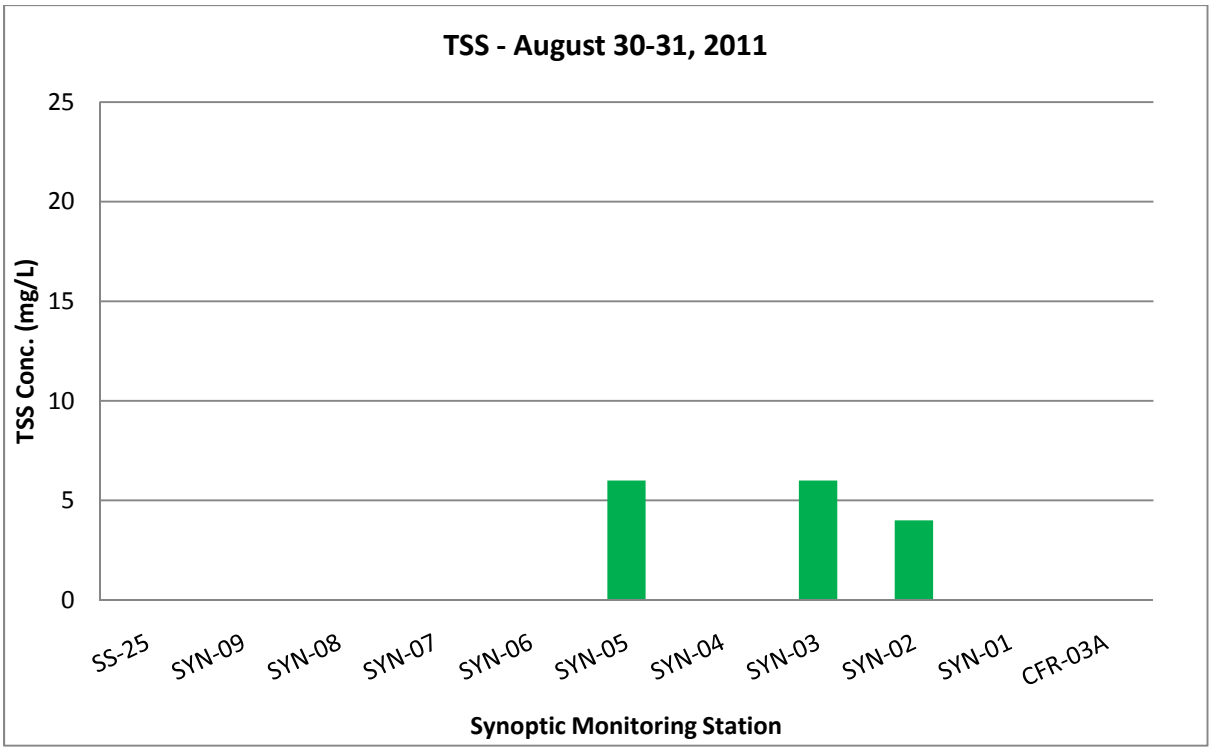

Figure H-3. Total suspended sediment concentrations in the upper Clark Fork River during the August 30 - 31, 2011 synoptic monitoring event.

H.2.3 Common Ions

Analysis of selected common cations and anions during the August 30-31, 2011 synoptic sampling event revealed hard water ranging from 146 mg/L at SYN-08 and SYN-07 to 168 mg/L at SYN-09 (Table H-2). In general there was a noticeable change in ion concentrations between sites SYN-09 and SYN-08, presumably due to the confluence of Warm Springs Creek, which occurs between these sites.

H.2.4 4Metals

Metals analyzed during the August 30-31, 2011 synoptic monitoring event included total recoverable (TR) and dissolved concentrations of arsenic, cadmium, copper, lead, and zinc. The Clark Fork monitoring plan established performance standards for metals in surface waters which are based on published chronic and acute toxicity criteria for freshwater aquatic life as well as human health standards for drinking water. The aquatic toxicity criteria apply to the total recoverable (TR) concentrations of metals and are expressed as a function of total hardness for cadmium, copper, lead and zinc. Human health standards are as total recoverable concentrations for surface waters. Aquatic toxicity thresholds were calculated from the water hardness at each station during the monitoring event.

H.2.5 Metals Spatial Trends and Criteria Excursions

H.2.5.1 *Arsenic*

Concentrations of dissolved arsenic during the August 30-31, 2011 synoptic monitoring event ranged from 0.014-0.037 mg/L, and concentrations of TR arsenic ranged from 0.015-0.037 mg/L (Figure H-4 and Table H-2). The ratio of dissolved to TR arsenic was between 93 percent and

100 percent at all of the monitoring stations, indicating nearly all of the arsenic present was in the dissolved form.

Total recoverable and dissolved arsenic concentrations exceeded the human health (drinking water) standard at all eleven monitoring locations (Figure H-4). However, the highest concentrations were measured at SS-25 and SYN-09 followed by a drastic decline at monitoring station SYN-08. The decline is presumably the result of dilution by the relatively clean waters of Warm Springs Creek, which enters the Clark Fork between stations SYN-09 and SYN-08. Total recoverable and dissolved arsenic remained relatively unchanged for stations SYN-08 to CFR-03A (Figure H-4). Arsenic concentrations were well below the acute and chronic aquatic life standards at all stations.

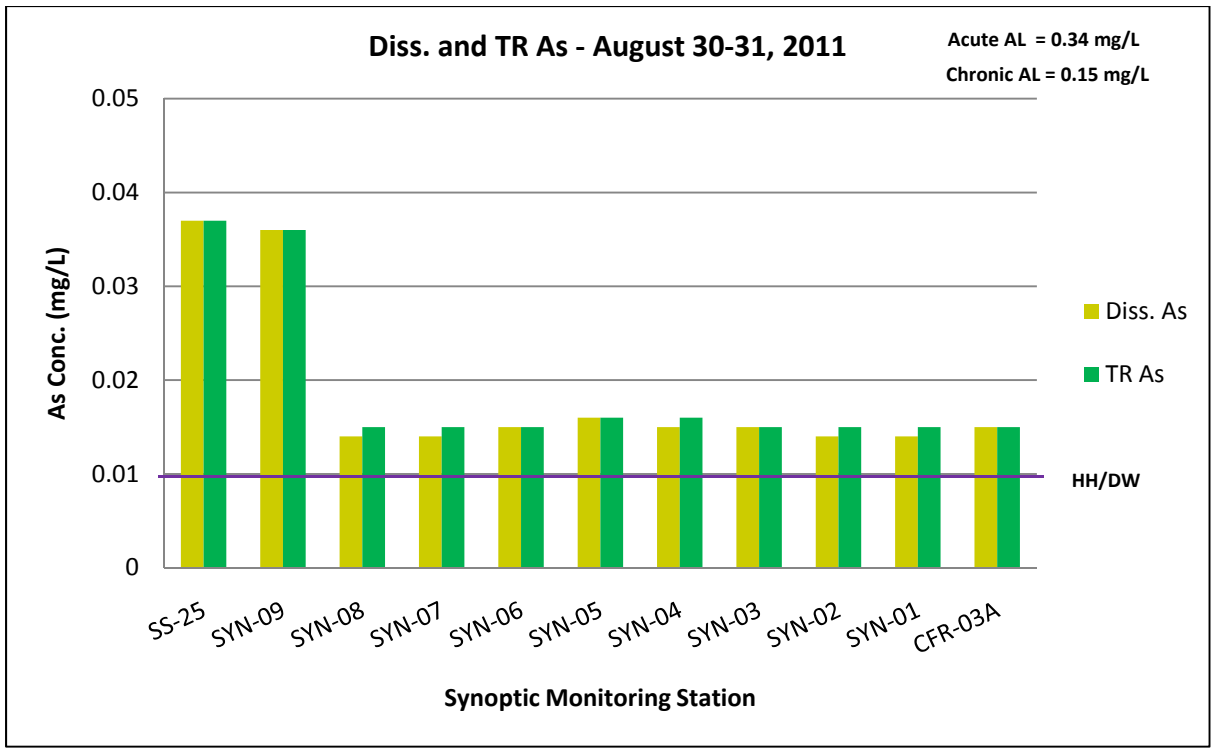

Figure H-4. Dissolved and total recoverable arsenic concentrations in the upper Clark Fork River during the August 30 - 31, 2011 synoptic monitoring event.

H.2.5.2 *Cadmium*

Concentrations of dissolved and total recoverable cadmium were below the detection limit at all eleven upper Clark Fork River synoptic monitoring stations during the August 30-31, 2011 synoptic monitoring event (Figure H-5 and Table H-2).

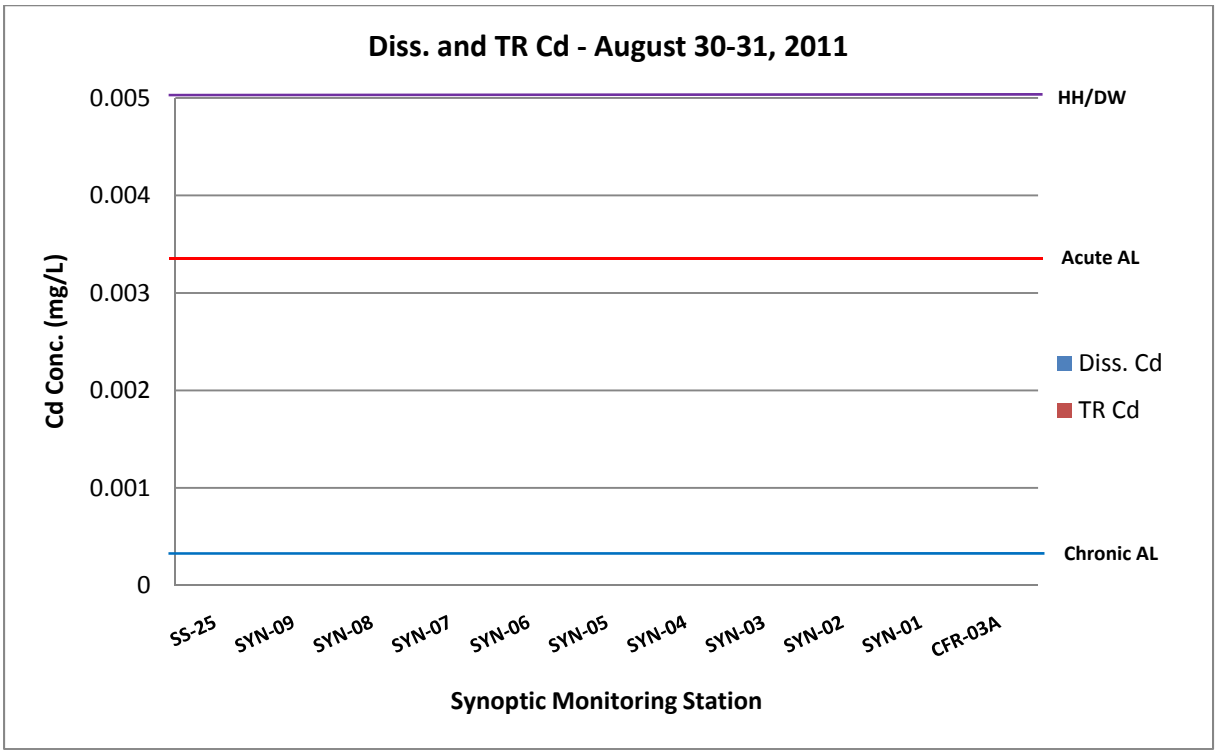

Figure H-5. Dissolved and total recoverable cadmium concentrations in the upper Clark Fork River during the August 30 - 31, 2011 synoptic monitoring event.

H.2.5.3 *Copper*

Dissolved copper levels ranged from 0.003 mg/L to 0.005 mg/L during the August 2011 synoptic monitoring event, while TR copper ranged from 0.005 mg/L to 0.013 mg/L (Figure H-6).

Total recoverable copper tended to increase in a downstream direction with peak at monitoring sites SYN-03 and CRF-03A, however, TR copper did not exceed chronic or acute aquatic toxicity threshold values, nor the human health/drinking water standard (Figure H-6).

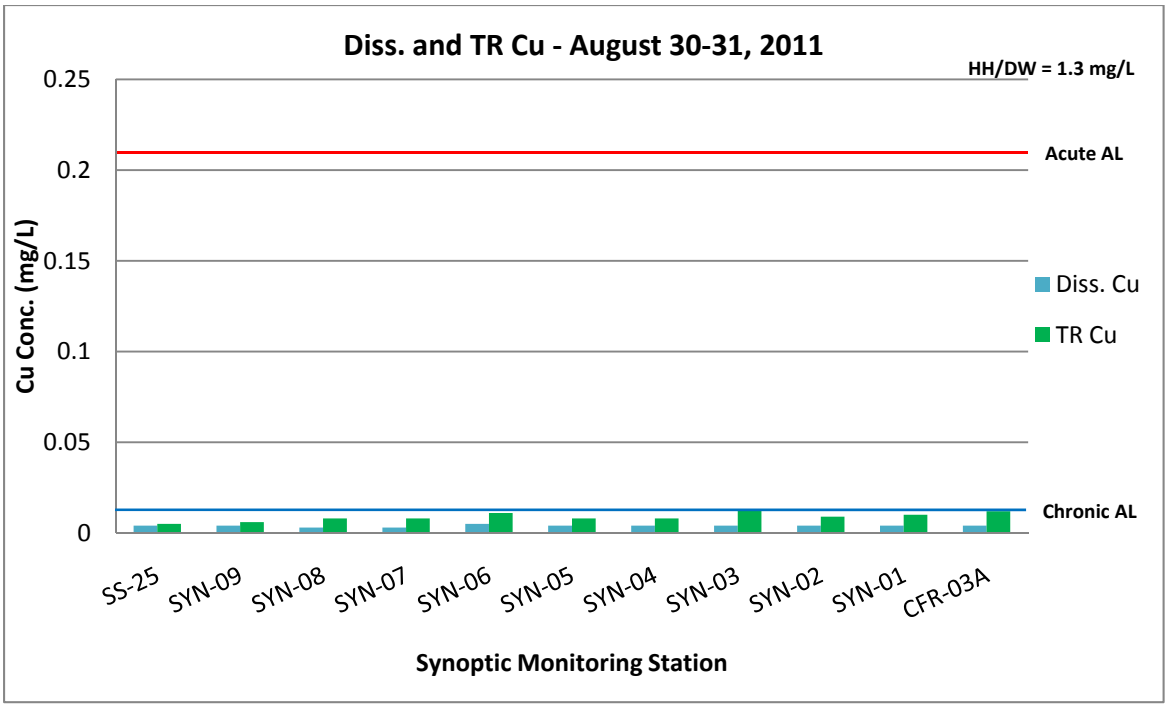

Figure H-6. Dissolved and total recoverable copper concentrations in the upper Clark Fork River during the August 30 - 31, 2011 synoptic monitoring event.

H.2.5.4 *Lead*

Concentrations of dissolved lead were undetectable at all August 2011 synoptic monitoring stations. Total recoverable lead was measureable at ten of the eleven stations, ranging from 0.0006 mg\L at SYN-05 and SYN-04 to a high of 0.0070 mg/L at station SYN-08 which was above the chronic aquatic life toxicity standard (Table H-2 and Figure.H-7).

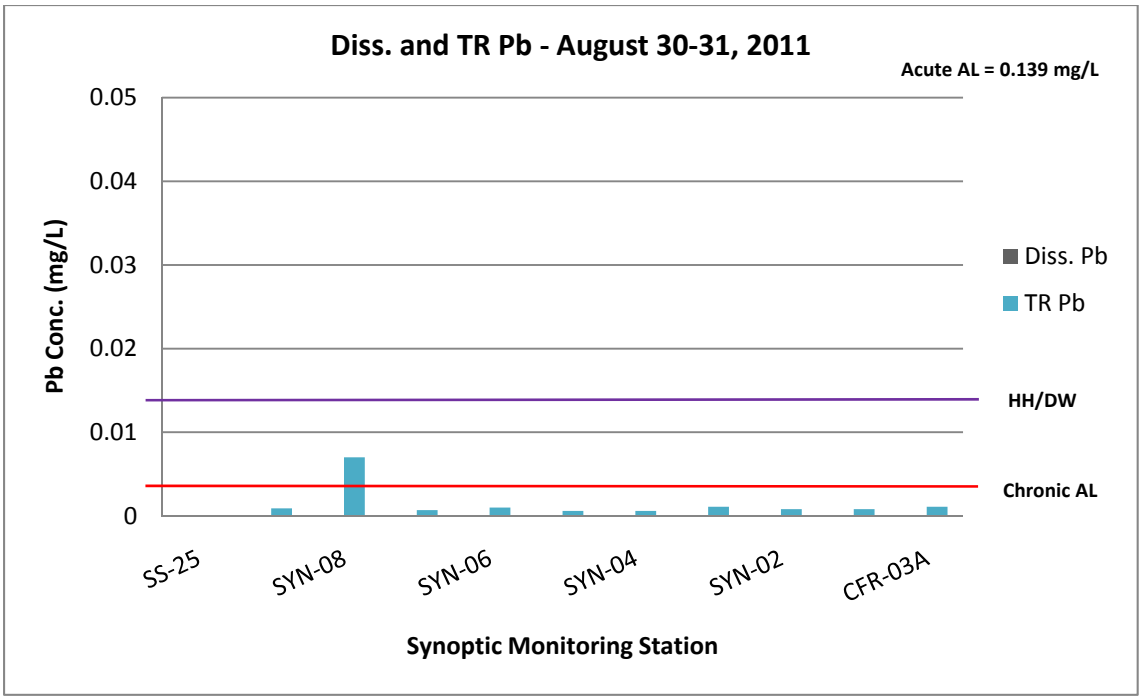

Figure.H-7. Dissolved and total recoverable lead concentrations in the upper Clark Fork River during the August 30 - 31, 2011 synoptic monitoring event.

H.2.5.5 *Zinc*

Concentrations of dissolved zinc and total recoverable zinc were below detection at all 11 monitoring stations during the August 30-31, 2011 synoptic monitoring even (Table H-2 and Figure H-8).

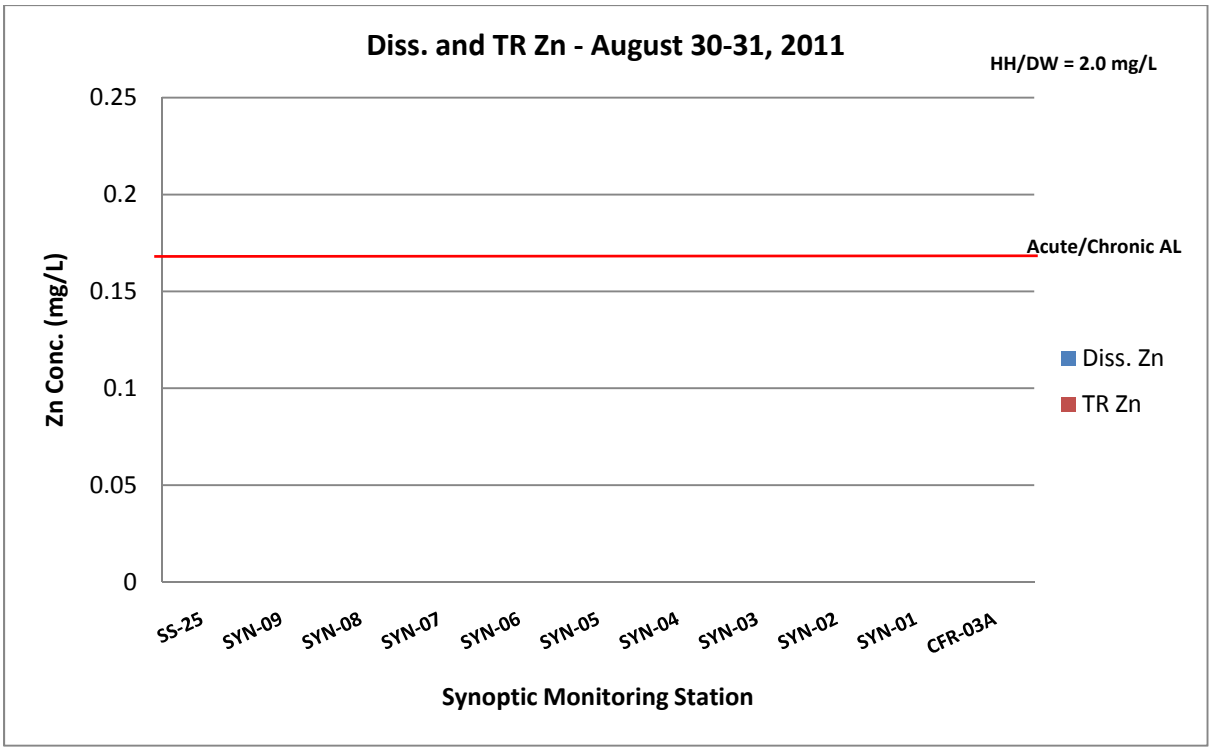

Figure H-8. Dissolved and total recoverable zinc concentrations in the upper Clark Fork River during the August 30 - 31, 2011 synoptic monitoring event.

H.2.5.6 *Algal Nutrients*

Concentrations of nitrogen and phosphorus variables were elevated at several of the August 2011 synoptic monitoring events (Figure H-9 and Figure H-10.). Total nitrogen (TN) concentrations were the highest in Silver Bow Creek at Warm Springs (SS-25) followed closely by SYN-09. Total phosphorus (TP) was also elevated at SS-25 and SYN-09 followed by a sharp decline at other sites, probably because of dilution by Warm Springs Creek, which enters the Clark Fork between sites SYN-09 and SYN-08 (Figure H-9 and Figure H-10).

Numeric water quality standards for nutrients have been established for the Clark Fork River from below Warm Springs Creek to the Flathead River confluence. The standards for the section of the Clark Fork River from its headwaters at Warm Springs Creek to the Blackfoot River confluence are 0.300 mg/L for total nitrogen and 0.020 mg/L for total phosphorus (ARM 17.30.631). Concentrations of TN measured at the upper Clark Fork River synoptic monitoring stations during the August 2011 period exceeded the Clark Fork River nutrient water quality standards at permanent sites SS-25 and CFR-03A as well as sites SYN-09, SYN-03 and SYN-01 (Figure H-9 and Table H-2). Concentrations of TP exceeded the Clark Fork River standard of 0.020 mg\L at all eleven monitoring stations (Figure H-10 and Table H-2).

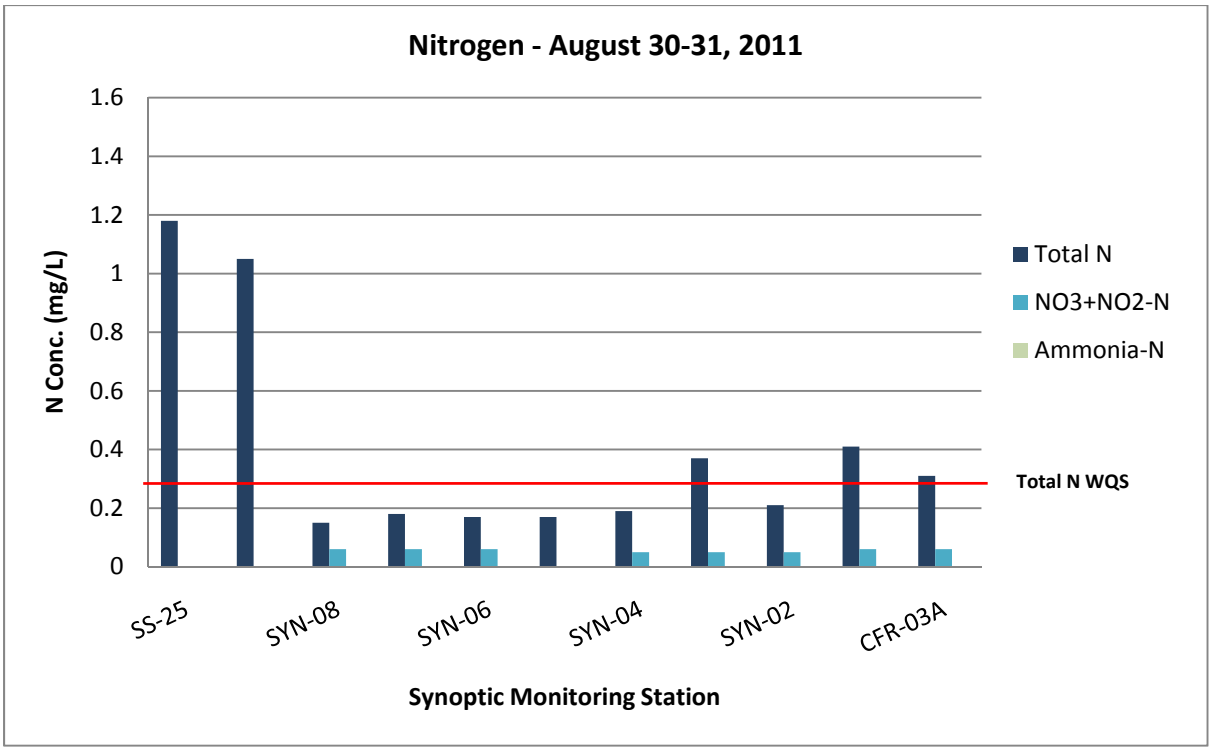

Figure H-9. Nitrogen concentrations in the upper Clark Fork River during the August 30 - 31, 2011 synoptic monitoring event.

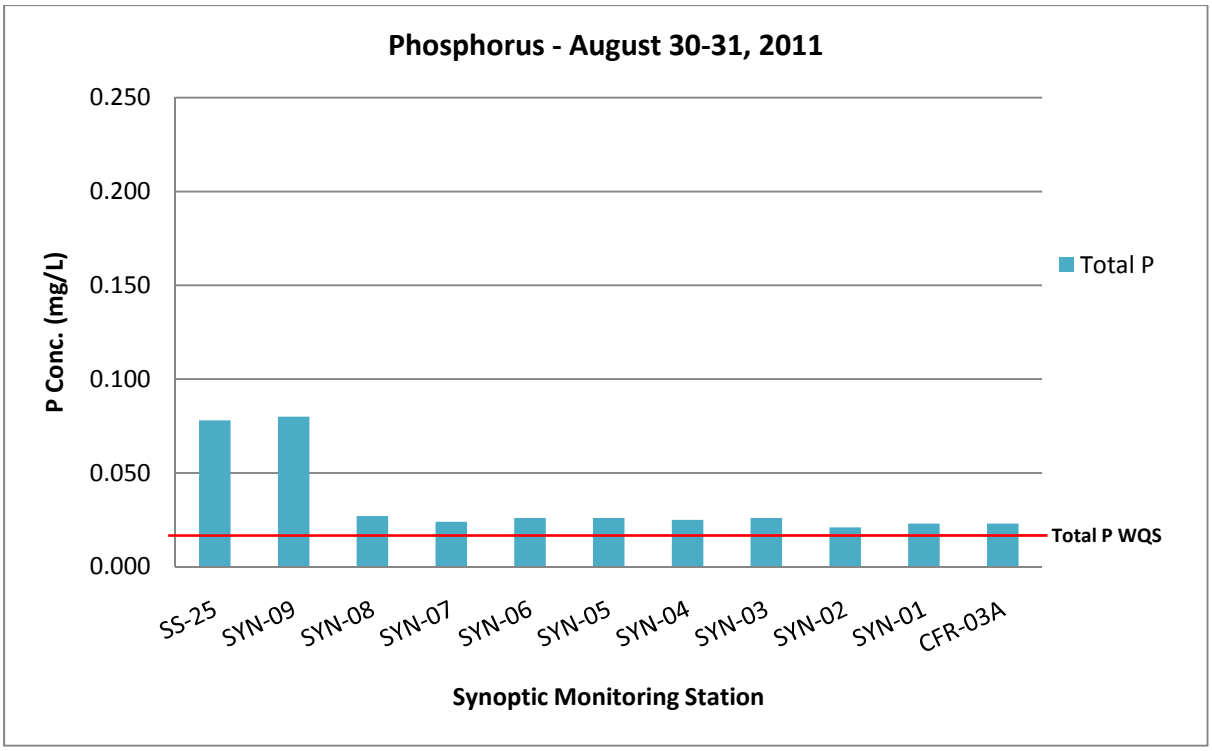

Figure H-10. Phosphorus concentrations in the upper Clark Fork River during the August 30 - 31, 2011 synoptic monitoring event.

Ammonia nitrogen is an algal nutrient, and it is also toxic to aquatic life. The degree of toxicity is influenced by in-stream pH values and water temperature which determine the amount of unionized ammonia that is present. In general, higher pH values and warmer water temperatures increase the toxicity potential for a given concentration of total ammonia. Ammonia nitrogen was not detectable at any of the eleven monitoring stations during the August 2011 monitoring event (Table H-2).

Metals, nutrients, hardness and TSS concentrations measured at each upper Clark Fork River synoptic monitoring stations during the August 30-31, 2011 monitoring event are summarized in Table H-2. Values which exceeded the aquatic life and human health performance standards established in the CFROU monitoring plan or, in the case of algal nutrients and ammonia, the Montana surface water quality standards, are highlighted. For hardness-dependent metals criteria, the excursions were determined based on the hardness measured at each station.

Results from the analytical laboratory are included in Appendix B to the main body of this report. The 2011 surface water data are included in Appendix C.

Table H-2. Dissolved and total recoverable metals, algal nutrients, hardness and total suspended solids (TSS) concentrations (mg/L) measured in the upper Clark Fork River during the third quarter 2011 (August 30-31, 2011) monitoring event.

Parameter	SS-25	SYN-09	SYN-08	SYN-07	SYN-06	SYN-05	SYN-04	SYN-03	SYN-02	SYN-01	CFR-03A
Arsenic, Dissolved	0.037	0.036	0.014	0.014	0.015	0.016	0.015	0.015	0.014	0.014	0.015
Cadmium, Dissolved	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper, Dissolved	0.004	0.004	0.003	0.003	0.005	0.004	0.004	0.004	0.004	0.004	0.004
Lead, Dissolved	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc, Dissolved	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic, Total Recoverable	0.037	0.036	0.015	0.015	0.015	0.016	0.016	0.015	0.015	0.015	0.015
Cadmium, Total Recoverable	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper, Total Recoverable	0.005	0.006	0.008	0.008	0.011	0.008	0.008	0.013	0.009	0.010	0.012
Lead, Total Recoverable	ND	0.0009	0.0070	0.0007	0.0010	0.0006	0.0006	0.0011	0.0008	0.0008	0.0011
Zinc, Total Recoverable	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hardness as CaCO3	166	168	146	146	148	147	144	153	147	153	156
Solids, Total Suspended TSS @ 105 C	ND	ND	ND	ND	ND	6	ND	6	4	ND	ND
Alkalinity, Total as CaCO3	110	110	120	120	120	120	120	120	120	120	120
Bicarbonate Alkalinity as HCO3	79	77	120	130	130	120	120	120	120	130	130
Sulfate	81	82	41	42	42	42	43	43	43	43	45
Nitrogen, Ammonia as N, mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NO3+NO2 as N, mg/L	ND	ND	0.06	0.06	0.06	ND	0.05	0.05	0.05	0.06	0.06
N-Total, mg/L	1.18	1.05	0.15	0.18	0.17	0.17	0.19	0.37	0.21	0.41	0.31
Phosphorus, Total as P, mg/L	0.078	0.080	0.027	0.024	0.026	0.026	0.025	0.026	0.021	0.023	0.023

No excursions of WQS
Chronic aquatic toxicity excursion
Human health or DW criteria excursion
Clark Fork nutrient WQS excursion

H.3 DISCUSSION

Monitoring at the eleven CFROU synoptic monitoring sites consisted of surface water sampling and field measurements. Monitoring results showed excursions of aquatic life chronic toxicity standards for TR lead at one station (SYN-08), and of human health/drinking water standards for TR arsenic at all eleven stations. Monitoring results for algal nutrients (nitrogen and phosphorus variables) showed excursions of Montana surface water quality standards established for the upper Clark Fork River at five of eleven stations for total nitrogen, and at all eleven stations for total phosphorus.

The Warm Springs Ponds appear to be a source of substantial nutrient and arsenic loading to the Clark Fork, with concentrations of both much higher at stations SS-25 and SYN-09 than at downstream stations. Concentrations of arsenic and algal nutrients dropped precipitously between stations SYN-09 and SYN-08, presumably due to the inflow of relatively clean water from Warm Spring Creek, which joins the Clark Fork between these sites. Arsenic concentrations were well below the acute and chronic aquatic life criteria, and ammonia was below detection at all sites. The 2011 synoptic results provide no obvious explanation for the decline in fish populations in the upper Clark Fork River.