MONITORING REPORT FOR 2012

CLARK FORK RIVER OPERABLE UNIT

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Acronyms

ALS	Aquatic Life Standards
CFROU	Clark Fork River Operable Unit
COC	Contaminants of Concern
CV	Coefficient of Variation
DO	Dissolved Oxygen
DQO	Data Qualit Objective
FSBI	Fine Sediment Biotic Index
ft/s	Feet per Second
MFWP	Montana Department of Fish, Wildlife and Parks
HBI	Hilsenhoff Biotic Index
HH/DW	Human Health/Drinking Water
LDO	Luminescent Dissolved Oxygen
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
PEC	Probable Effect Concentration
QA/QC	Quality Assurance/Quality Control
RIVPACS	River Invertebrate Prediction and Classification System
RPD	Relative Percent Difference
SBC	Silver Bow Creek
TEC	Threshold of Effect Concentration
TN	Total Nitrogen
TP	Total Phosphorus
TR	Total Recoverable
TSS	Total Suspended Sediment
USGS	United States Geological Service

EXECUTIVE SUMMARY

The *Interim Comprehensive Long-Term Monitoring Plan for the Clark Fork River Operable Unit – 2012* (Atkins 2012a) established monitoring activities that will determine the environmental effectiveness of remediation and restoration actions within the Milltown Reservoir/Clark Fork River Superfund sites as they are implemented over the next 10-12 years. The Clark Fork River Operable Unit (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 River. As of the end of 2012, remediation was just beginning in the CFROU. Therefore, results presented in this report represent an assessment of pre-remediation conditions.

Monitoring under the Interim Comprehensive Long-Term Plan began in the CFROU in the spring of 2010. In 2010, six Clark Fork River monitoring stations were established prior to initiation of any remediation and restoration actions within the CFROU: near Galen (CFR-03A), at Deer Lodge (CFR-27H), above the Little Blackfoot River confluence (CFR-42G), at Gold Creek (CFR-53C), near Drummond (CFR-84F), and at Turah (CFR-116A). In 2011, a monitoring station was added immediately downstream from the Warm Springs Ponds: Silver Bow Creek at Warm Springs (SS-25). In 2012, eight additional tributary stations were added to the monitoring network: Mill-Willow Creek at Frontage Road (MCWC-MWB), Mill-Willow Creek near mouth (MWB-SBC), Warm Springs Creek near mouth (WSC-SBC), Lost Creek near mouth (LC-7), Racetrack Creek near mouth (RTC-1), Little Blackfoot River near Garrison (LBR-CFR), Flint Creek near mouth (FC-CFR), and Rock Creek near mouth (RC-CFR).

The CFROU monitoring schedule in 2012 included four sampling events. Monitoring occurred once during each annual quarter: winter (Q1), spring (Q2), summer (Q3), and fall (Q4). The Q1, Q3, and Q4 sampling events are intended to be scheduled during periods of relatively low streamflow. The Q2 sampling event is intended to be scheduled near the peak of the spring snowmelt runoff, when streamflows are typically at the annual peak. Quarterly sample periods in 2012 occurred from April 9-11 (Q1), June 5-7 (Q2), September 11-13 (Q3), and December 4-6 (Q4).

In 2012, five environmental media were monitored in the CFROU: surface water, instream sediment, macroinvertebrate biointegrity, periphyton biointegrity, and fish mortality. Surface water was sampled at all sites during each quarter. Instream sediments, macroinvertebrates, and periphyton were monitored only during Q3. Fish mortality was monitored by Montana Fish Wildlife and Parks (MFWP) from April-August.

Surface water monitoring evaluates progress toward attainment of remediation and restoration goals for the upper Clark Fork River, as established by the Montana Department of Environmental Quality (MDEQ) and the Montana Department of Justice, Natural Resource Damage Program (NRDP). Surface water samples were collected using a depth integrating sampler (either a hand-held or bridge crane-mounted device) at equal-width increments of a stream cross-section at each sample site. Each sample is composited and subsampled according to approved methods and devices (Atkins 2012a). Surface water parameters included dissolved and total recoverable metal contaminants of concern (COCs) (i.e., arsenic, cadmium, copper, lead, zinc, mercury, and methylmercury), total suspended sediment, selected inorganic compounds and ions (i.e., chloride, sulfate, total alkalinity, bicarbonate alkalinity, and hardness), and nutrients (i.e., ammonia, nitrate plus nitrite nitrogen, total nitrogen, and total phosphorus). Field measurements include water temperature, pH, dissolved oxygen, electrical conductivity, and turbidity. Streamflows were measured during each sampling event, or were determined from co-located U. S. Geological Survey (USGS) streamflow gauging stations.

Instream sediment samples were collected and analyzed to assess exposure risk to humans and aquatic species from contaminated sediments. No specific remediation performance standards have yet been established for metal COC concentrations in the Clark Fork River. Instream sediment samples, collected at all monitoring stations in Q3 2012, were composites of predominately fine-grained material from at least five low velocity depositional zones at each site. Sediment samples were sieved in the laboratory into three size fractions (<0.065 mm, 0.065–1 mm, and 1–2 mm), digested, and analyzed for the metal COC concentrations.

Macroinvertebrate samples, collected in Q3 2012, consisted of four replicate modified Hess samples (each Hess samples a 0.1 m^2 area). Taxonomic identification and enumeration of macroinvertebrates from each replicate sample was performed according to standard methods. Community biointegrity was assessed at each station using bioindices (overall biointegrity, metals tolerance, and nutrient tolerance) which were established specifically for monitoring of the Clark Fork River (McGuire 2010). Each bioindex used in this monitoring program is scored on a 100 point scale, with higher numbers indicating lower levels of impairment. The remedial goal for macroinvertebrate biointegrity in the CFROU is a mean metal sensitivity score ≥80.

Periphyton samples, collected in Q3 2012, were analyzed for non-diatom algae, diatom taxonomy, and community structure. A suite of metrics were applied to these diatom data to assess the degree of impairment from metals, nutrients, and sedimentation in CFROU sites.

In-situ (i.e., on site) toxicity tests were implemented to assess the effects of current metals contaminant levels in the Clark Fork River on fish survival. Results from toxicity tests will be used as pre-impact monitoring data for the assessment of remediation in the CFROU and to aid in the planning and implementation of cleanup efforts. Toxicity tests used juvenile brown trout *Salmo trutta* as the aquatic biomonitoring subjects. Fish cages (three per site) were placed in the CFROU at each mainstem monitoring site, near the Silver Bow Creek at Warm Springs site (SS-25), and in four tributary control sites (the Little Blackfoot River, Flint Creek, Rock Creek, and the Clinton Spring). The Clinton Spring site was included as a handling control site. Each cage was stocked with 25 fingerling trout and mortalities were counted and collected (for tissue and histological samples) biweekly, from April 1-August 31, 2012. During the study potential explanatory water quality factors were monitored; water temperature was monitored hourly at all sites, water chemistry (e.g., pH, nutrient concentrations) was monitored hourly at selected sites, and metal COC concentrations were monitored at all sites on three occasions.

In general, during the 2012 quarterly sample periods, streamflows at mainstem Clark Fork River sites were similar to long-term median streamflows (3-35 year periods of record) as measured by co-located USGS streamflow gauge stations. Streamflows were generally slightly above, about equal to, slightly below, and slightly above the long-term median in Q1, Q2, Q3, and Q4 respectively. Measured water conditions in the CFROU would not be expected to preclude cold water fisheries or any other designated beneficial uses. Water was generally cold (<15 °C), well-oxygenated (dissolved oxygen [dissolved oxygen] range: 8.51-14.05 mg/L), slightly basic (pH range: 7.64-9.07), had low to moderate conductivity (range: 47.0-577.0 µs/cm), and low turbidity during non-runoff sample periods (<15.0 NTU). In Q2, turbidity ranged from 4.3-53.8 NTU. Water hardness in mainstem sites was categorized as “hard” (range: 120-180 mg/L as $CaCO_3$) to “very hard” (range: >180 mg/L as $CaCO_3$) except during snowmelt runoff, when hardness was slightly lower at each site and typically categorized as “moderately hard” (range: 60-120 mg/L as $CaCO_3$). Generally, tributary sites had similar, or lower, hardness compared to mainstem sites. Lost Creek was an exception with consistently high hardness (range: 299-321 mg/L as $CaCO_3$). Mainstem sites had predominantly calcium bicarbonate water type. Sulfate concentrations declined with distance from the headwaters to Turah.

Although the quarterly monitoring data did not indicate that water temperatures in the Clark Fork River mainstem or tributaries are elevated, more detailed (hourly) water temperature data collected by MFWP during the fish mortality biomonitoring study indicated that summertime water temperatures in the Clark Fork River mainstem and in tributaries are stressful, and sometimes lethal, for trout. In 2012, maximum daily water temperatures exceeded the critical temperature threshold (19.0 °C) for brown trout at all mainstem sites and in Silver Bow Creek, the Little Blackfoot River, and Flint Creek on most days from July-August. Maximum daily water temperatures also exceeded 19.0 °C in Rock Creek for a few days in 2012. Maximum daily temperatures exceeded the lethal temperature threshold (24.7 °C) for brown trout, at least once, at the mainstem site above the Little Blackfoot River confluence and at Silver Bow Creek at Warm Springs.

Total suspended sediment (TSS) concentrations in the Clark Fork River mainstem sites were relatively high (range: 40-184 mg/L) in Q2 compared to other quarters (range: 0-44). Load estimates for total suspended sediment suggested that much of the annual total suspended sediment load in the Clark Fork River was transported during the spring snowmelt runoff. Significant increases in total suspended sediment loads in the Clark Fork River occurred between Galen and Deer Lodge, between Deer Lodge and Garrison, and between Gold Creek and Drummond. In the upper Clark Fork River sites monitored from 2010-2012, total suspended sediment concentrations were strongly positively correlated with total recoverable (total recoverable) arsenic (r^2 = 0.67), cadmium (r^2 = 0.86), copper (r^2 = 0.82), lead (r^2 = 0.89), and zinc (r^2 = 0.89) concentrations.

Excessive nutrient concentrations in surface waters may result in nuisance plant and algae growth, and in severe cases, hypoxia (i.e., low dissolved oxygen concentrations). In Q3, total nitrogen concentrations exceeded the standard (which applies during summertime only) in Silver Bow Creek at Warm Springs and in Racetrack Creek, but not in any Clark Fork River mainstem sites. Total phosphorous concentrations exceeded the summertime standard at 4 of 6 Clark Fork River mainstem sites and in 4 of 9 tributary sites (Silver Bow Creek at Warm Springs, Racetrack Creek near mouth, the Little Blackfoot River near mouth, and Flint Creek near mouth). In the mainstem Clark Fork River sites in Q2, total phosphorous concentrations were particularly high (from 1.5-5.5 times higher than in any other quarter). Total ammonia concentrations were below detection limits during all sample periods at all sites. Nitrate plus nitrite nitrogen did not exceed the recommended summer standard at any mainstem Clark Fork River sites in 2012, but did exceed the standard in Racetrack Creek in Q3.

The highest rates of total nitrogen and total phosphorous transport (loads) in the Clark Fork River mainstem occurred during Q2, perhaps as a result of cumulative nonpoint source inputs throughout the upper Clark Fork River watershed. The general spatial trend for total nitrogen and total phosphorous loading during each quarterly monitoring event was an incremental downstream increase. Possible sources of total nitrogen and total phosphorous loading within the CFROU include agricultural nonpoint sources, groundwater inputs, natural geologic sources, and municipal wastewater discharges from the communities of Butte (via Silver Bow Creek), Warm Springs, Deer Lodge, and Drummond.

For each metal COC in the Clark Fork River mainstem sites, the highest concentrations occurred in Q2 and were generally almost an order of magnitude higher than during any other quarter. Of all CFROU sites in 2012, the highest total recoverable concentrations of arsenic (0.048 mg/L), cadmium (0.00095 mg/L), copper (0.272 mg/L), and zinc (0.22 mg/L) occurred in the Clark Fork River near Garrison in Q2; the highest lead (0.0416 mg/L), mercury (0.00150 mg/L), and methylmercury (4.56 ng/L) concentrations occurred in Flint Creek in Q2. The

second highest total recoverable arsenic (0.048 mg/L), cadmium (0.00081 mg/L), copper (0.252 mg/L), and zinc (0.18 mg/L) concentrations occurred in the Clark Fork River at Deer Lodge in Q2. Flint Creek also had relatively high arsenic (0.044 mg/L) and zinc (0.12 mg/L) concentrations in Q2. During relatively low streamflow sample periods (Q1, Q3, and Q4), total recoverable cadmium, copper, lead, and zinc concentrations were particularly low compared to Q2 concentrations. Maximum total recoverable concentrations for each metal COC in Q1, Q3, and Q4 were: cadmium (0.00029 mg/L), copper (0.055 mg/L), lead (0.0068 mg/L), and zinc (0.04 mg/L). The largest proportion of most metal COCs was present in the sediment-associated form (i.e., unfiltered samples), particularly during Q2. However, the largest proportion of arsenic concentrations typically occurred in dissolved form (i.e., filtered at 0.45 µm mesh size), with a few exceptions in Q2.

In the CFROU, metal COCs in surface water frequently exceeded standards in 2012, particularly in Q2. Exceedances of the aquatic life standards (ALS) or human health/drinking water standards (HH/DW) occurred in mainstem Clark Fork River sites for arsenic, cadmium, copper, lead, zinc, and mercury. Exceedances of the ALS or HH/DW also occurred in tributary sites: Mill-Willow Creek (arsenic, copper, lead), Silver Bow Creek (arsenic), Warm Springs Creek (copper), Lost Creek (arsenic), Racetrack Creek (arsenic, copper, and lead), the Little Blackfoot River (lead), and Flint Creek (arsenic, cadmium, copper, lead, zinc, and mercury). No exceedances of the ALS or HH/DW occurred in Rock Creek.

The following metal COC exceedances occurred in CFROU surface waters:

- Arsenic exceedances of the HH/DW occurred in the Clark Fork River mainstem at 5 of 6 (83%) sites in Q2, and 3 of 6 (50%) sites in all other quarters. In tributary sites, arsenic exceedances of the HH/DW occurred in Mill-Willow Creek (both sample sites during all quarters), Silver Bow Creek (all quarters), Lost Creek (Q1, Q2, and Q4), Racetrack Creek (Q3), and Flint Creek (Q2).
- Cadmium exceedances of the chronic ALS occurred in the Clark Fork River mainstem at 3 of 6 (50%) sites in Q2. In tributary sites, cadmium exceeded the chronic ALS in Flint Creek (Q2).
- Copper exceedances of the chronic ALS occurred in the Clark Fork River mainstem at 5 of 6 (83%) sites in Q1, 6 of 6 (100%) sites in Q2, and 3 of 6 (50%) sites in Q4; copper exceedances of the acute ALS occurred at 6 of 6 (100%) sites in Q2, and 1 of 6 (17%) sites in Q4. In tributary sites, copper exceedances of the chronic ALS occurred at Mill-Willow Creek at Frontage Road (Q2, Q4), Mill-Willow Bypass near mouth (Q2), Warm Springs Creek (Q2), Racetrack Creek (Q2), and Flint Creek (Q2); copper exceedances of the acute ALS occurred at Mill-Willow Creek at Frontage Road (Q2, Q4), Warm Springs Creek (Q2), Racetrack Creek (Q2), and Flint Creek (Q2).
- Lead exceedances of the chronic ALS occurred in the Clark Fork River mainstem at 6 of 6 (100%) sites in Q2; lead exceedances of HH/DW occurred at 2 of 6 (33%) sites in Q2. In tributary sites, lead exceedances of the chronic ALS occurred at Mill-Willow Creek at Frontage Road (Q2, Q4), Racetrack Creek (Q2), the Little Blackfoot River (Q2), and Flint Creek (Q2); lead exceeded the HH/DW standard occurred at Flint Creek (Q2).
- Zinc exceedances of the acute ALS occurred in the Clark Fork River mainstem at 2 of 6 (33%) sites in Q2. In tributary sites, zinc exceeded the acute ALS in Flint Creek (Q1, Q2) and exceeded the HH/DW standard in Flint Creek (Q2).
- Mercury exceedances of the HH/DW occurred in the Clark Fork River mainstem at 3 of 6 (50%) sites in Q2. In tributary sites, mercury exceeded the HH/DW in Flint Creek (Q1, Q2) and exceeded the ALS in Q2.

Load estimates for metal COCs in surface water of the Clark Fork River mainstem suggest that spring snowmelt runoff (Q2) is a primary period for loading. The Clark Fork River mainstem reach between the Galen and Deer Lodge sites appears to be a primary source area for metal COCs, as was also noted by Sando et al. (2013). Flint Creek appears to be a secondary source of metal COCs, and a primary source of mercury. Addition of relatively clean water from the Little Blackfoot River appears to dilute metal COC loads in the mainstem.

The following metal COC load changes were observed between Clark Fork River mainstem sites in Q2:

- Between Galen and Deer Lodge, load estimates increased substantially for each metal COC: arsenic by 147% (from 75-185 lbs/day), cadmium by 325% (from 0.8-3.4 lbs/day), copper by 465% (from 188-1,062 lbs/day), lead by 485% (from 24-140 lbs/day), zinc by 376% (from 149-709 lbs/day), and mercury by 1,300% (from 0.03-0.42 lbs/day).
- Between Garrison and Gold Creek (sites immediately upstream and downstream from the Little Blackfoot River confluence), load estimates decreased substantially for each metal COC: arsenic by 48% (from 259-134 lbs/day), cadmium by 57% (from 5.1-2.2 lbs/day), copper by 65% (from 1,466-514 lbs/day), lead by 63% (from 197-73 lbs/day), zinc by 62% (from 1,186-447 lbs/day), and mercury by 95% (from 0.81-0.04 lbs/day).
- Between Gold Creek and Drummond (sites immediately upstream and downstream from the Flint Creek confluence), load estimates increased for each metal COC: arsenic by 37% (from 134-184 lbs/day), cadmium by 54% (from 2.2-3.4 lbs/day), copper by 37% (from 134-184 lbs/day), lead by 59% (from 73-116 lbs/day), zinc by 80% (from 447-830 lbs/day), and mercury by 2,675% (from 0.04-1.11 lbs/day).

Sediment metal COC concentrations were generally highest in the smallest sediment size fraction (<0.065 mm). The largest size fraction (1-2 mm) typically had the highest concentrations. In Clark Fork River mainstem sites, the highest concentrations tended to occur in the most upstream sites. The relative proportion, by weight, of each size fraction (i.e., the sediment gradation) was determined for each sediment sample, and weighted mean concentrations were calculated for each metal COC. Weighted mean concentrations of total metal COCs exceeded the threshold effect concentration (TEC) or probable effect concentration (PEC) frequently at CFROU monitoring stations in Q3 2012.

The following TEC and PEC exceedances occurred in CFROU sediment samples:

- Arsenic in the Clark Fork River mainstem exceeded the TEC at 6 of 6 (100%) sites and exceeded the PEC at 2 of 6 (33%) sites. In tributary sites, arsenic exceeded the TEC in Silver Bow Creek, Warm Springs Creek, Lost Creek, and Flint Creek.
- Copper in the Clark Fork River mainstem exceeded the TEC at 3 of 6 (50%) sites and exceeded the PEC at 2 of 6 (33%) sites. In tributary sites, copper exceeded the TEC in Silver Bow Creek, Warm Springs Creek (PEC also exceeded), and Lost Creek.
- Lead in the Clark Fork River mainstem exceeded the TEC at 1 of 6 (17%) sites.
- Zinc in the Clark Fork River mainstem exceeded the TEC at 4 of 6 (67%) sites.

Among all CFROU sites sampled for macroinvertebrate biointegrity, five sites failed to meet the remedial goal in 2012. Sites that failed to meet the remedial goal included the Clark Fork River at Deer Lodge, Silver Bow Creek at Warm Springs, Lost Creek, the Little Blackfoot River, and Rock Creek. At all Clark Fork River mainstem sites, macroinvertebrate biointegrity classifications were either “not impaired” to “slightly impaired” for the overall biointegrity and metals sensitivity indices. All Clark Fork River mainstem sites were classified as “not impaired”

for the nutrient sensitivity index. Overall macroinvertebrate biointegrity scores in the mainstem sites (range: 85-93) were lowest at Drummond and highest near Galen. Macroinvertebrate metals sensitivity scores in the mainstem (range: 79-94) were lowest at Deer Lodge and highest at Galen. Macroinvertebrate nutrient sensitivity scores in the mainstem (range: 80-93) were lowest at Deer Lodge and highest at Turah. In tributary sites, macroinvertebrate overall biointegrity classifications were either "not impaired" or "slightly impaired" at all sites. Overall macroinvertebrate biointegrity scores in the tributary sites (range: 72-97) were lowest in Silver Bow Creek and Lost Creek and highest in Flint Creek. In tributary sites, macroinvertebrate metal sensitivity classifications were either "not impaired" or "slightly impaired" at all sites except Silver Bow Creek, which was classified as "moderately impaired". Macroinvertebrate metal sensitivity scores in the tributary sites (range: 50-100) were lowest in Silver Bow Creek and highest in Flint Creek. The Silver Bow Creek macroinvertebrate metal sensitivity score (50) was particularly low; all other scores were ≥75. In tributary sites, macroinvertebrate nutrient sensitivity classifications were either "not impaired" or "slightly impaired" at all sites. Macroinvertebrate nutrient sensitivity scores in the tributary sites (range: 65-94) were lowest in Racetrack Creek and highest in Flint Creek. Silver Bow Creek and Lost Creek also had relatively low (68) macroinvertebrate nutrient sensitivity scores.

Overall biological integrity of periphyton in all Clark Fork River mainstem samples, and in 4 of 5 tributary samples, was categorized as "good". Tributary samples categorized as having "fair" overall biological integrity were collected in Silver Bow Creek at Warm Springs, Warm Springs Creek, Racetrack Creek, the Little Blackfoot River, and Flint Creek. However, specific bioindices estimating the probability of impairment in periphyton samples from specific stressors indicated that impairments were likely at many of the CFROU sites.

The following CFROU periphyton samples had likely (i.e., >50% probability) impairments from environmental stressors:

- Metal impairment was likely in 83% (5 of 6) of the Clark Fork River mainstem site samples; only the Deer Lodge sample had an impairment probability <50%. Metal impairment was likely at all tributary sites except: Lost Creek, Racetrack Creek, and Rock Creek.
- Nutrient impairment was likely in 83% (5 of 6) of the Clark Fork River mainstem site samples; only the Deer Lodge sample had an impairment probability <50%. Nutrient impairment was likely at all tributary sites except: Mill-Willow Creek near mouth, Warm Springs Creek, Lost Creek, Racetrack Creek, and Rock Creek.
- Sediment impairment was not likely in any of the Clark Fork River mainstem site samples. Sediment impairment was likely at Mill-Willow Creek at Frontage Road, the Little Blackfoot River, and in Flint Creek.

Among Clark Fork River mainstem sites, where fish mortality biomonitoring occurred in 2012, no sites had mortality that was significantly higher than expected based on mortality rates of fish in tributary control sites. However, fish at the Silver Bow Creek at Warm Springs site had significantly higher mortality than expected in 2012, but did not have higher than expected mortality in 2011. In 2011, the Galen and Turah sites had higher than expected mortality; however, in 2012 mortality was not higher than expected at either site. Survival in mainstem sites in 2012 (range: 83-91%) was lowest at Galen and highest at Deer Lodge. Survival in mainstem sites in 2011 (range: 69-100%) was highest at Bearmouth and Gold Creek and lowest at Turah. Physiological evaluation suggested that water quality may impair fish health in the Clark Fork River mainstem as well as in tributaries. Fish held at mainstem Clark Fork River cages in 2012 had hepatocytic necrosis (a potential indicator for contaminant exposure) scores

ranging from “mild” to “moderately severe”, and fish held in tributaries had similar scores. Fish held at mainstem Clark Fork River cages in 2012 also had melanomacrophage aggregation in the kidney and liver (another potential indicator of contaminant exposure). Scores describing the severity of melanomacrophage impairment in the kidney of Clark Fork River mainstem fish ranged from “moderate” to “severe” and scores from fish held in tributaries were similar. Scores describing the severity of melanomacrophage impairment in the liver of Clark Fork River mainstem fish ranged from “mild” to “moderate” and scores from fish held in tributaries ranged from “minimal” to “moderate”.

INTRODUCTION

Heavy metals originating from historic mining activities, milling and smelting processes associated with the Anaconda Company operations in Butte and Anaconda have accumulated in the Clark Fork River streambanks 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 streambanks and floodplains, which erode during high streamflow 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 Montana Department of Environmental Quality (MDEQ), as lead agency and in consultation with the Environmental Protection Agency and the National Park Service, oversees, manages, coordinates, designs, and implements remedial actions for the Clark Fork River site. The MDEQ coordinates with the Montana Department of Justice, Natural Resource Damage Program for implementation and integration of restoration components to supplement the remedial actions. The MDEQ coordinates with the NPS to implement the Federal Restoration Plan on the Grant-Kohrs Ranch. Consultation and coordination between the agencies clarifies data collection and analysis methods, provides review and comment, and maximizes resource use and environmental benefits.

The *Interim Comprehensive Long-Term Monitoring Plan for the Clark Fork River Operable Unit – 2012* (Atkins 2012a) identified monitoring activities to evaluate the environmental effectiveness of remediation and restoration actions within the Clark Fork River Operable Unit (CFROU) as they are implemented.

This report contains the results from the third year of the CFROU monitoring program. In addition, Section 5 provides a brief literature review of past fisheries investigations in the Clark Fork River. Monitoring was first conducted by MDEQ and Atkins personnel in the spring of 2010, prior to initiation of any remediation and restoration actions within the CFROU. Since 2010, monitoring sites have been added to the monitoring program in Clark Fork River tributaries. In 2012, surface water sampling was conducted during each annual quarter, instream sediments and aquatic macroinvertebrates were sampled in the third quarter (summer), and fish mortality was monitored by Montana Fish Wildlife and Parks from April 1-August 31.

1 SURFACE WATER

1.1 Introduction

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

Table 1-1. Numeric water quality standards applicable to the Clark Fork River Operable Unit (MDEQ 2012b).

Parameter	Water Quality Standards (mg/L)		
	Human Health[b]	Aquatic Life[a]	
		Chronic[b]	Acute[b]
Arsenic	0.010	0.150	0.340
Cadmium	0.005	0.00041	0.00375
Copper	1.3	0.015	0.024
Lead	0.015	0.0064	0.1653
Zinc	2.0	0.192	0.192
Mercury	0.00005	0.00091	0.00170
Methylmercury[c]	---	---	---
Nitrogen, Total[d]	0.300	0.300	0.300
Phosphorus, Total[d]	0.020	0.020	0.020

a. Criteria for cadmium, copper, lead, and zinc are water hardness-based. Representative values presented above are based on a hardness of 174 mg/L, measured as $CaCO_3$, which was the mean water-hardness of the six mainstem Clark Fork River Operable Unit (CFROU) monitoring stations during the 2010-2012 monitoring period. These standard values differ slightly from those in the Record of Decision, which were based on a hardness of 100 mg/L.

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

c. The methylmercury human health standard is expressed as a concentration in fish and shellfish tissue rather than in water.

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

1.2 Methods

Surface water samples were collected quarterly in 2012 at 15 Clark Fork River mainstem and tributary monitoring sites following the procedures outlined in the *Interim Comprehensive Long-Term Monitoring Plan for the Clark Fork River Operable Unit* (Atkins 2012a; Figure 1-1 and Figure 1-2). All 2012 monitoring occurred prior to the implementation of remediation activities within the CFROU that are expected to begin in 2013. Six mainstem stations were established in 2010 and monitored in each quarterly event from 2010-2012 (Table 1-2). A seventh site, Silver Bow Creek near Warm Springs, was added in 2011 (Table 1-2). Beginning in 2012, eight additional tributary monitoring sites were added to the CFROU network (Table 1-3). Monitoring events were scheduled to capture early spring (April), late summer (September), and winter (December) low streamflow conditions, as well as the rising limb of the hydrograph corresponding to spring snowmelt runoff (June). The September monitoring event coincided with the instream sediment and biological (macroinvertebrate and periphyton) components of the CFROU monitoring program (Sections 2-4).

Surface water samples were collected for the parameters specified in the ROD (USEPA 2004, pp. 2–134) (Table 1-4), as well as several additional parameters which were added beginning in 2012 (e.g., total mercury and methylmercury). Water samples were collected using an isokinetic depth integrating sampler (DH-81). When the sampling site was not safe to wade, depth integrated samples were collected using a bridge crane-mounted sampler (D-95), operated from bridge decks. Sampling methods followed USGS protocol 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 protocol (USGS 2006). Samples for analysis of dissolved metals and common ions were field-filtered (0.45 µm membrane filter with a glass fiber pre-filter).

Physical parameters (i.e., temperature, pH, dissolved oxygen [DO], and conductivity), were measured during each monitoring event with a field multi-meter (*YSI Professional Plus*). Field turbidity was measured during each monitoring event with a field turbidity meter (*Hach Model 2100P Portable Turbidimeter*). Field meters were calibrated prior to the start of each monitoring event, and at least every other day for monitoring events that required several field days. Field measurement data and site conditions were recorded on a standardized site visit form. All m

onitoring procedures followed quality assurance and quality control (QA/QC) guidelines as described in the project monitoring plan including routine collection of field duplicate and field blank samples (Atkins 2012a).

Energy Laboratories, Inc. (Helena, Montana) conducted laboratory analyses for all sampling events in 2012. Methylmercury sample analyses were outsourced from Energy Laboratories, Inc. Laboratory analyses were conducted according to the project monitoring plan, including all applicable laboratory QA/QC procedures. Analytes included total recoverable and dissolved metals, total mercury, methylmercury, common ions, total suspended sediment (TSS), and nutrients (Table 1-4). Contaminants of concern (COCs) included metals and metalloids commonly associated with contaminated stream channel and floodplain sediments in the CFROU area: arsenic, cadmium, copper, lead, zinc, mercury, and methylmercury.

Analysis of the 2012 surface water data allowed inferences on water quality status within the CFROU. Spatial trends were evaluated by comparison of water quality parameters among stations. Temporal trends were evaluated by comparison of water quality parameters among sample periods. Remediation performance standards were evaluated by comparison of sample concentrations to water quality standards. Examination of spatial and temporal trends in contaminant loads provides insight into contaminant transport dynamics, the timing of contaminant loading, and potential contaminant source areas. Finally, a review of water quality at the tributary monitoring sites provided insight into dilution influences of tributary inflows and, in some cases, identified additional contaminant sources.

Aquatic life standards (ALS) apply to mean contaminant concentrations over specific time periods. For example, toxicity standards are violated if the mean concentration of a contaminant exceeds a specific concentration over a 96-hour (chronic) or 1-hour (acute) period. However, analyte concentrations measured in this report represent discrete sampling events. Variability in analyte concentrations were not monitored over 1-hour or 96-hour periods. Therefore, where exceedances of standards are referenced in this report, it was assumed that the measured analyte concentrations were stable over the necessary time period. Also, as noted in the footnote to Table 1-1, the water quality standards for total nitrogen and total phosphorous only apply between June 21 and September 21. Thus, total nitrogen and total phosphorous standards are only relevant to the third quarter (September 2012) monitoring event. The total nitrogen and total phosphorous standards also apply only to the Clark Fork River mainstem monitoring locations.

Table 1-2. Clark Fork River mainstem monitoring locations and sampling schedule, Clark Fork River Operable Unit, 2012.

Site ID	Site Description	USGS Gage	LAT/LON (NAD 83)	Sampling Event (Quarter)			
				1	2[a]	3[b]	4
SS-25	Silver Bow Creek at Warms Springs	12323750	46.18123°N -112.77917°W	SW	SW	SW, S, B	SW
CFR-03A	Clark Fork River near Galen	12323800	46.20877°N -112.76740°W	SW	SW	SW, S, B	SW
CFR-27H	Clark Fork River at Deer Lodge	12324200	46.39796°N -112.74283°W	SW	SW	SW, S, B	SW
CFR-42G	Clark Fork River above Little Blackfoot River near Garrison	12324400	46.51111°N -112.78977°W	SW	SW	SW, S, B	SW
CFR-53C	Clark Fork River at Gold Creek	12324680	46.59004°N -112.92864°W	SW	SW	SW, S, B	SW
CFR-84F	Clark Fork River near Drummond	12331800	46.71204°N -113.33137°W	SW	SW	SW, S, B	SW
CFR-116A	Clark Fork River at Turah	12334550	46.82646°N -113.81424°W	SW	SW	SW, S, B	SW

SW = surface water, S = instream sediment, and B = aquatic biota (macroinvertebrates and periphyton)

a. Spring runoff event shall be conducted during high streamflows associated with spring snowmelt runoff, during the rising limb of the hydrograph.

b. Low water event may be conducted during the 3rd or 4th calendar quarter but must occur no later than September 21 to accommodate the deadline for biological monitoring.

Table 1-3. Clark Fork River tributary monitoring locations and sampling schedule, Clark Fork River Operable Unit, 2012.

Site ID	Site Description	USGS Gage	LAT/LON (NAD 83)	Sampling Event (Quarter)			
				1	2[a]	3[b]	4
MCWC-MWB	Mill-Willow Creeks at Frontage Road	none	46.12649°N -112.79876°W	SW	SW	SW, S, B	SW
MWB-SBC	Mill-Willow Bypass near mouth	none	46.17839°N -112.78270°W	SW	SW	SW, S, B	SW
WSC-SBC	Warms Springs Creek near mouth	12323770	46.18041°N -112.78592°W	SW	SW	SW, S, B	SW
LC-7	Lost Creek near mouth	12323850	46.22665°N -112.76017°W	SW	SW	SW, S, B	SW
RTC-1	Racetrack Creek near mouth	none	46.28406°N -112.74484°W	SW	SW	SW, S, B	SW
LBR-CFR	Little Blackfoot River near Garrison	12324590	46.51964°N -112.79312°W	SW	SW	SW, S, B	SW
FC-CFR	Flint Creek near mouth	12331500	46.62891°N -113.15151°W	SW	SW	SW, S, B	SW
RC-CFR	Rock Creek near mouth	12334510	46.72153°N -113.68169°W	SW	SW	SW, S, B	SW

SW = surface water, S = instream sediment, and B = aquatic biota (macroinvertebrate and periphyton)

a. Spring runoff event shall be conducted during high streamflows associated with spring snowmelt runoff, during the rising limb of the hydrograph.

b. Low water event may be conducted during the 3rd or 4th calendar quarter but must occur no later than September 21 to accommodate the deadline for biological monitoring.

Table 1-4. Constituents analyzed in Clark Fork River Operable Unit 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
Mercury, Total		E245.1
Methylmercury		EPA 1630
Calcium	Common Ions, Suspended Sediment and Aggregate Organics	E200.7
Magnesium		E200.7
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
Organic Carbon, Dissolved (DOC)		A5310 C
Nitrogen, NH_3 as N	Algal Nutrients	E350.1
Nitrogen, $NO_3^- + NO_2^-$ as N		E353.2
Nitrogen, Total		A4500 N-C
Phosphorus, Total		E365.1

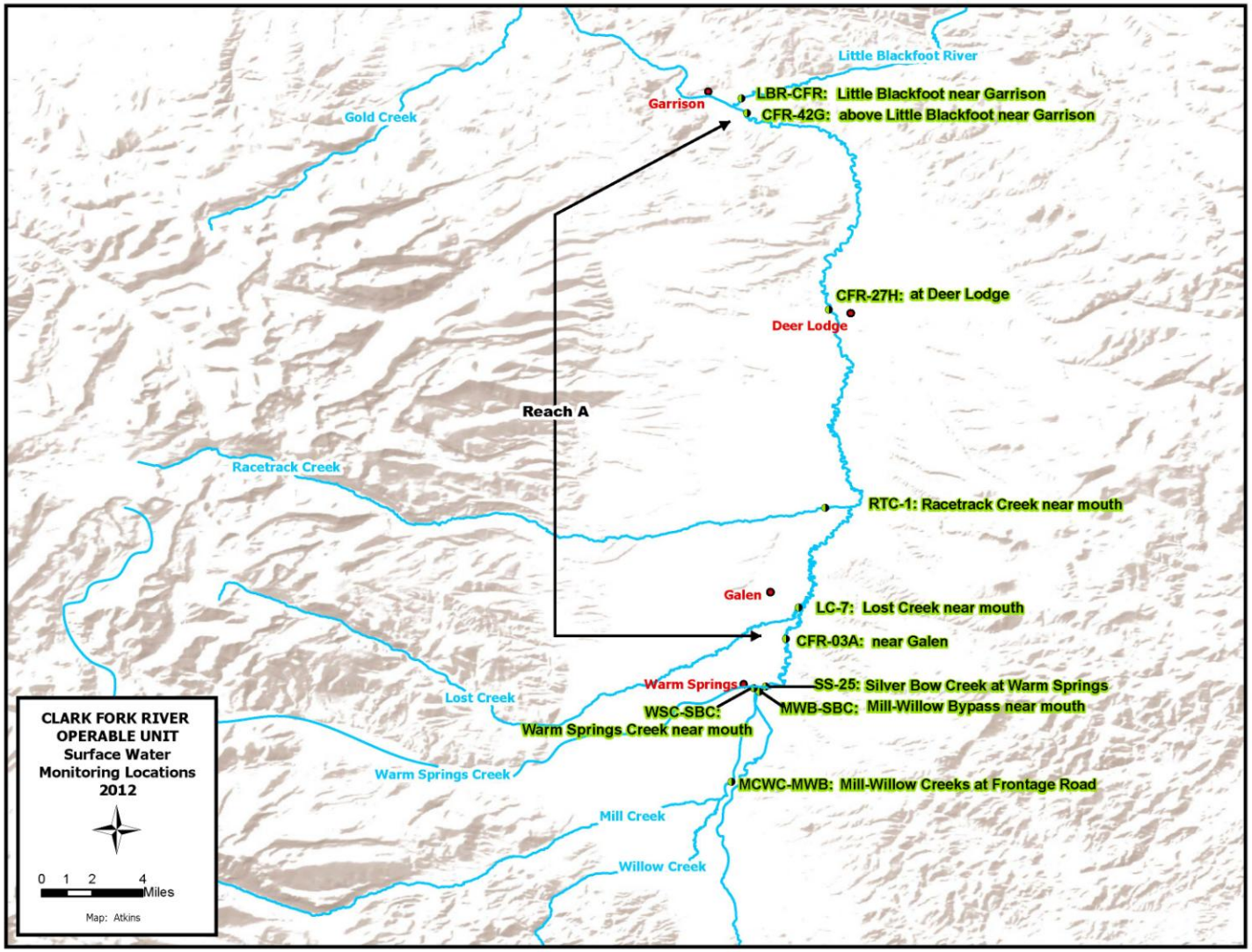

Figure 1-1. Surface water monitoring locations in Reach A of the Clark Fork River Operable Unit, 2012.

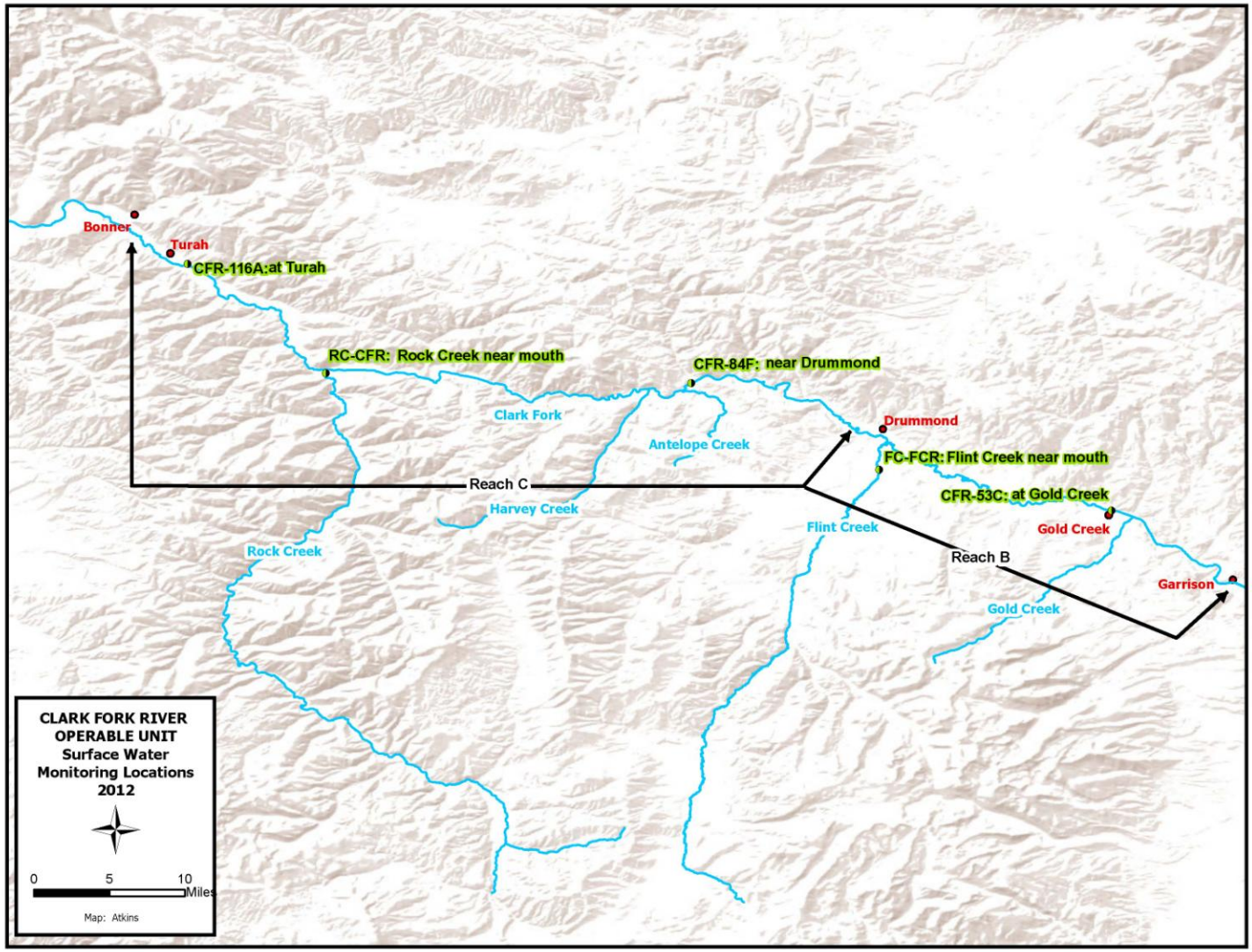

Figure 1-2. Surface water monitoring locations in Reach B and C of the Clark Fork River Operable Unit, 2012.

1.3 Results and Discussion

1.3.1 Data Validation

Laboratory analysis of data from surface water and instream sediment samples collected at upper Clark Fork River locations were validated through field quality control samples (i.e., field duplicates and field blanks; see Appendix A) as well as laboratory control samples (i.e., lab duplicates, blanks, spikes, and reference and calibration standards, Appendix B).

Analysis results for surface water field duplicate samples were within acceptable limits for the majority of chemical parameters during all quarters of 2012. The relative percent difference (RPD) for 94% (177/188) of the surface water field duplicates were below 25% for results below 5 times the reporting limit (RL). Exceptions were total nitrogen and total suspended sediment in the first quarter (Q1), total suspended sediment in the second quarter (Q2), total recoverable copper and lead, total suspended sediment, total nitrogen and phosphorous in the third quarter (Q3), and total suspended sediment and total phosphorous in the fourth quarter (Q4). Time lags between collection of the first cross-sectional depth-integrated sample and collection of a subsequent depth-integrated duplicate sample is likely responsible for measurement differences exceeding the established RPD criteria. Beginning in Q4, the original sample and the duplicate sample were collected simultaneously with the original sample and duplicate samples were prepared using separate sample churn splitters. In Q4, RPDs improved for most of the previously listed parameters, and this revised protocol will be used for future sampling events.

Deionized water field blanks submitted with surface water samples were below detection limits for the parameters of interest in 92% (173/188) of the field blanks during the quarterly monitoring events in 2012. Exceptions were dissolved organic carbon and dissolved zinc in Q1, Q2, and Q3; total nitrogen in Q1 and Q2; total suspended sediment in Q1 and Q3; and total and bicarbonate alkalinity in Q2. In addition, 22% (13/60) of the dissolved zinc concentrations measurements in actual site (i.e., non-QA) samples during each quarter exceeded the associated total recoverable zinc concentration, suggesting field contamination occurred, likely from the field filters. Beginning in Q4, field filters were rinsed with deionized water prior to field filtration of samples. In Q4, 13% (2/15) of the samples had dissolved zinc concentrations exceeding total recoverable zinc concentrations, indicating that the deionized rinsing decreased contamination from the filters, but the problem was not completely eliminated. Another corrective measure applied in Q4 was field filtration of dissolved organic carbon samples, rather than lab filtration. As a result, dissolved organic carbon was not detectable in field blank samples in Q4.

Laboratory control samples were within acceptable limits for all surface water parameters during all quarters of 2012. Data quality objectives (i.e., representativeness, comparability, and completeness) were met, and data quality indicators (i.e., sensitivity, precision, bias, and accuracy) were acceptable as established in the CFROU monitoring plan (Atkins 2012a).

Overall, data quality objectives (DQOs) established in the CFROU monitoring plan (Atkins 2012a) for data representativeness, comparability, completeness, sensitivity, precision, bias and accuracy were largely met in all quarters of 2012. A completed QA/QC checklist, summary tables of field duplicate and field blank results, and assessments of data quality objectives are included in Appendix A.

1.3.2 Streamflows

Metal concentrations in the Clark Fork River are strongly tied to streamflows (Sando et al. 2013). 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. Ten of the 15 monitoring stations in the expanded Clark Fork River monitoring network (six mainstem Clark Fork River sites and four tributary sites) are located at USGS streamflow gage stations and station records were accessed for this report. Streamflows at non-gaged stations were measured manually during each monitoring event using a digital flowmeter.

Overall, streamflows in the upper Clark Fork River watershed in 2012 were slightly above normal in the first half of the year and normal, to slightly below normal, in the second half of the year. In Q1 monitoring (April 9-11) streamflows were slightly above the long-term average for those dates. In Q2 monitoring (June 5-7), streamflows were increasing and were close to the peak of the spring snowmelt runoff period. In Q3 monitoring (September 11-13), streamflow conditions were typical of late summer base streamflows. In Q4 monitoring (December 4-6), streamflows were generally normal for those dates at the monitoring sites.

Streamflows at the CFROU monitoring stations in 2012 are depicted in hydrographs for each USGS gage station (Figure 1-3 through Figure 1-9). Hydrographs presented in Figures 1-3 through 1-9 present median daily streamflows at each gage location based on the period of record, ranging from 3 to 35 years, depending on the gage station.

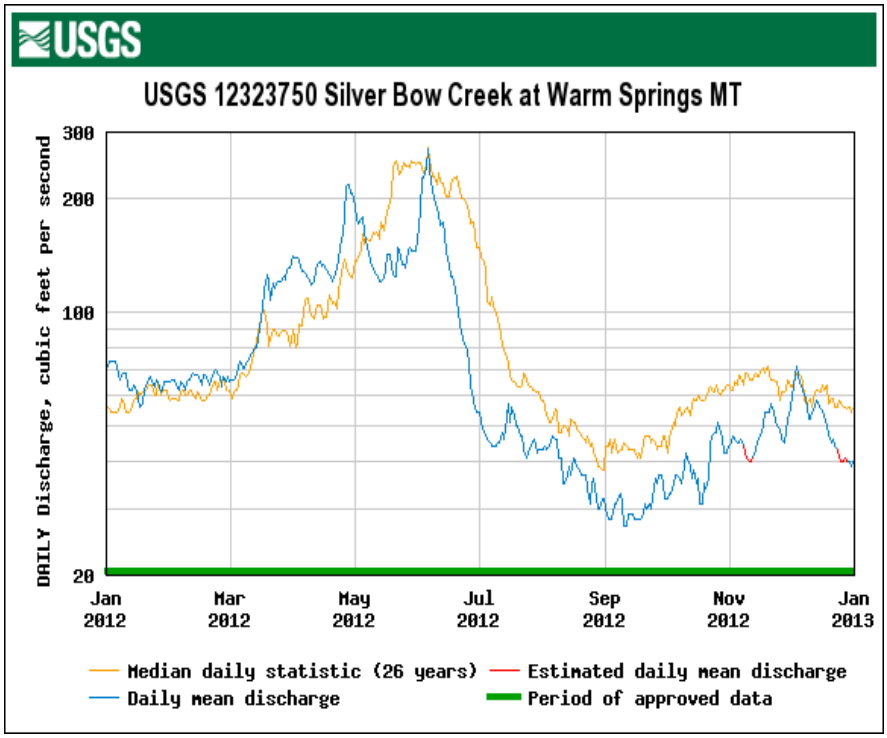

Figure 1-3. Hydrograph for Silver Bow Creek at Warm Springs, Montana, 2012.

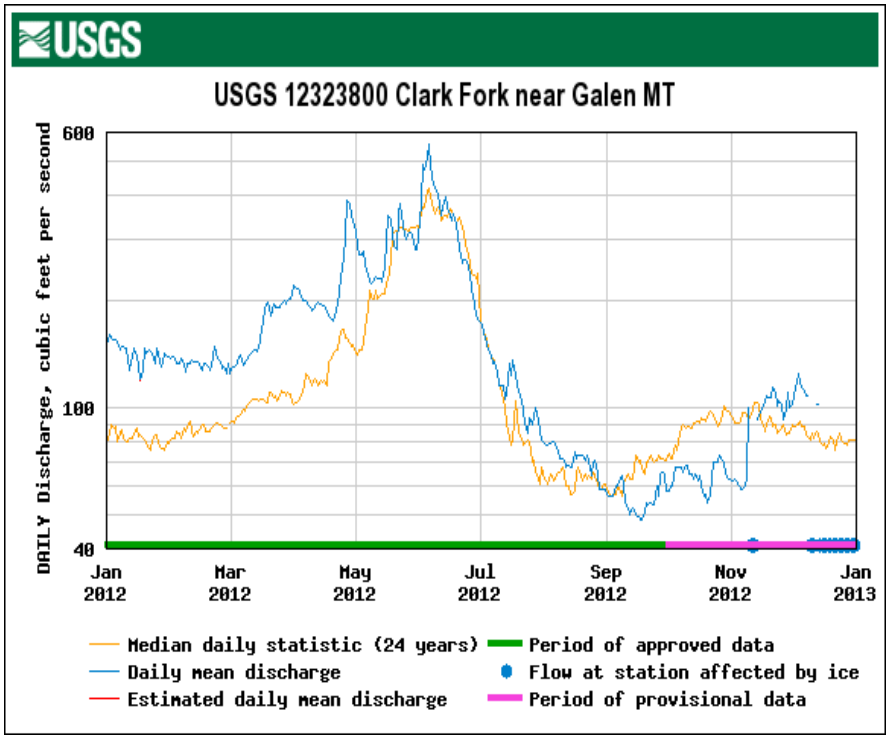

Figure 1-4. Hydrograph for Clark Fork River near Galen, Montana, 2012.

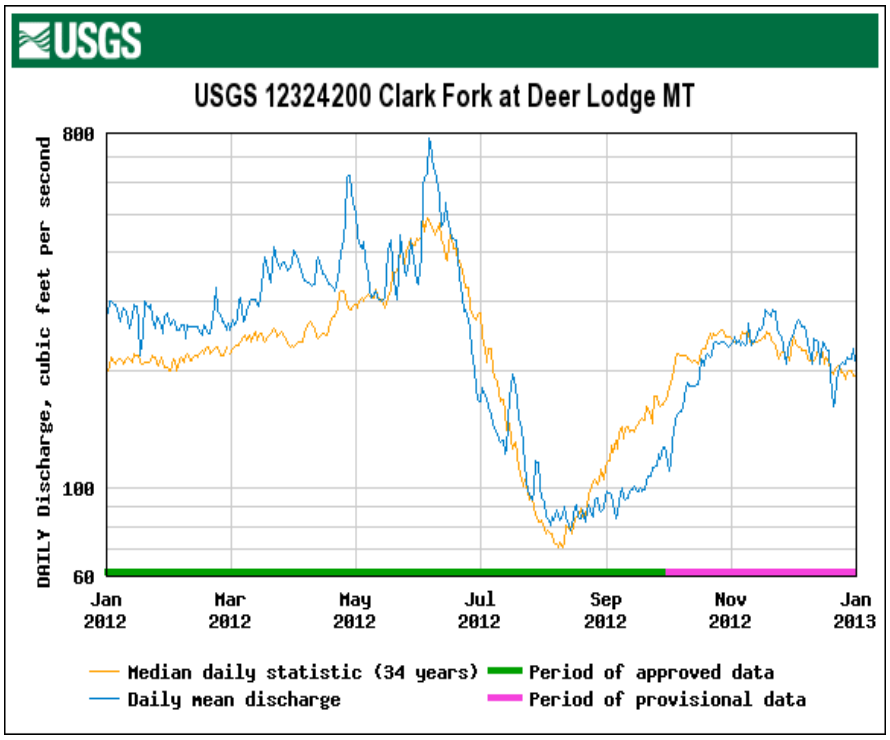

Figure 1-5. Hydrograph for Clark Fork River at Deer Lodge, Montana, 2012.

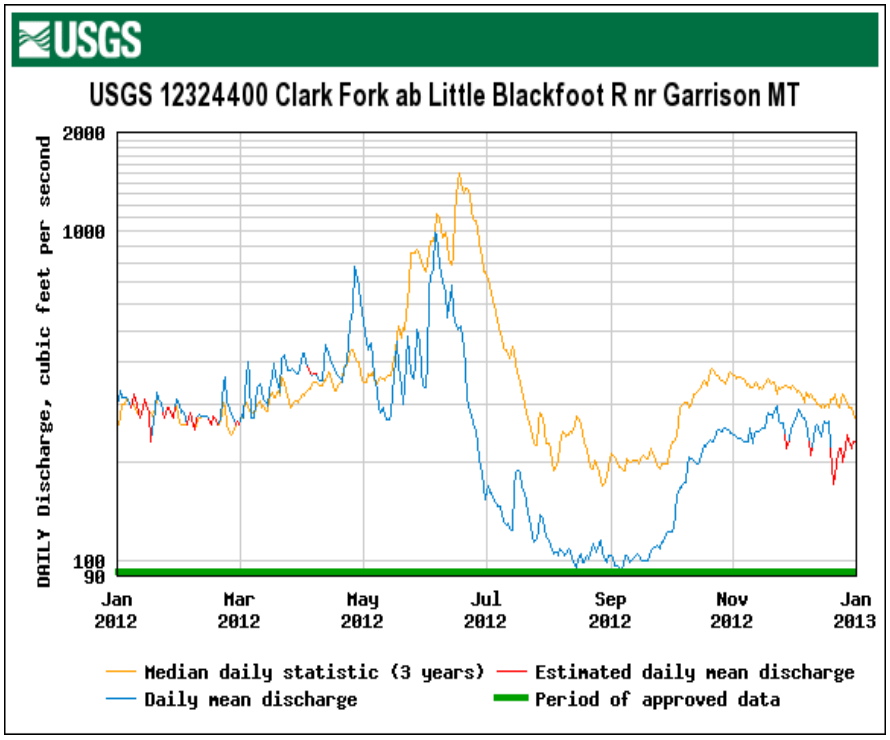

Figure 1-6. Hydrograph for Clark Fork River above Little Blackfoot River confluence near Garrison, Montana, 2012.

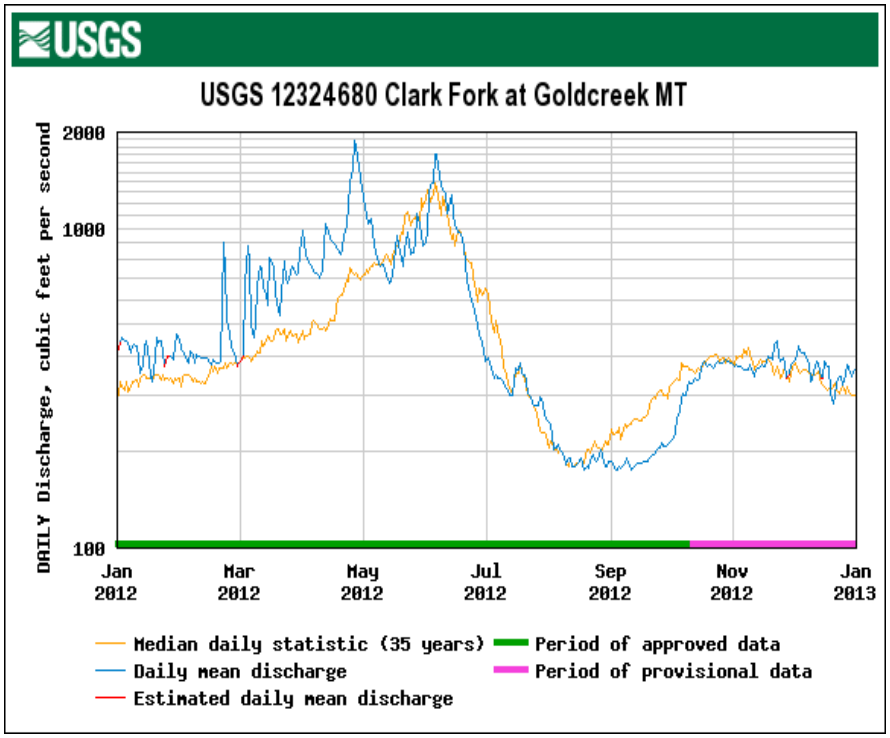

Figure 1-7. Hydrograph for Clark Fork River at Gold Creek, Montana, 2012.

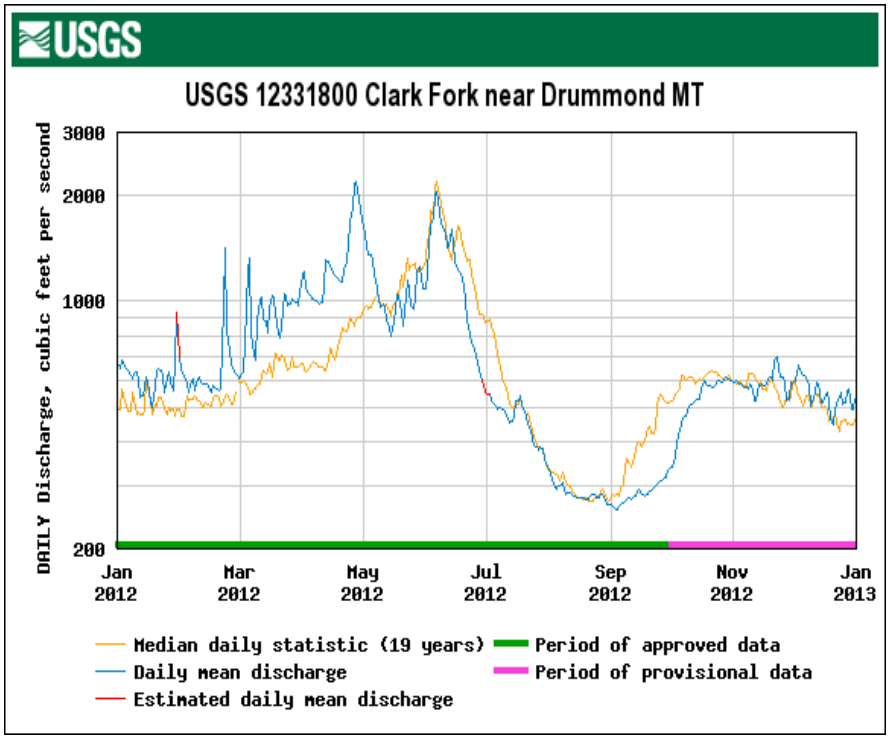

Figure 1-8. Hydrograph for Clark Fork River near Drummond, Montana, 2012.

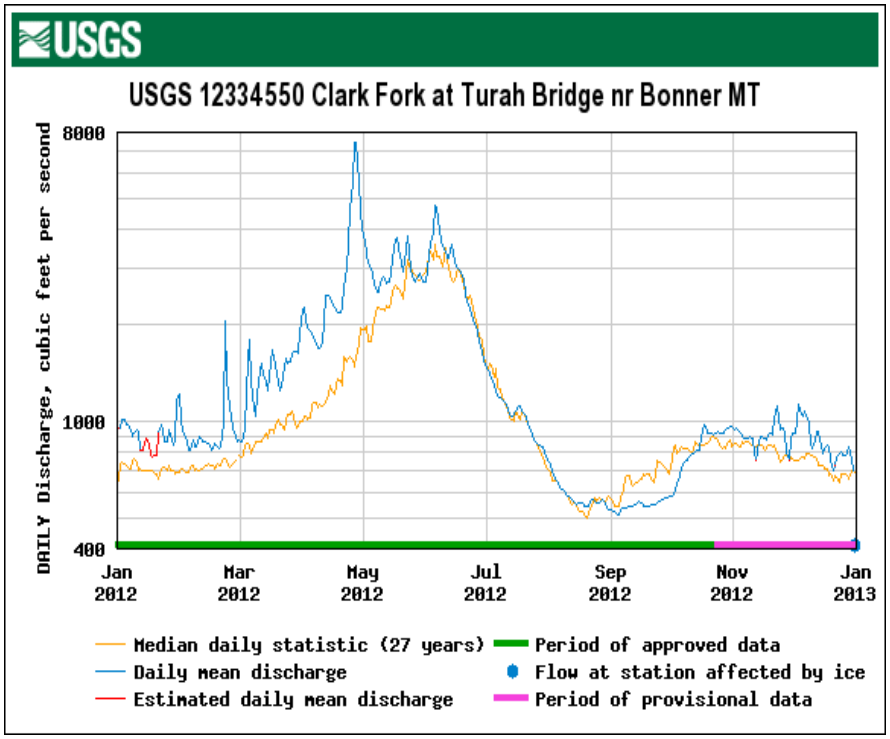

Figure 1-9. Hydrograph for Clark Fork River at Turah Bridge near Bonner, Montana, 2012.

1.3.3 Field Parameters

Results of the field parameter measurements (i.e., water temperature, pH, dissolved oxygen, electrical conductivity, and turbidity) during each monitoring event are summarized below.

1.3.3.1 Water Temperature

Water temperature has considerable chemical and biological significance in lacustrine systems (Hauer and Hill 2006). 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 (Hauer and Hill 2006). For salmonid fishes, water temperatures above 20ºC are stressful (Brungs and Jones 1977).

Temperature monitoring results for upper Clark Fork River monitoring stations in 2012 indicated modest seasonal and spatial variation, with temperatures that were consistently below 20ºC (Figure 1-10). However, although the temperatures observed in these sampling events do not indicate stressful conditions for salmonids and other coldwater organisms, hourly temperature monitoring in the upper Clark Fork River by MFWP (see Section 5) and others (M. Mayfield, Montana State University, unpublished data) indicate that water temperatures in the Clark Fork River during the summer commonly exceed 20ºC and may be related to increased salmonid mortality during the summer months (see Section 5). Therefore, although the temperature data included in this report does not indicate stressful conditions for salmonids, it is important to recognize the limitations of these data because of the discrete sampling approach. Differences in water temperatures among sites (Figure 1-10) were likely, at least partially, due to diel warming related to the time of day that monitoring occurred at respective sites. Peak water temperatures tend to occur late in the afternoon, and minimum temperatures occur just before dawn.

Maximum water temperatures at most of the 15 monitoring stations during the quarterly monitoring events in 2012 occurred in Q3, when temperatures at some sites exceeded 14ºC. Peak temperatures at four of the 15 sites were measured in Q2, but only one of those measurements exceeded 14 ºC. Minimum temperatures ranged from <1-5ºC and were observed in Q4. The only notable spatial trend in water temperature across the six mainstem Clark Fork River 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 likely related to the sequence in which monitoring was performed (typically from downstream to upstream) and the influence of diel warming.

Diel warming between monitoring stations during the course of each sampling day is likely the primary factor related to the observed water temperature spatial trends during each quarter. A secondary factor may have been the influence of tributary inflows, particularly Warm Springs Creek in the Clark Fork River headwaters, the Little Blackfoot River entering the Clark Fork River between the CFR-27H and CFR-53C monitoring stations, Rock Creek entering the river between the CFR-84F and CFR-116A stations, and possibly, Flint Creek entering the river between the CFR-53C and CFR-84F stations. In 2012 monitoring events, Flint Creek water temperatures were similar to those measured in the mainstem Clark Fork River above and below the Flint Creek confluence. Mill-Willow Creeks, Lost Creek and Racetrack Creeks near their mouths also had water temperatures that were similar to mainstem Clark Fork River monitoring station temperatures.

Water temperatures at CFROU mainstem monitoring stations in 2012 quarterly monitoring events were generally in the same temperature range as observed in the 2010 and 2011 monitoring years.

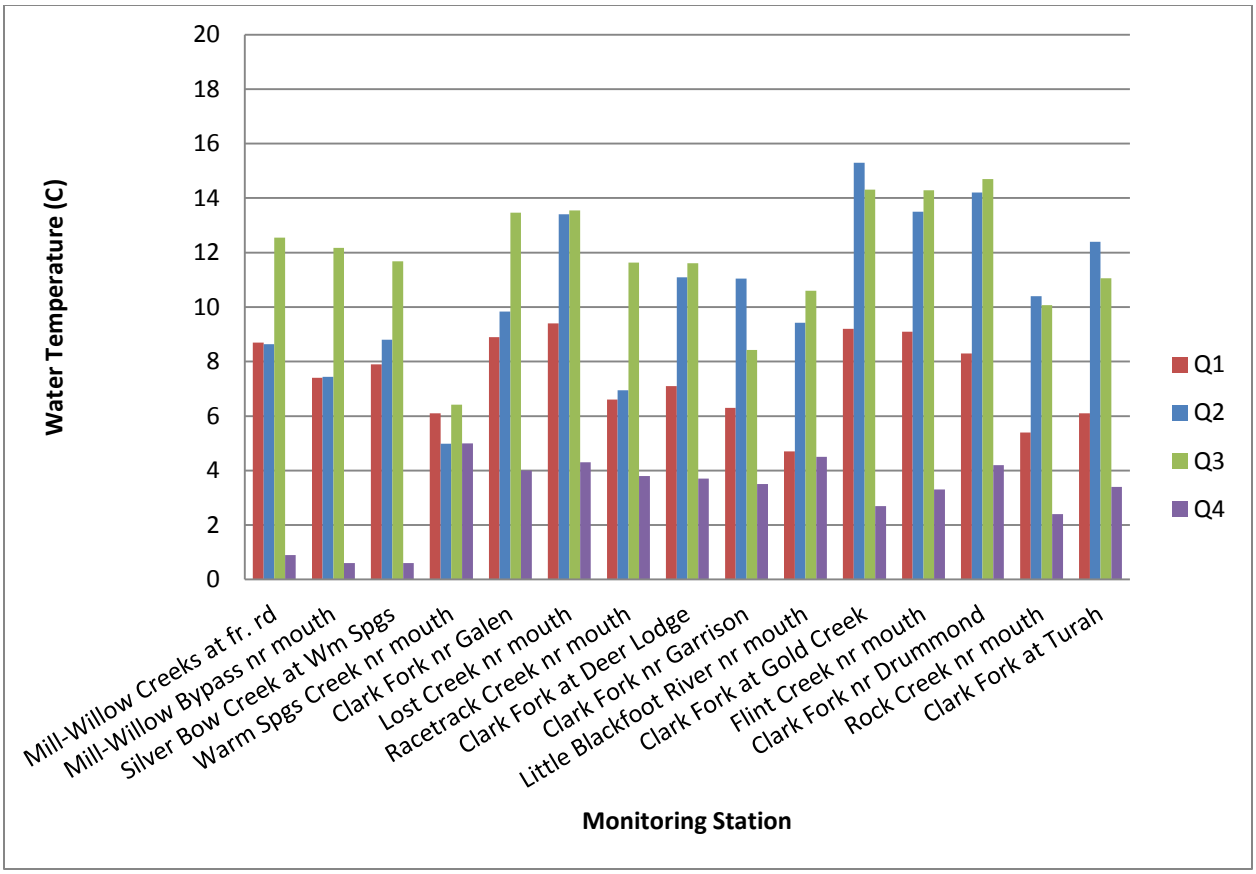

Figure 1-10. Water temperatures at Clark Fork River Operable Unit monitoring stations, 2012.

1.3.3.2 pH

Acidity is measured by pH which is a reciprocal measure of the hydrogen ion activity in a solution ($pH = -\log_{10}[H^+]$). Water pH is influenced by 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 snowmelt runoff. Water pH typically fluctuates on diel cycles associated with water temperature and the metabolism of primary producers. To evaluate changes in water chemistry alkalinity and pH should be measured.

Water pH has direct and indirect effects on water chemistry and the biota of aquatic systems. Declines in pH below 6.5 may reduce salmonid egg production and hatching, and reduce the emergence of some aquatic insects. The MDEQ has concluded that pH should be maintained within the 6.5 to 9.0 range to protect aquatic life. The solubility of some metals varies with pH. This is important in systems such as the Clark Fork River where metal concentrations in sediments are elevated. Water pH also influences instream chemical equilibria and the toxicity of some substances (e.g., ammonia).

Water pH at CFROU monitoring stations during the quarterly 2012 monitoring events ranged from 7.64-9.07 (Figure 1-11). One measurement (9.07) was outside the optimal range for the protection of aquatic life (6.5-9.0), and it occurred in Silver Bow Creek at Warm Springs in Q2. This station is immediately downstream from the Warm Springs Ponds where lime (i.e., inorganic materials containing calcium) is added to increase pH. There were no clear temporal or spatial patterns in pH among monitoring stations or between sample periods during the 2012

monitoring year. However, the highest pH values were generally observed at two stations in close proximity to the lime additions: Silver Bow Creek at Warm Springs and the Clark Fork River near Galen. Other variability between stations was likely due to diel variation in relation to the time in which monitoring occurred at each station. All pH measurements at CFROU monitoring stations in 2012 were within the range of previous quarterly measurements in 2010 and 2011.

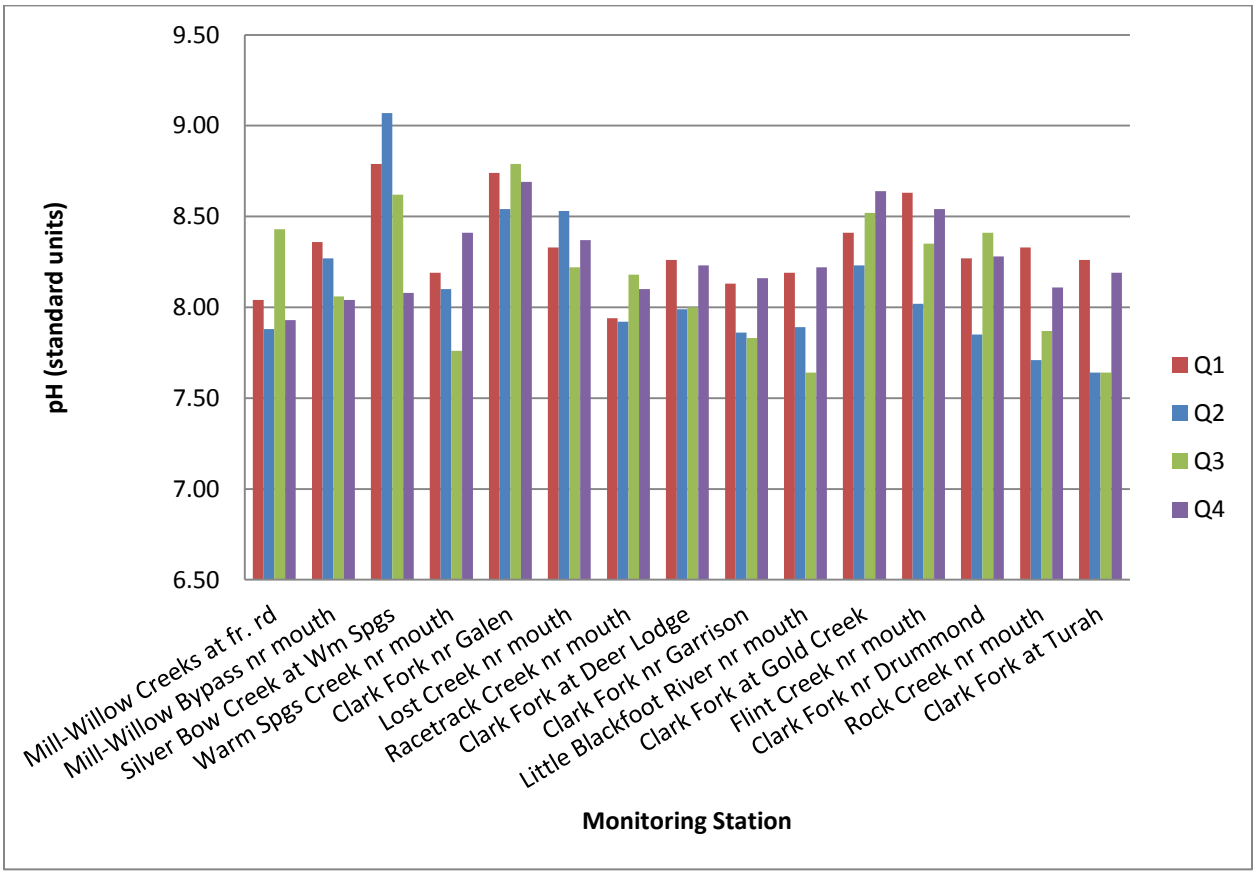

Figure 1-11. Acidity at Clark Fork River Operable Unit monitoring stations, 2012.

1.3.3.3 Conductivity

Conductivity is a measure of the ability of an aqueous solution to conduct electrical current. Conductivity varies with water temperature and with the concentration of dissolved ions in solution. Conductivity may also provide an approximation of the concentration of dissolved solids in water as well as its potential suitability for uses that may be limited by excessive salinity. Monitoring conductivity also gives general insight into spatial and seasonal changes in water chemistry.

Stream conductivity is fundamentally related to the underlying geology of the watershed. Watersheds with underlying granitic geology tend to have to low conductivity and watersheds with predominantly clay soils typically have high conductivity. High conductivity may also indicate excessive concentrations of dissolved solids, which may be related to anthropogenic alterations to the stream such as sewage inputs. If conductivity is particularly high, some water uses (e.g., irrigation or drinking water) may be impaired. Low conductivity is indicative of

generally low productivity of associated biological systems. Conductivity tends to be inversely proportional to streamflow due to dilutional influences.

Conductivity in the CFROU in 2012 varied seasonally and was likely associated with seasonal changes in streamflows. The highest conductivities were observed in Q3 and Q4, when streamflows were lowest. The lowest conductivities were observed in Q2 when streamflows were highest. In each quarterly monitoring event, conductivity declined in the Clark Fork below the confluences of the Little Blackfoot River and Rock Creek. Conductivity ranged from 47-577 µs/cm, with the lowest concentrations in Rock Creek in Q2, and the highest concentrations in Lost Creek in Q3 (Figure 1-12). The highest conductivity was consistently observed at the Lost Creek monitoring station (Figure 1-12). Racetrack Creek and Rock Creek consistently had the lowest conductivity (Figure 1-12).

Conductivity ranges at CFROU mainstem monitoring stations in 2012 were similar to 2010 and 2011; conductivity ranges were 176-466 µs/cm, 113-439 µs/cm, and 138-456 µs/cm in 2010, 2011, and 2012 respectively.

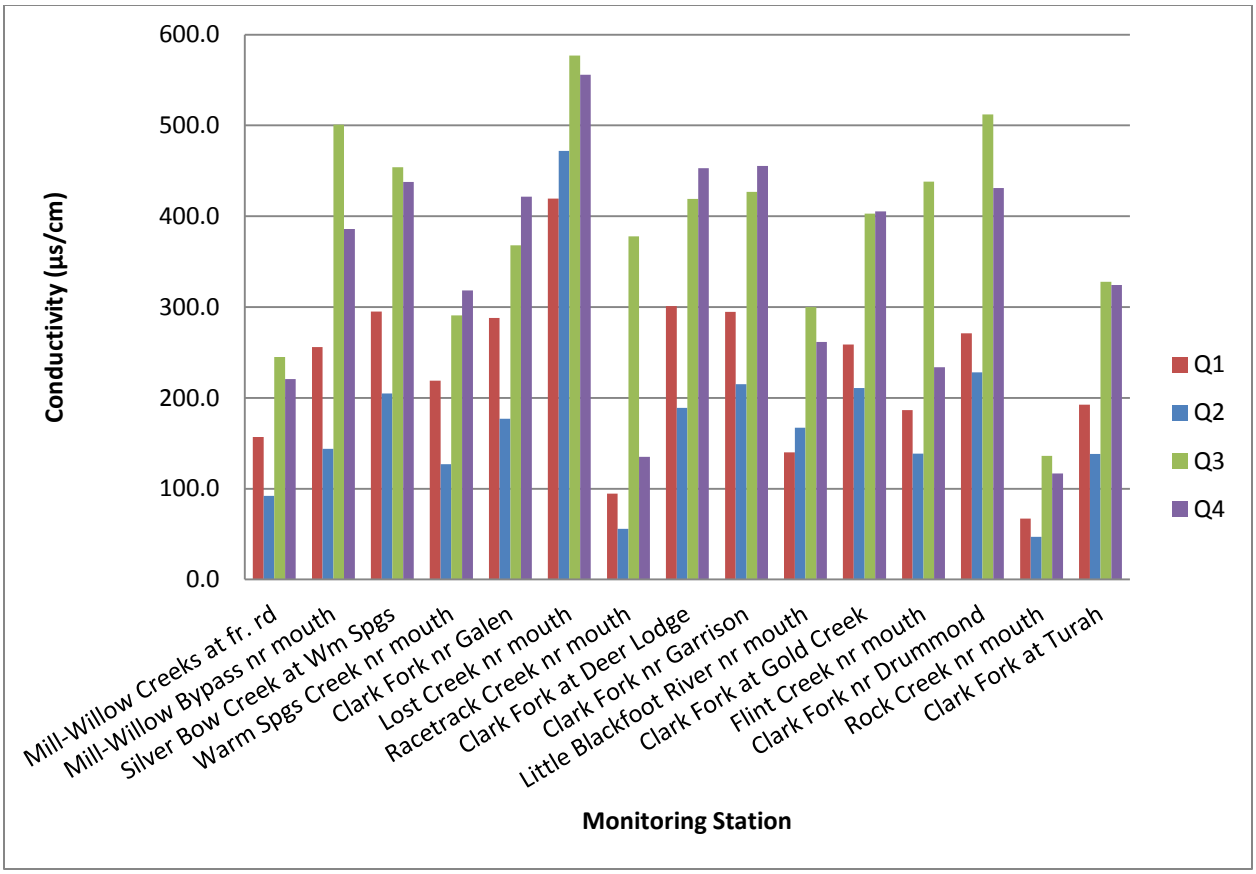

Figure 1-12. Conductivity at Clark Fork River Operable Unit monitoring stations, 2012.

1.3.3.4 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, instream dissolved oxygen 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 into the water. Dissolved oxygen concentrations in streams typically fluctuate on diel cycles in relation to photosynthetic and respiratory processes; the highest concentrations occur during the day and the lowest concentrations occur at night. On seasonal cycles, dissolved oxygen concentrations are typically highest during the winter when water temperatures are lowest and highest during the summer when water temperatures are highest.

Adequate dissolved oxygen concentrations are required by aerobic stream biota (e.g., macroinvertebrates and fish) and for decomposition of organic matter in the stream. Acceptable concentrations of dissolved oxygen for the protection of aquatic life are defined in the Montana water quality standards (MDEQ 2012b). Dissolved oxygen concentration standards that are applicable to the upper Clark Fork River include the seven-day mean concentration where sensitive early life stages are present (9.5 mg/L) and the one-day minimum for waters with early life stages of aquatic life present (4.0 mg/L; MDEQ 2012b).

Dissolved oxygen concentrations in the CFROU 2012 monitoring events ranged from 8.49-14.05 mg/L. The lowest dissolved oxygen concentration in the Clark Fork River occurred near

Garrison in Q2 and the highest concentration occurred in Silver Bow Creek at Warm Springs in Q3 (Figure 1-13).

Based on these data, there are no water quality or water use limitations associated with inadequate dissolved oxygen concentrations. No major temporal or spatial trends in dissolved oxygen concentrations were observed in these 2012 data, although the highest concentrations at each monitoring station were observed in the colder sampling periods of Q1, Q3, or Q4. Some variation in dissolved oxygen concentrations between stations may have been related to water temperature differences, timing of sampling at each site, or both, and to relative differences in the magnitude of diel dissolved oxygen fluctuations at each site.

Dissolved oxygen concentrations at CFROU mainstem monitoring stations in 2012 were similar to 2010 and 2011; dissolved oxygen concentration ranges were 8.69-15.03 mg/L, 8.60-14.85 mg/L, and 8.49-14.05 mg/L in 2010, 2011, and 2012 respectively.

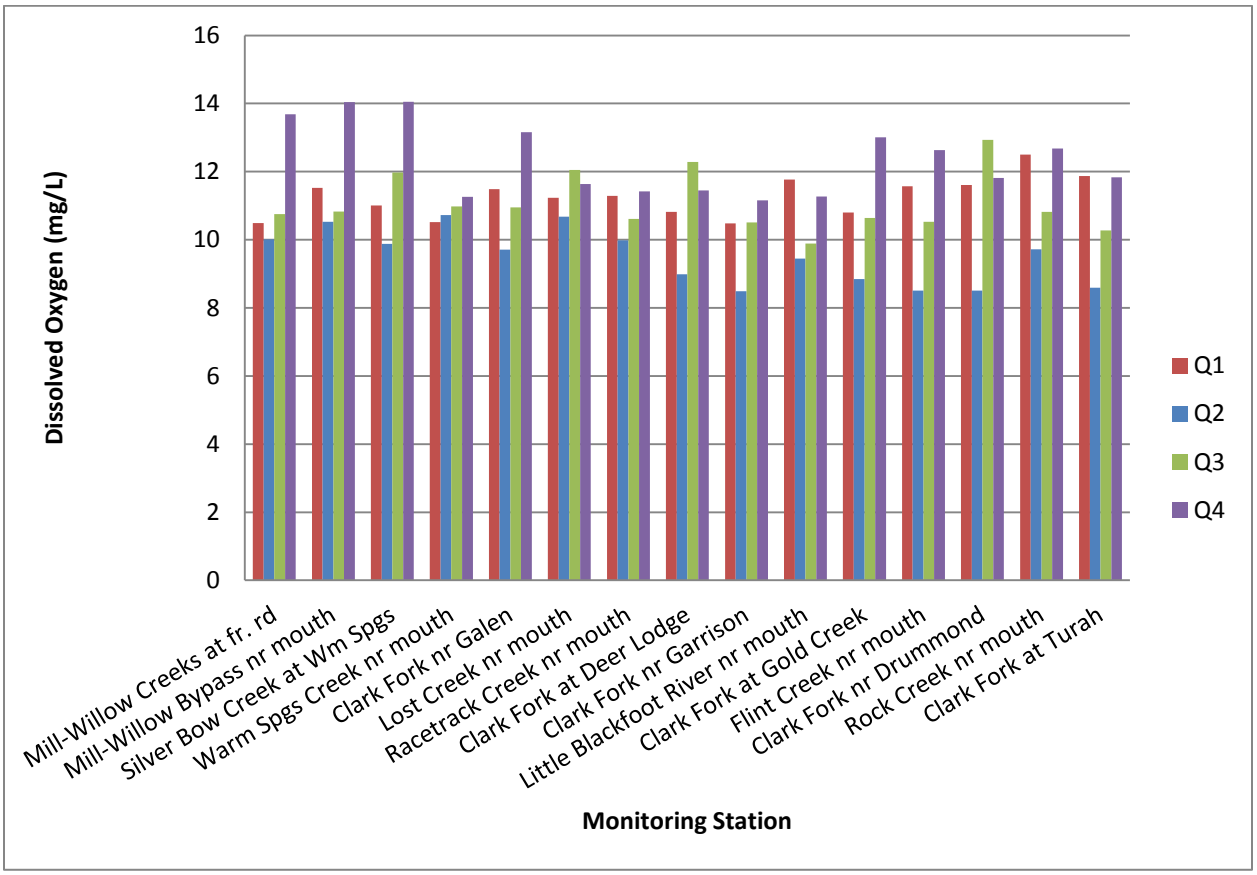

Figure 1-13. Dissolved oxygen concentrations at Clark Fork River Operable Unit monitoring stations, 2012.

1.3.3.5 Turbidity

Turbidity is an optical property of water, specifically the amount of light that is absorbed or scattered by water. High turbidity or "cloudiness" in surface waters may result from the presence of suspended silt or clay particles, organic matter, colored organic compounds, or microorganisms. Turbidity is not necessarily related to the weight of suspended matter, as is discussed further in Section 1.2.4, because turbidity is influenced by the size and refractive properties of the suspended particles as well as particle weight.

Elevated turbidity may impede recreational and aesthetic uses of water, and influence the quality of drinking water. High turbidity also may adversely affect feeding, growth, and habitat suitability for salmonid fishes, and may influence surface water temperatures. To regulate turbidity alteration in streams, MDEQ has established maximum allowable increases above naturally occurring turbidity (ARM 17.30.623, 2007; ARM 17.30.626–627, 2007). For streams classified as C-2, which includes the Clark Fork River from the Warm Springs Creek confluence downstream to the Cottonwood Creek confluence, the allowable increase in turbidity is 10 nephelometric turbidity units (NTU). For streams classified as C-1, which includes the Clark Fork River from the Cottonwood Creek confluence downstream to the Little Blackfoot River confluence, the allowable increase in turbidity is 5 NTU. For streams classified as B-1, which includes the Clark Fork River from the Little Blackfoot Creek confluence downstream throughout the remainder of the CFROU, the allowable increase in turbidity is 5 NTU.

Turbidity in Q2 2012 was high compared to other quarters, presumably because Q2 sampling occurred near the hydrograph peak during the snowmelt runoff period. In Q2, turbidity was particularly high in Clark Fork River monitoring stations near Garrison, below the Little Blackfoot River confluence downstream from the Rock Creek confluence, and downstream from the Flint Creek confluence (Figure 1-14). In Q1, Q3, and Q4 monitoring, turbidity was lower and typically ranged from 1-10 NTU (Figure 1-14). In Q1, turbidity was somewhat elevated at several CFROU stations compared to Q3 and Q4 (Figure 1-14), which may have been related to above normal early season streamflow, ice scour, or both.

Turbidity at CFROU mainstem monitoring stations in Q1, Q3, and Q4 monitoring in 2012, were similar to quarterly monitoring in 2010 and 2011. However, in Q2 of 2011 turbidity was higher than in Q2 of 2010 and 2012, presumably due to substantially higher streamflow in Q2 of 2011 compared to Q2 of 2010 and 2012.

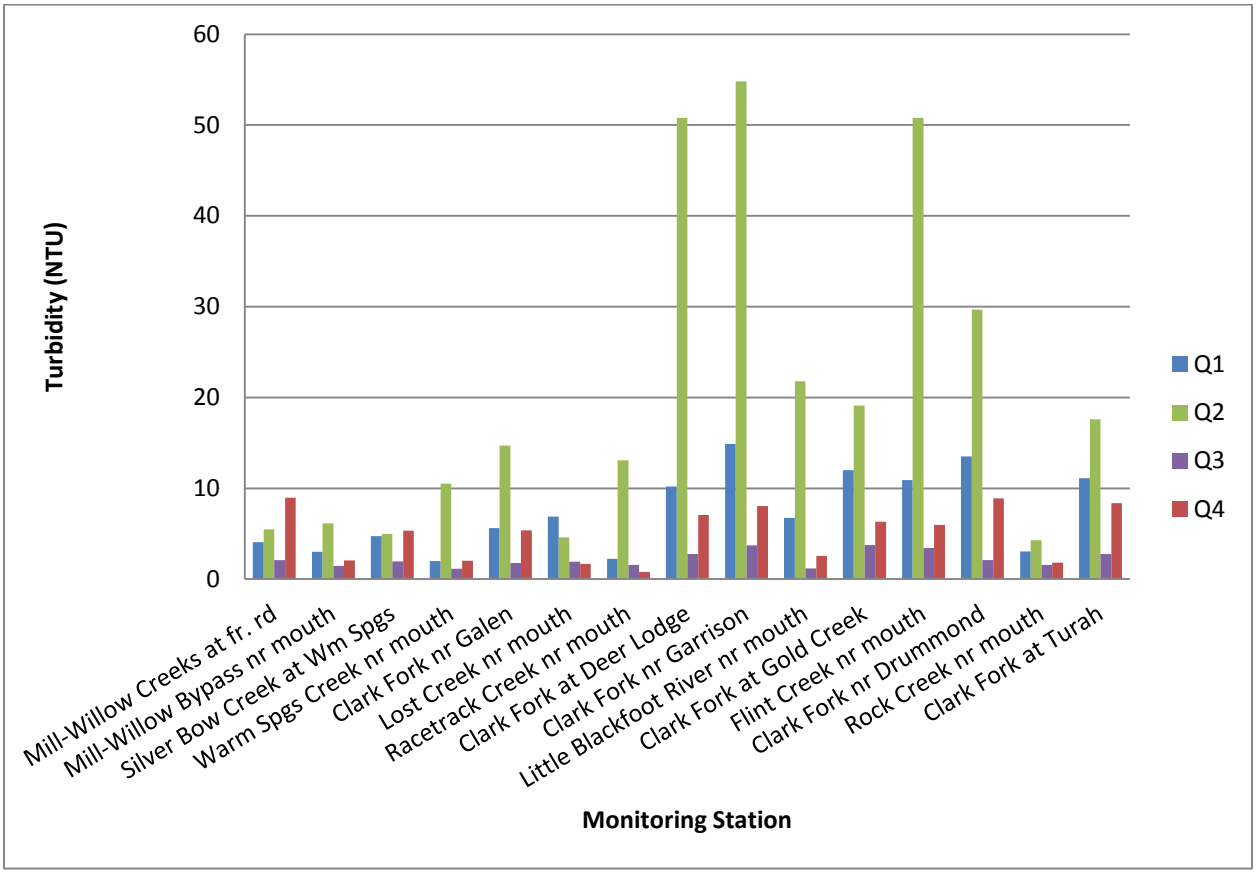

Figure 1-14. Turbidity at Clark Fork River Operable Unit monitoring stations, 2012.

1.3.4 Total Suspended Sediment

Suspended sediment refers to sediment suspended in the water column, as opposed to sediment transported along the stream bottom, which is referred to as bedload. Suspended sediment in streams generally includes a range of particle sizes which vary with watershed geology, stream velocity, streambed form, and water turbulence. Excess sediment interferes with many water uses and has adverse effects on benthic invertebrate and salmonid growth and reproduction. Increased suspended sediment may reduce light penetration and affect primary production by aquatic plants, and alter the morphology of alluvial stream channels. In the Clark Fork River system, transport of many of the COC is directly related to suspended sediment transport (Section 1.3.7).

Total suspended sediment (TSS) concentrations measured in the CFROU in 2012 were moderately elevated in Q1 at several mainstem stations, were very high at most mainstem stations in Q2, and were generally low in Q3 and Q4 (Figure 1-15). In Q2, the lowest mainstem total suspended sediment concentration (14 mg/L) occurred in Silver Bow Creek at Warm Springs and the highest (184 mg/L) occurred near Garrison (Figure 1-15).

Total suspended sediment concentrations increased in the Clark Fork River reach from near Galen to Deer Lodge in Q2. The input of the Little Blackfoot River (Q2 TSS = 74 mg/L) apparently had a strong negative effect on mainstem total suspended sediment concentrations in Q2. Total suspended sediment declined from 184 mg/L at the station immediately upstream from the Little Blackfoot River confluence to 68 mg/L immediately downstream from the confluence. In contrast, the input of Flint Creek (Q2 TSS = 146 mg/L) apparently had a positive effect on mainstem total suspended sediment concentrations in Q2. Total suspended sediment increased from 68 mg/L at the station immediately upstream from the Flint Creek confluence to 92 mg/L immediately downstream from the confluence. Further downstream, a decrease in total suspended sediment occurred from near Drummond to Turah, from 92-44 mg/L, presumably in response to the Rock Creek inflow with low total suspended sediment (6 mg/L).

The highest total suspended sediment concentrations in Q1 were observed at the five mainstem Clark Fork River stations between Deer Lodge and Turah, with lower concentrations at the upstream monitoring stations. Monitoring stations with elevated total suspended sediment concentrations in Q1 and Q2 also had elevated water column metals concentrations (see Section 1.3.7). Total suspended sediment in Mill-Willow Creek at Frontage Road monitoring station in Q4 were somewhat elevated (18 mg/L) and were likely caused by remediation activities occurring just upstream from the monitoring station.

Total suspended sediment concentrations at CFROU mainstem monitoring stations in 2012 were generally similar to concentrations in 2010 and 2011. However, maximum total suspended sediment concentrations recorded at some stations in Q2 of 2011 were higher than in Q2 of 2010 and 2012, presumably because streamflows in Q2 of 2011 were higher than in the other years.

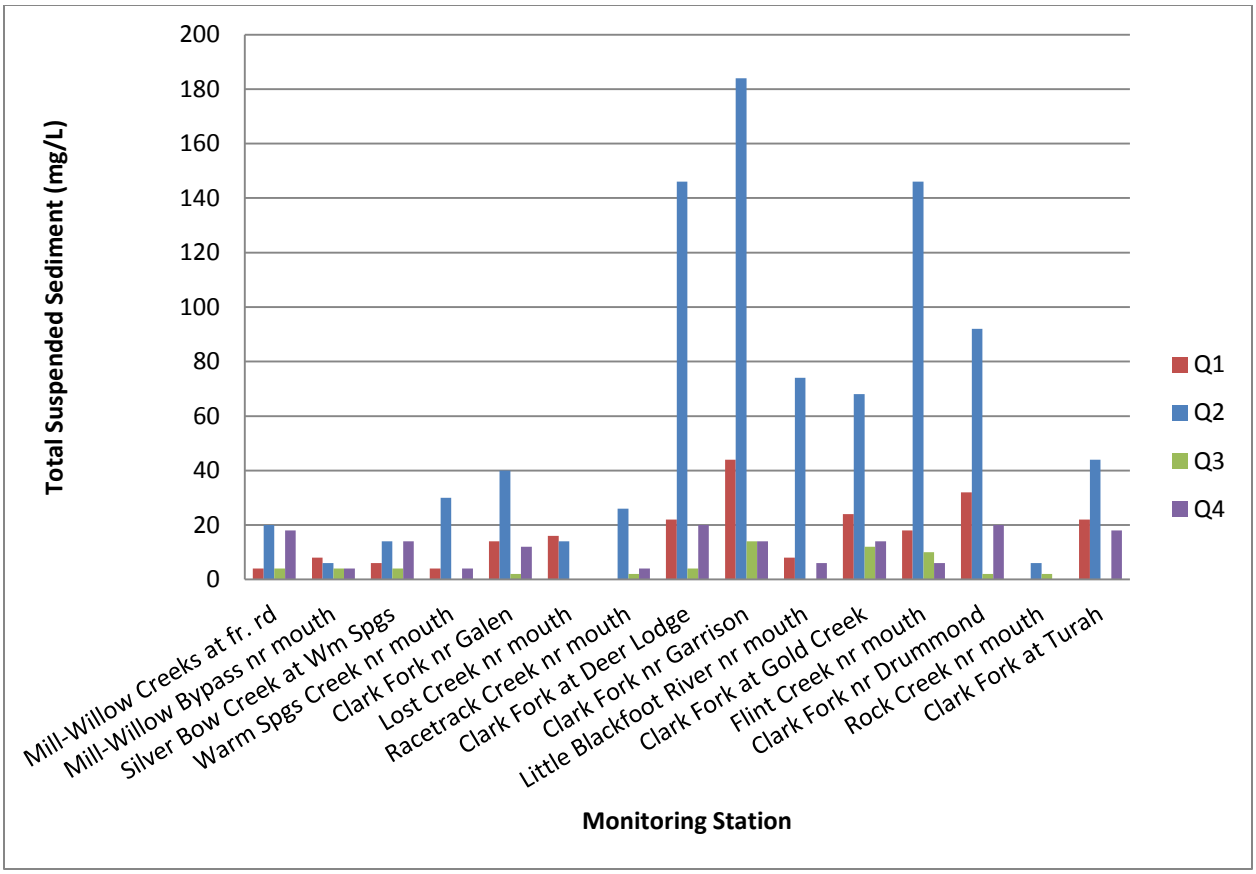

Figure 1-15. Total suspended sediment concentrations at Clark Fork River Operable Unit monitoring stations, 2012. Measurements occurred in all quarters; measurements below the method detection limit are expressed as 0.

Load estimates for total suspended sediment were calculated from instream total suspended sediment concentrations and mean daily streamflows obtained from USGS gages located near each monitoring station. Where USGS gages were unavailable load estimates were calculated using manually gaged streamflows (Figure 1-16). Total suspended sediment load estimates describe temporal and spatial characteristics of total suspended sediment loading in the upper Clark Fork River. However, these data do not account for the confounding influence of river travel times. Monitoring was not performed with regard to river travel times or the potential influence of varying instream conditions during monitoring events. These factors may account for some of the apparent gains or losses in total suspended sediment loading between monitoring stations during quarterly monitoring events.

The total suspended sediment loading data suggests that much of the annual total suspended sediment load was transported during the spring snowmelt period (Figure 1-16). Total suspended sediment loads in Q2 far exceeded loads during other quarters (Figure 1-16). In Q2, total suspended sediment loads increased from the headwaters of the Clark Fork River downstream to near Garrison (Figure 1-16). The total suspended sediment loads in Q2 declined slightly downstream from near Garrison to the Gold Creek station, but were higher at downstream mainstem stations (Figure 1-16). Some variation in total suspended sediment loading between stations was likely caused by differences in the date and time of sampling at each station. The Q2 monitoring event was conducted over the course of three field days.

Large increases in total suspended sediment loading between mainstem monitoring stations in Q2 occurred between the near Galen station and the Deer Lodge station, between the Deer Lodge station and the near Garrison station, and between the Gold Creek station and the near Drummond station. In other quarters, increases in total suspended sediment loads between stations were minimal. In Q2 of 2011, total suspended sediment loads were frequently 2-6 times higher than in Q2 of 2010 and 2012, presumably due to higher streamflows in Q2 of 2011.

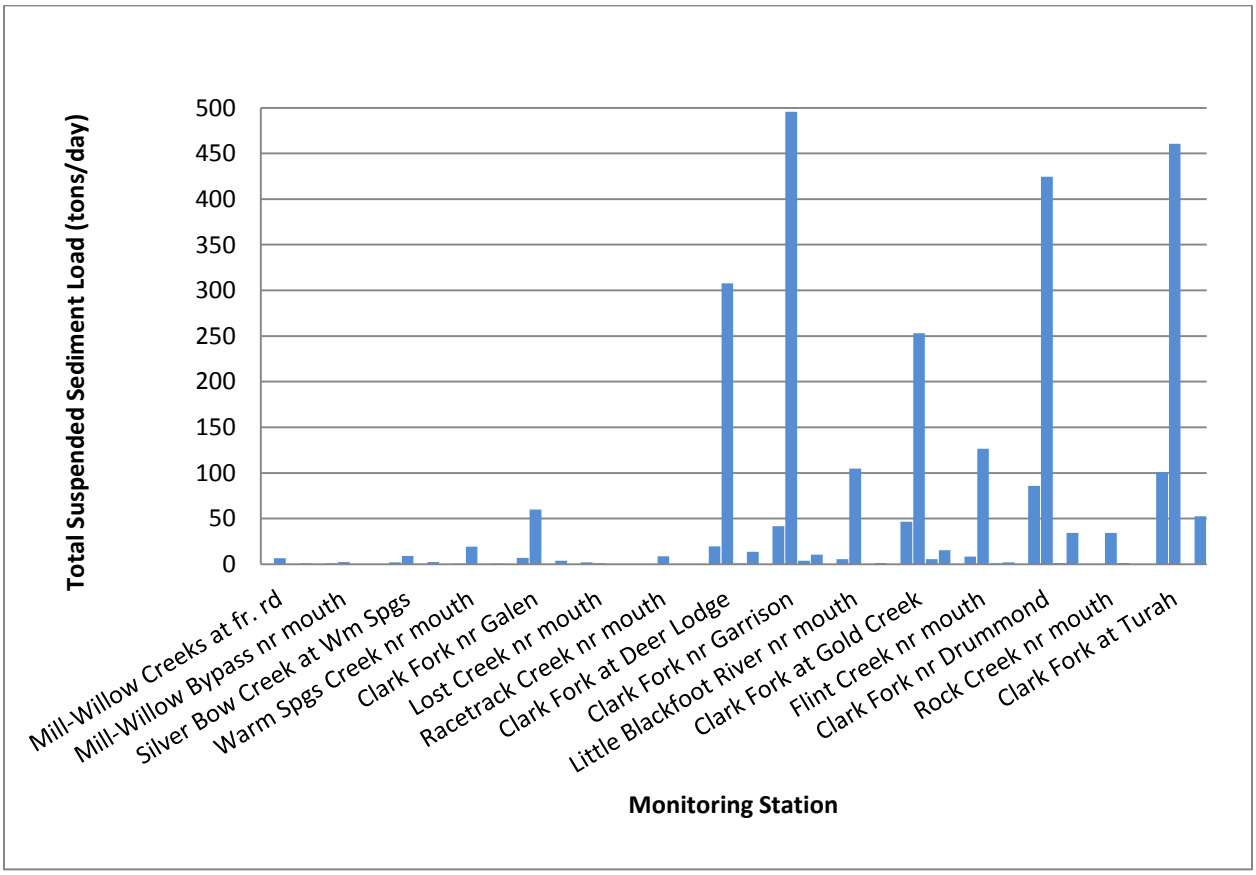

Figure 1-16. Total suspended sediment loads at Clark Fork River Operable Unit monitoring stations, 2012. Measurements occurred in all quarters; measurements below the method detection limit are expressed as 0.

1.3.5 Common Ions

Common cations and anions dissolved in water (i.e., calcium, magnesium, total alkalinity, bicarbonate alkalinity, and sulfate) were analyzed in water samples collected from CFROU monitoring stations in 2012. These common ions describe the basic water chemistry of the river. Certain ions (e.g., sulfate) may be used as indicators for the presence of mine-related contaminants. Water hardness is a function of the concentration of calcium and magnesium ions in solution. The toxicity of cadmium, copper, lead, zinc, and other metals is inversely related to hardness. Thus, aquatic life standards for these metals are hardness-based (MDEQ 2012b). Carbonate and bicarbonate alkalinity buffers water from variation in pH. Water hardness and alkalinity also influence the productivity of aquatic systems. Western freshwater systems typically have alkalinity of 100–200 mg/L.

Based on previous monitoring, calcium appears to be the dominant cation in the CFROU monitoring network. The characterization of water hardness at upper Clark Fork River

mainstem stations in 2012 ranges from “hard” to “very hard”, except during runoff, which apparently diluted calcium and magnesium concentrations (Figure 1-17). Water hardness in Lost Creek and, to a lesser extent, Warm Springs Creek is high presumably because of the prevalence of limestone geology within these watersheds. Silver Bow Creek at Warm Springs has high water hardness presumably due to the addition of lime at several locations along the stream. Hardness of these headwater tributaries contributes to elevated water hardness in the Clark Fork River. Other Clark Fork River tributaries, including Racetrack Creek and Rock Creek, had soft to moderately hard water which appeared to reduce water hardness in the Clark Fork River downstream of each respective confluence. Hardness in the mainstem Clark Fork River was lowest at the Turah station, below the Rock Creek confluence (Figure 1-17). Water hardness in 2012 quarterly monitoring was similar to hardness in 2010 and 2011.

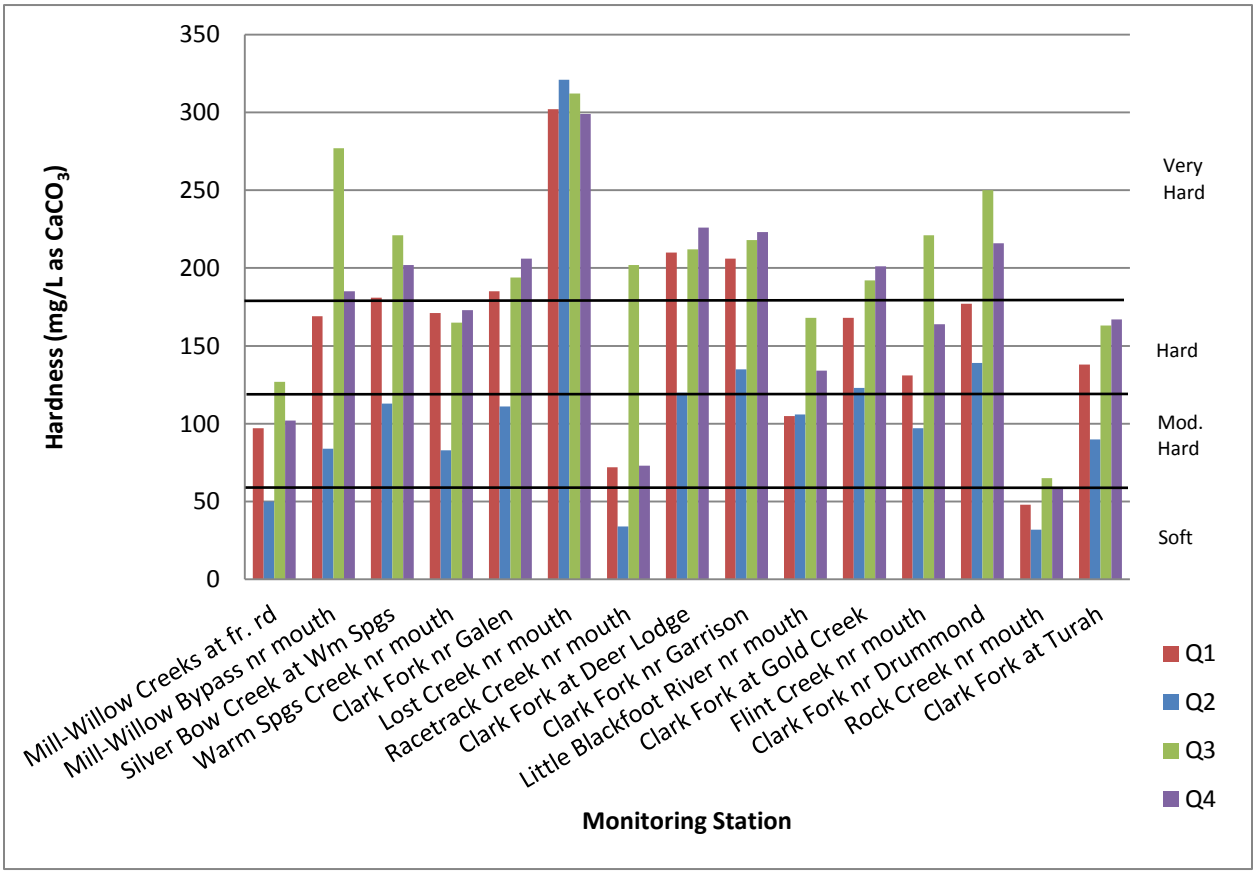

Figure 1-17. Water hardness at Clark Fork River Operable Unit monitoring stations, 2012. Qualitative hardness categories (e.g., “soft” or “hard”) from MDEQ (2012b).

Total and bicarbonate alkalinity in the upper mainstem Clark Fork River in 2012 increased modestly from the headwaters near Warm Springs to the near Drummond station, with decreases noted below the Little Blackfoot River confluence at the Gold Creek station, and below Rock Creek confluence at the Turah station (Figure 1-18 and Figure 1-19). Among the tributary monitoring stations, Lost Creek had consistently high alkalinity compared to other tributary or mainstem monitoring stations (Figure 1-18 and Figure 1-19). Racetrack Creek and Rock Creek had low alkalinity, as well as low conductivity and hardness. Moderate alkalinity levels in the upper mainstem Clark Fork River indicate the river is well buffered from pH changes. Alkalinity was low during snowmelt runoff in Q2 and was highest at all stations in Q3

(Figure 1-18 and Figure 1-19). Total and bicarbonate alkalinity at each CFROU mainstem monitoring station was similar in each year from 2010-2012.

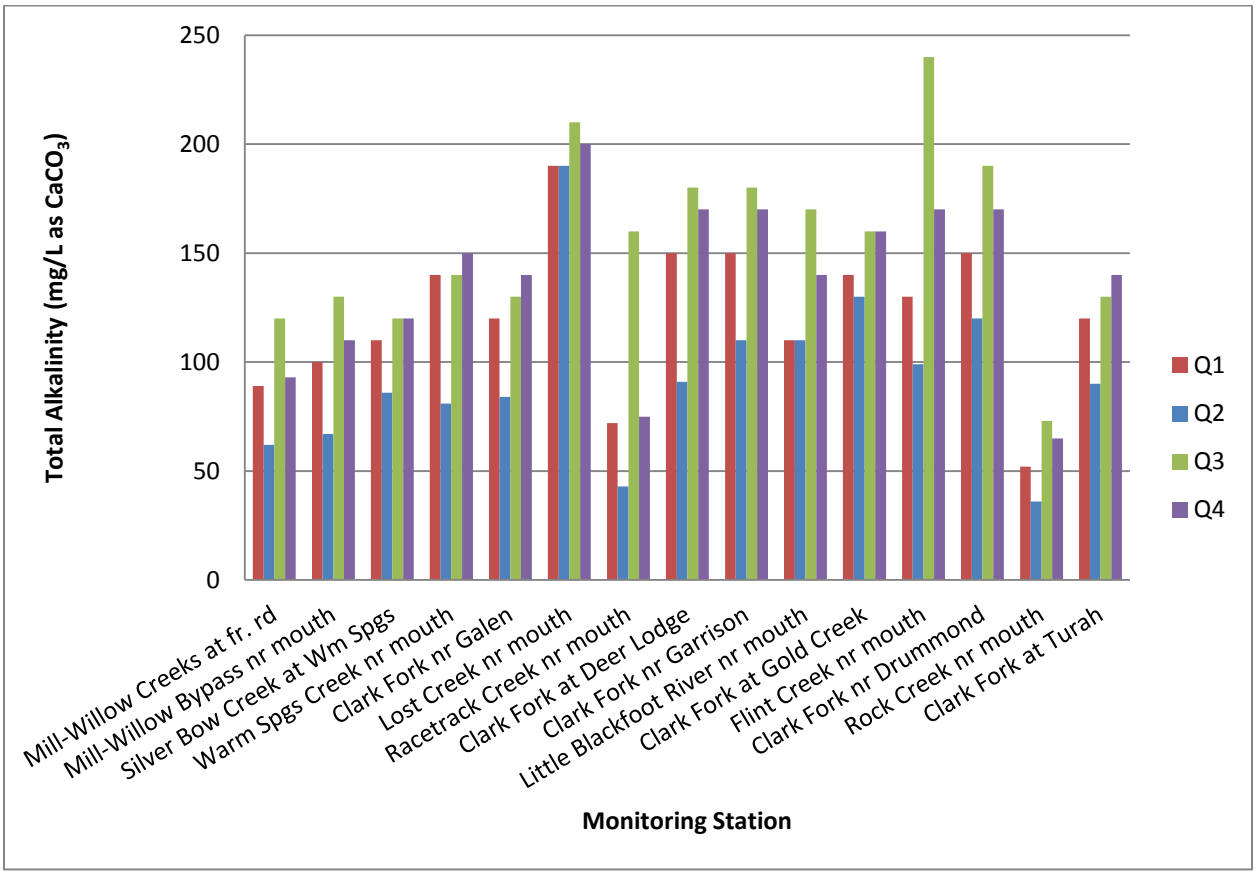

Figure 1-18. Total alkalinity at Clark Fork River Operable Unit monitoring stations, 2012.

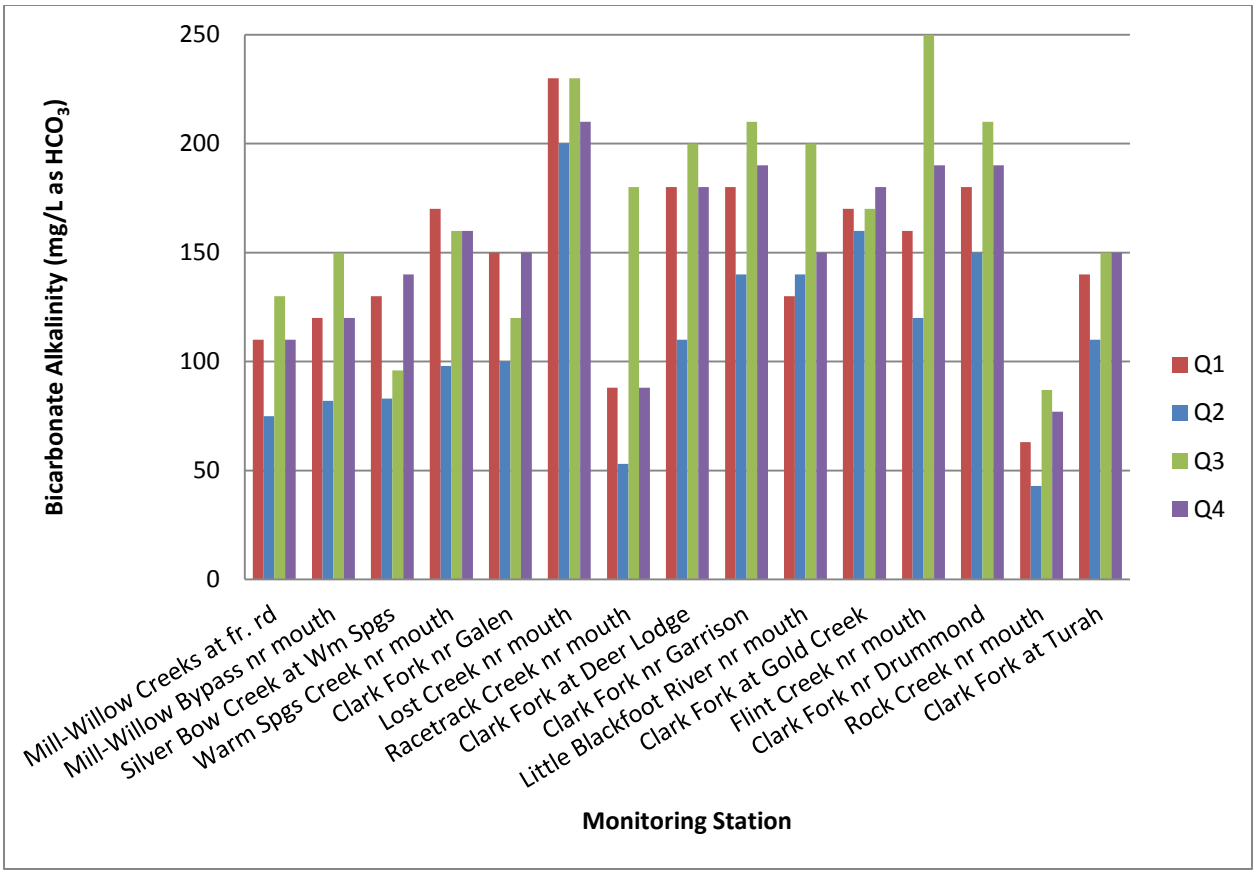

Figure 1-19. Bicarbonate alkalinity at Clark Fork River Operable Unit monitoring stations, 2012.

Sulfate concentrations in the mainstem Clark Fork River decreased from the headwaters near Warm Springs downstream to Turah (Figure 1-20). One exception to this decreasing longitudinal trend was at the near Drummond station, where sulfate was slightly higher than at the mainstem stations immediately upstream and immediately downstream (Figure 1-20). The overall decreasing longitudinal trend in sulfate concentration in the Clark Fork River mainstem may be explained by the distance from Butte area sulfate sources due to mining or local geology. Additionally, tributaries appeared to be sources of sulfate. The Mill-Willow Bypass, and especially Lost Creek, had high sulfate concentrations during at least one quarterly monitoring event (Figure 1-20). However, Racetrack Creek and Rock Creek had low sulfate concentrations (Figure 1-20). The Flint Creek watershed contains hundreds of mine sites, both active and abandoned, and appears to be a source of mining-related contaminants to the upper Clark Fork River. However, Flint Creek had relatively low sulfate concentrations during all quarterly monitoring events in 2012 (Figure 1-20). Previous data indicates that sulfate is the second most prevalent anion (bicarbonate being the most prevalent) in the upper Clark Fork River watershed (PBSJ 2010; Atkins 2012b). Sulfate concentrations were reduced by half or more at all CFROU monitoring stations in Q2, with the exception of Lost Creek, where sulfate concentrations remained high during all quarterly monitoring events (Figure 1-20). Sulfate concentrations measured at mainstem Clark Fork River monitoring stations were similar in each year from 2010-2012.

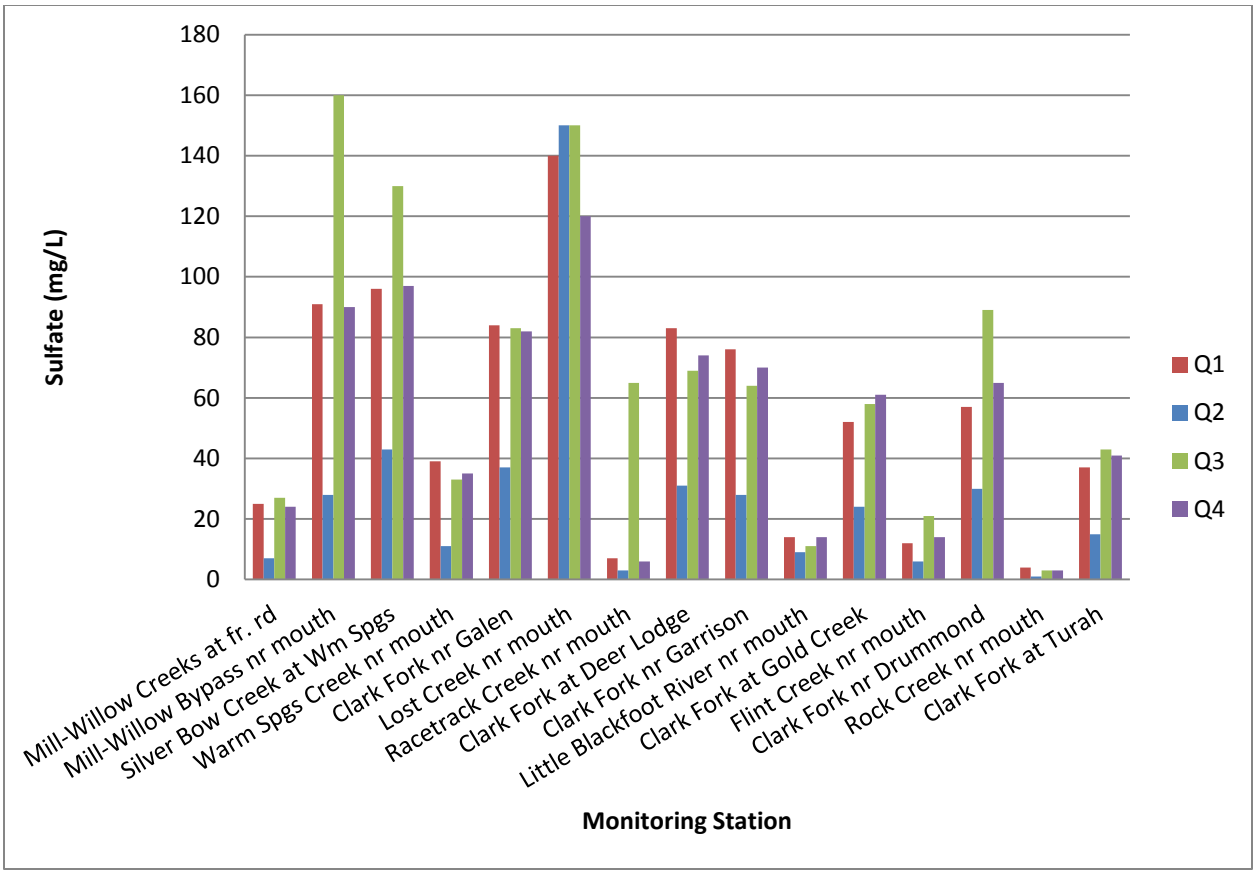

Figure 1-20. Sulfate concentrations at Clark Fork River Operable Unit monitoring stations, 2012.

1.3.6 Nutrients

Nutrient concentrations were monitored at CFROU monitoring stations for the first time in 2011. Parameters analyzed include total ammonia as nitrogen (NH_3-N), nitrate plus nitrite (NO_3+NO_2), total nitrogen (TN), and total phosphorous (TP). Assessment of nutrient monitoring results included: 1) comparison of total nitrogen, nitrate plus nitrite, and total phosphorous concentrations to standards designed to reduce nutrient enrichment and nuisance algae growth in surface waters and associated impacts to beneficial water uses, 2) examination of spatial patterns for nitrogen and phosphorus loads in the upper Clark Fork River mainstem and its tributaries as indicators of nutrient sources, and 3) evaluation of ammonia toxicity standards.

Numeric water quality standards for nutrients in the Clark Fork River have been adopted for the river portion between the Warm Springs Creek confluence and the Blackfoot River confluence, encompassing all mainstem CFROU monitoring stations with the exception of SS-25. The standards apply only to the summer season, defined as the period from June 21 through September 21, and thus are relevant only to Q3. The standards for this portion of the Clark Fork River are 0.300 mg/L for total nitrogen and 0.020 mg/L for total phosphorous (ARM 17.30.631). The standards do not apply to the Silver Bow Creek at Warm Springs (SS-25) station or any of the tributary monitoring stations. Additionally, MDEQ has developed ecoregion-based nutrient threshold values intended to prevent nutrient enrichment and nuisance algae growth. These threshold values may eventually be proposed as new water quality standards for the Clark Fork River and other water bodies within the Middle Rockies Ecoregion. The MDEQ Middle Rockies Ecoregion nutrient threshold values are 0.320 mg/L for total

nitrogen, 0.10 mg/L for nitrate plus nitrite, and 0.048 mg/L for total phosphorous. As with the numeric nutrient water quality standards, MDEQs nutrient thresholds apply to the summer period when nutrient enrichment is most likely to occur. Lastly, ammonia is a nitrogen compound which is readily assimilated by aquatic plants and algae but in excessive concentrations it may be detrimental to aquatic life. Ammonia occurs in two forms in solution; the unionized form (NH_3) is highly toxic whereas the ionized form (NH_4^+) is less toxic. The proportion of total ammonia in solution that is NH_3 is positively related to both pH and temperature (USEPA 1998). Therefore, higher pH and warmer water temperatures increase the toxicity for a given concentration of total ammonia.

1.3.6.1 Total Nitrogen

During the non-summer period, total nitrogen concentrations exceeded the Clark Fork River water quality standards at several stations including Silver Bow Creek at Warm Springs, Lost Creek, and at mainstem stations near Deer Lodge and near Garrison (Table 1-5). Exceedances were also noted in the Mill-Willow Bypass, in Racetrack Creek, in the Clark Fork River at Gold Creek and near Drummond, and in Flint Creek. Exceedances in the summertime (Q3) were observed only at the Silver Bow Creek at Warm Springs and Racetrack Creek monitoring stations (Table 1-5; Figure 1-21).

Total nitrogen concentrations in Q4 were highest in Silver Bow Creek, in Racetrack Creek, and at mainstem stations near Deer Lodge and near Garrison (Table 1-5). The lowest total nitrogen concentrations were observed in Rock Creek, Warm Springs Creek, the Little Blackfoot River, and in Mill-Willow Creeks at Frontage Road. The lowest total nitrogen concentrations in the mainstem Clark Fork River were observed at Turah. The highest total nitrogen concentrations were observed in Lost Creek in Q4.

Table 1-5. Total nitrogen concentrations (mg/L) at Clark Fork River Operable Unit monitoring stations, 2012.

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork near Galen
Q1 (April)	0.07	0.37	0.41	0.18	0.29
Q2 (June)	0.20	0.16	0.25	0.09	0.26
Q3 (Sept.)	0.11	0.16	0.48	0.09	0.25
Q4 (Dec.)	0.20	0.18	0.36	0.11	0.27
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork at Deer Lodge**	**Clark Fork near Garrison**	**Little Blackfoot River near mouth**
Q1 (April)	0.54	0.18	0.44	0.42	0.11
Q2 (June)	0.35	0.18	0.25	0.39	0.27
Q3 (Sept.)	0.19	0.50	0.28	0.23	0.12
Q4 (Dec.)	0.65	0.23	0.45	0.43	0.10
Monitoring Station Calendar Quarter	**Clark Fork at Gold Creek**	**Flint Creek near mouth**	**Clark Fork near Drummond**	**Rock Creek near mouth**	**Clark Fork at Turah**
Q1 (April)	0.37	0.19	0.25	0.07	0.25
Q2 (June)	0.23	0.34	0.31	0.10	0.21
Q3 (Sept.)	0.18	0.26	0.17	0.09	0.14
Q4 (Dec.)	0.28	0.25	0.27	0.09	0.24

Remedy performance standard attained
Montana Department of Environmental Quality, Middle Rockies Ecoregion nutrient threshold value exceeded

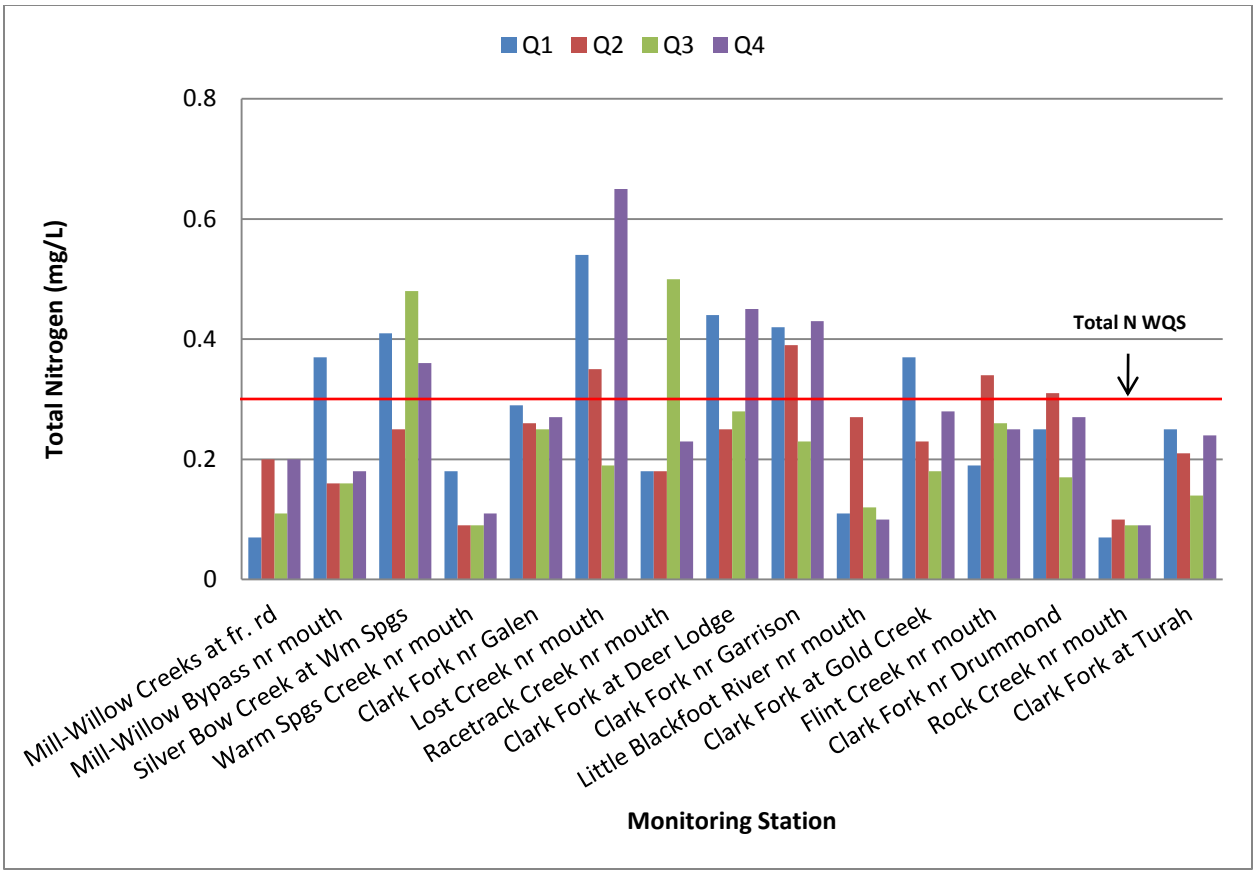

Figure 1-21. Total nitrogen concentrations at Clark Fork River Operable Unit monitoring stations, 2012. The total nitrogen water quality standard (Total N WQS) for the upper Clark Fork River during the summertime (MDEQ 2012b) is shown for reference.

Total nitrogen load estimates were calculated from the observed concentrations and streamflows. Streamflow estimates were either obtained from mean daily streamflows at USGS gages located near the monitoring stations or from manually measured streamflows for non-gaged monitoring stations (Figure 1-22). Total nitrogen load estimates provide insight into spatial and temporal characteristics of nitrogen loading and nitrogen sources within the CFROU. However, these data do not account for river travel times. Monitoring was not performed with regard to river travel times or the potential influences of varying conditions between monitoring stations. Those factors may account for a portion of the gains or losses in total nitrogen loads between stations during quarterly monitoring events.

The highest rates of total nitrogen transport occurred in Q2, likely caused by cumulative nonpoint source inputs throughout the upper Clark Fork River watershed (Figure 1-22). Total nitrogen loads in Q2 generally increased at each downstream monitoring station, which relates with increasing watershed drainage area and streamflow (Figure 1-22). The largest load was measured at the downstream-most monitoring station at Turah (Figure 1-22).

During the other quarterly monitoring events, spatial trends in total nitrogen load also indicated incremental downstream increases in total nitrogen loads (Figure 1-22). Possible sources of total nitrogen 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 Silver Bow Creek), Warm Springs, Deer Lodge, and Drummond.

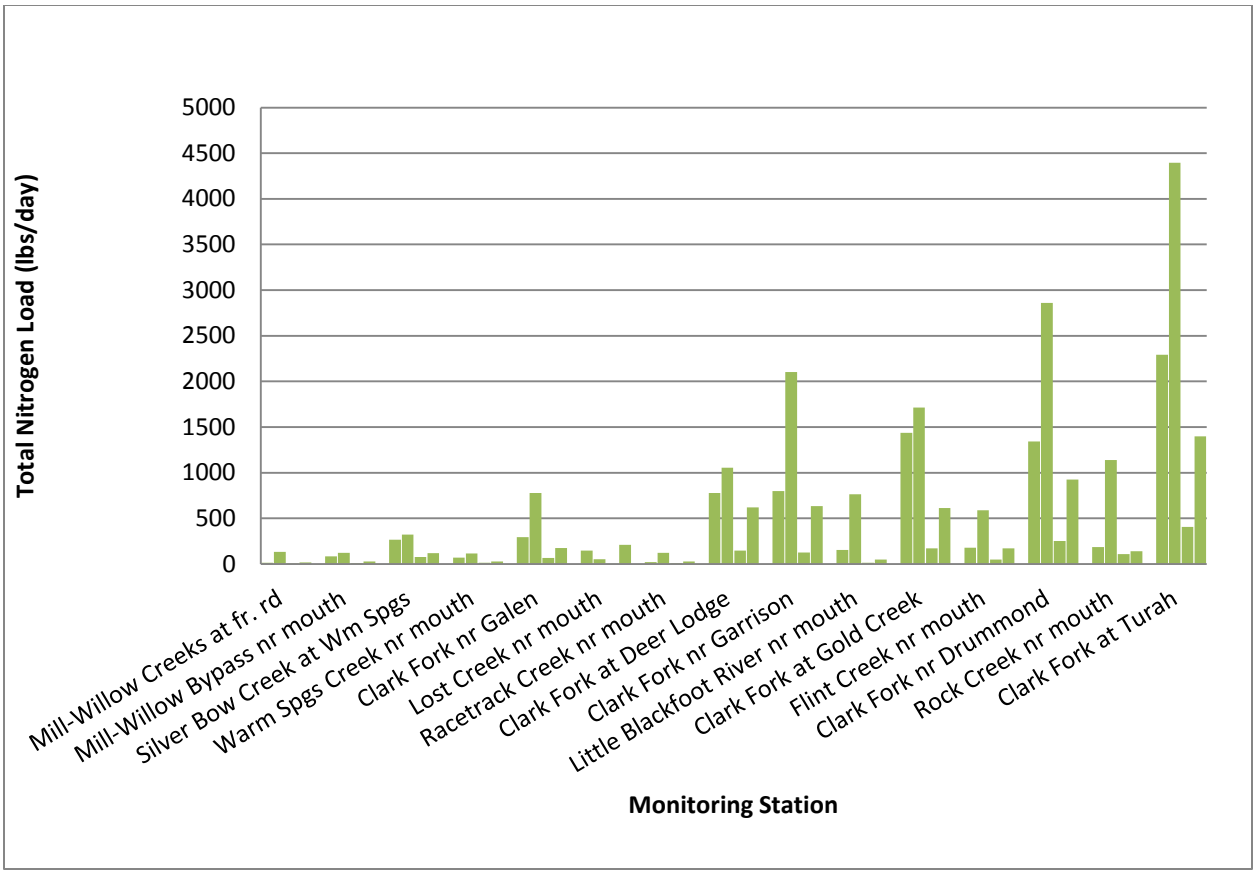

Figure 1-22. Total nitrogen loads at Clark Fork River Operable Unit monitoring stations, 2012.

1.3.6.2 Nitrate plus Nitrite Nitrogen

Concentrations of nitrate plus nitrite were periodically elevated in Lost Creek, Racetrack Creek, and in the Clark Fork River at Deer Lodge and near Garrison in 2012 (Figure 1-23). Only one measurement exceeded the MDEQ summertime recommended threshold value (0.10 mg/L) which only applies in Q3; the Racetrack Creek near mouth monitoring station (0.31 mg/L) (Table 1-6). Nitrate plus nitrite concentrations in the mainstem Clark Fork River increased from near Galen to near Garrison, but were lower at the three downstream mainstem stations: Gold Creek, near Drummond, and Turah. Nitrate plus nitrite concentrations were generally below the analytical detection limit at tributary monitoring stations at Mill-Willow Creeks, Mill-Willow Bypass, Silver Bow Creek at Warm Springs, the Little Blackfoot River, Flint Creek, and Rock Creek, and in the mainstem Clark Fork River near Galen, at Gold Creek, near Drummond, and at Turah (Figure 1-23). Loading patterns specifically for nitrate plus nitrite were not analyzed, but are included in the load estimates for total nitrogen.

Table 1-6. Nitrate plus nitrite nitrogen concentrations (mg/L) at Clark Fork River Operable Unit monitoring stations, 2012.

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork near Galen
Q1 (April)	ND	ND	ND	0.07	0.05
Q2 (June)	ND	ND	ND	ND	ND
Q3 (Sept.)	ND	ND	ND	ND	ND
Q4 (Dec.)	0.06	ND	ND	0.06	ND
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork at Deer Lodge**	**Clark Fork near Garrison**	**Little Blackfoot River near mouth**
Q1 (April)	0.48	0.14	0.21	0.19	ND
Q2 (June)	0.18	ND	0.06	0.06	ND
Q3 (Sept.)	ND	0.31	0.07	ND	ND
Q4 (Dec.)	0.51	0.16	0.25	0.22	ND
Monitoring Station Calendar Quarter	**Clark Fork at Gold Creek**	**Flint Creek near mouth**	**Clark Fork near Drummond**	**Rock Creek near mouth**	**Clark Fork at Turah**
Q1 (April)	0.09	ND	0.09	ND	0.06
Q2 (June)	ND	ND	ND	ND	ND
Q3 (Sept.)	ND	ND	ND	ND	ND
Q4 (Dec.)	0.10	0.10	0.10	ND	0.09

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

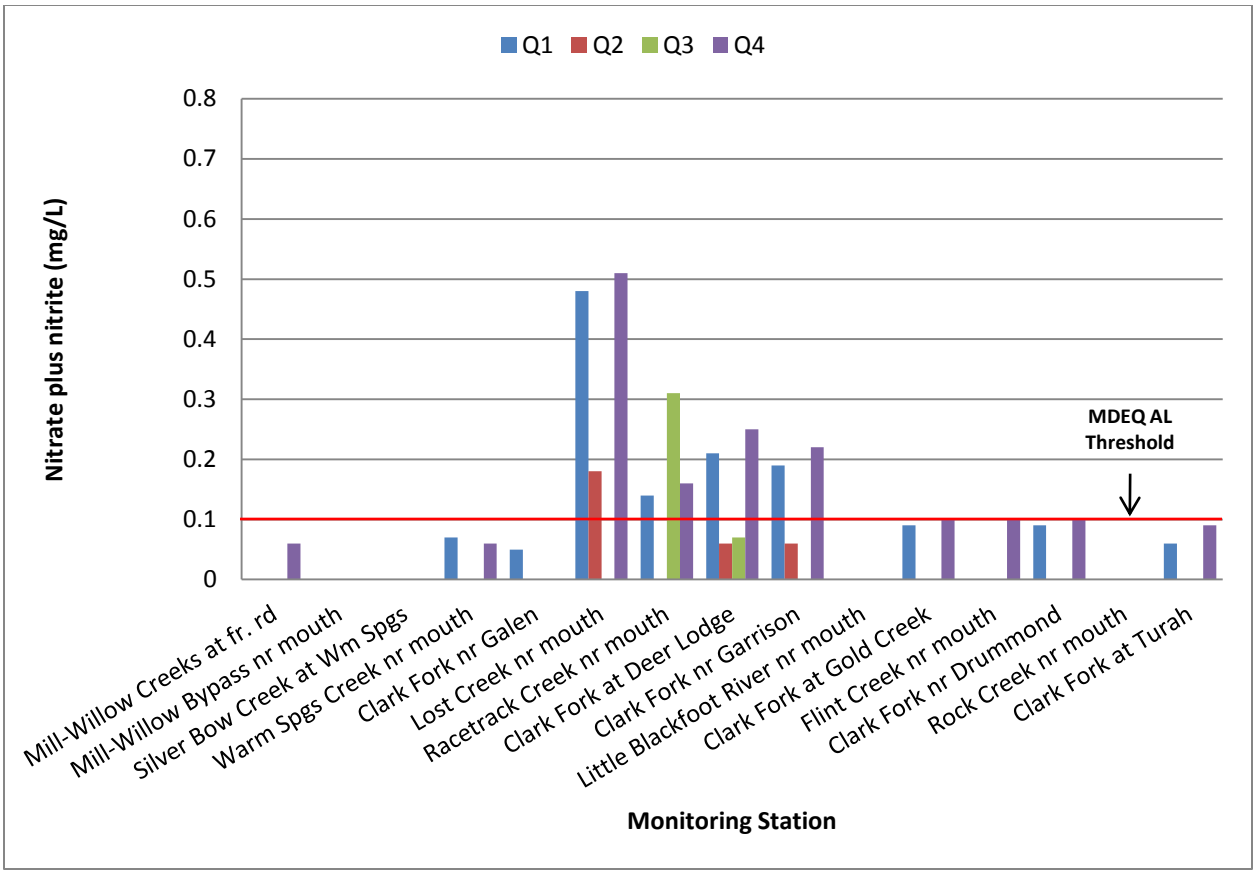

Figure 1-23. Nitrate plus nitrite nitrogen concentrations at Clark Fork River Operable Unit monitoring stations, 2012. Measurements occurred in all quarters; measurements below the method detection limit are expressed as 0. The MDEQ recommended aquatic life water quality standard for nitrate plus nitrite nitrogen (MDEQ 2012b) is shown for reference.

1.3.6.3 Total Phosphorus

In at least one quarter of 2012, total phosphorus concentrations in the upper CFROU exceeded the Clark Fork River total phosphorous water quality standard (0.020 mg/L) in 87% (13 of 15) of the stations in 2012 (Figure 1-24). The magnitude of total phosphorous exceedance was greatest in Q2 (Figure 1-24) and was likely related to high total suspended sediment in Q2 (Figure 1-15). Phosphorus readily adsorbs to sediment particles and there is a strong correlation between total phosphorous and total suspended sediment concentrations in surface water. In Q3, when the total phosphorous standard technically applies, exceedances of the standard occurred at 53% (8 of 15) of the stations: Silver Bow Creek at Warm Springs, Racetrack Creek, the Little Blackfoot River, Flint Creek, the Clark Fork River near Galen, the Clark Fork River near Garrison, the Clark Fork River at Gold Creek, and the Clark Fork River near Drummond (Table 1-7).

Total phosphorous concentrations during low streamflow periods (Q1, Q3, and Q4) were highest in the Mill-Willow Bypass and in Silver Bow Creek, and were generally similar among Clark Fork River mainstem stations (Figure 1-24). The lowest total phosphorous concentrations were observed in tributary monitoring stations in Rock Creek, Lost Creek, and Warm Springs Creek. The lowest mainstem Clark Fork River total phosphorous concentrations were observed at

Turah. The highest total phosphorous concentrations occurred in the Clark Fork River near Garrison in Q2 and corresponded to the highest measured total suspended sediment concentrations (Figure 1-15 and Figure 1-24). This pattern was also observed in 2011.

Table 1-7. Total phosphorous concentrations (mg/L) at Clark Fork River Operable Unit monitoring stations, 2012.

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork near Galen
Q1 (April)	0.024	0.019	0.024	0.008	0.024
Q2 (June)	0.029	0.028	0.067	0.021	0.068
Q3 (Sept.)	0.013	0.008	0.079	ND	0.035
Q4 (Dec.)	0.030	0.054	0.047	0.010	0.033
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork at Deer Lodge**	**Clark Fork near Garrison**	**Little Blackfoot River near mouth**
Q1 (April)	0.015	0.008	0.031	0.042	0.026
Q2 (June)	0.013	0.031	0.172	0.177	0.112
Q3 (Sept.)	0.015	0.027	0.019	0.022	0.028
Q4 (Dec.)	0.009	0.007	0.027	0.030	0.021
Monitoring Station Calendar Quarter	**Clark Fork at Gold Creek**	**Flint Creek near mouth**	**Clark Fork near Drummond**	**Rock Creek near mouth**	**Clark Fork at Turah**
Q1 (April)	0.040	0.032	0.046	0.012	0.031
Q2 (June)	0.085	0.114	0.098	0.017	0.048
Q3 (Sept.)	0.024	0.060	0.023	0.014	0.015
Q4 (Dec.)	0.026	0.034	0.036	0.010	0.023

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

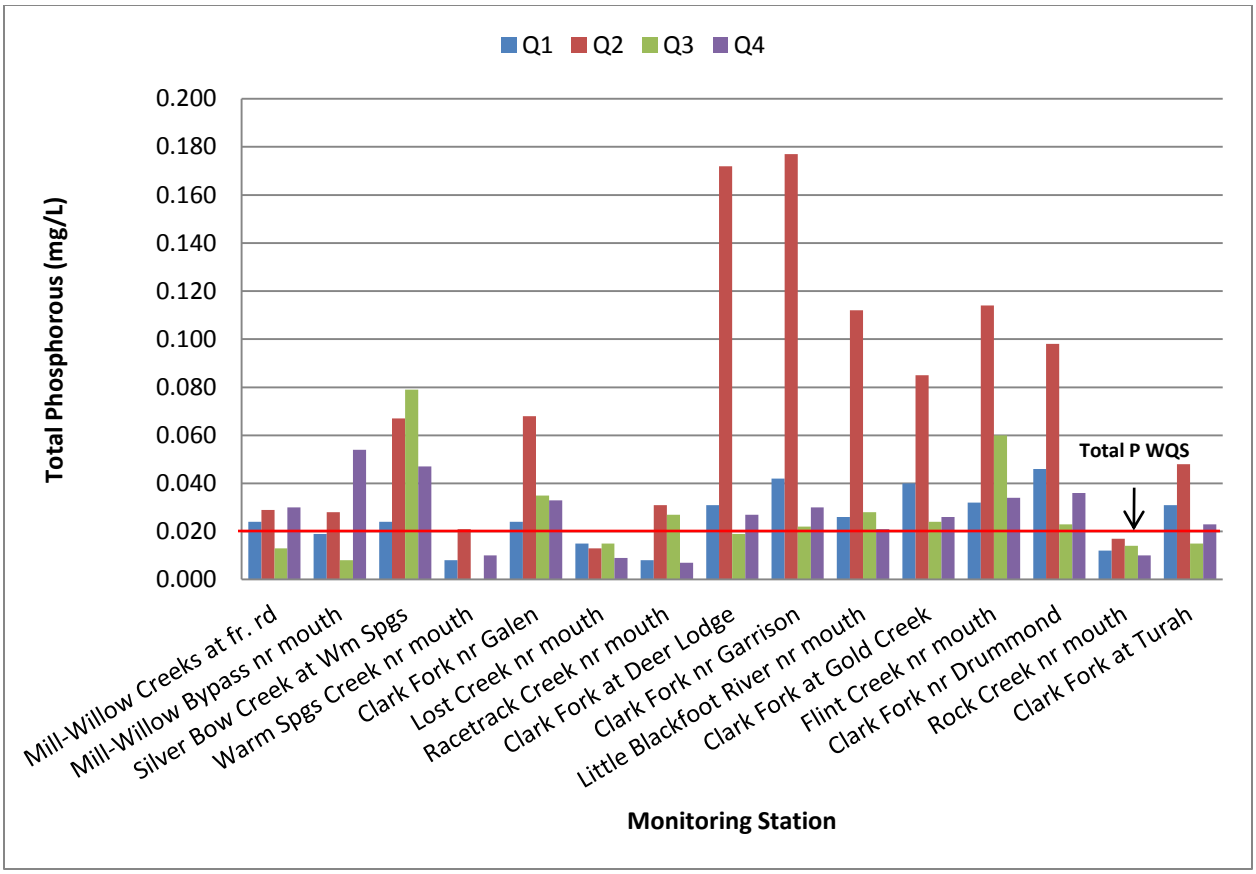

Figure 1-24. Total phosphorous concentrations at Clark Fork River Operable Unit monitoring stations, 2012. Measurements occurred in all quarters; measurements below the method detection limit are expressed as 0. The MDEQ recommended water quality standard (MDEQ 2012b) for total phosphorous (Total P WQS) is shown for reference.

Total phosphorous load estimates were calculated from instream concentrations and streamflows derived either from nearby USGS gages or manual streamflow measurements. As for total nitrogen, these estimates provide some insight into temporal and spatial characteristics of phosphorous loading and sources within the CFROU. Also, as with total nitrogen, these data do not account for river travel times as monitoring was not performed with regard to river travel times or the potential influences of rapidly changing instream conditions during some monitoring events. Those factors may account for some of the gains or losses in loading between monitoring stations during any quarterly monitoring events.

The highest rates of total phosphorous transport occurred in Q2, likely as a result of cumulative nonpoint source inputs throughout the upper Clark Fork River watershed, and in association with elevated total suspended sediment concentrations. As with total nitrogen loads, total phosphorous loads in Q2 tended to increase downstream, and may have been positively related to watershed drainage area and streamflow. During other quarterly monitoring events, total phosphorous loads increased downstream but the magnitude of these increases was small relative to Q2. The largest Q2 increases in total phosphorous load (521.5 lbs/day) occurred in the Clark Fork River between the near Galen station and Deer Lodge station (Figure 1-25). The largest increase in total phosphorous load in Q1 (91.5 lbs/day) occurred in the Clark Fork River between the Gold Creek station and the near Drummond station. The largest increase in total phosphorous load in Q4 (66.5 lbs/day) occurred in the Clark Fork River between the near

Garrison station and the Gold Creek station. In Q1 there was also a large increase in total phosphorous load (75.6 lbs/day) in the Clark Fork River between the near Garrison station and the Gold Creek station (Figure 1-25).

Possible sources of phosphorous 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 Silver Bow Creek), Warm Springs, Deer Lodge, and Drummond.

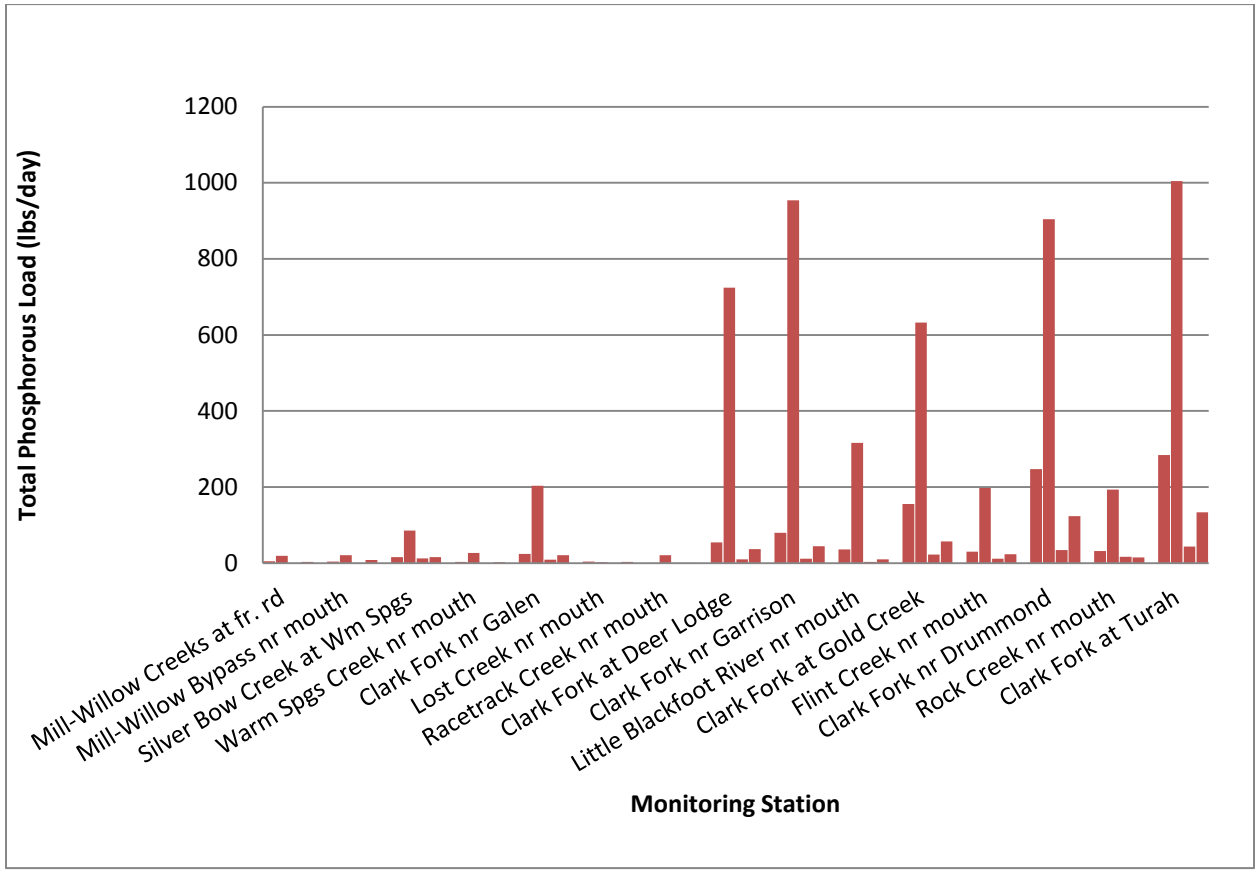

Figure 1-25. Total phosphorous loads at Clark Fork River Operable Unit monitoring stations, 2012.

1.3.6.4 Ammonia Nitrogen

Concentrations of total ammonia as nitrogen (NH_3-N) concentrations were below detection limits at all CFROU monitoring stations during all quarters of 2012 (Table 1-8). Total ammonia data are not presented graphically and loading estimates were not calculated because all total ammonia concentrations were below detection limits. In all CFROU monitoring stations in 2012, total ammonia concentrations were below aquatic life chronic and acute standards.

Table 1-8. Total ammonia concentrations (mg/L) at Clark Fork River Operable Unit monitoring stations, 2012.

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork near Galen
Q1 (April)	ND	ND	ND	ND	ND
Q2 (June)	ND	ND	ND	ND	ND
Q3 (Sept.)	ND	ND	ND	ND	ND
Q4 (Dec.)	ND	ND	ND	ND	ND
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork at Deer Lodge**	**Clark Fork near Garrison**	**Little Blackfoot River near mouth**
Q1 (April)	ND	ND	ND	ND	ND
Q2 (June)	ND	ND	ND	ND	ND
Q3 (Sept.)	ND	ND	ND	ND	ND
Q4 (Dec.)	ND	ND	ND	ND	ND
Monitoring Station Calendar Quarter	**Clark Fork at Gold Creek**	**Flint Creek near mouth**	**Clark Fork near Drummond**	**Rock Creek near mouth**	**Clark Fork at Turah**
Q1 (April)	ND	ND	ND	ND	ND
Q2 (June)	ND	ND	ND	ND	ND
Q3 (Sept.)	ND	ND	ND	ND	ND
Q4 (Dec.)	ND	ND	ND	ND	ND

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

1.3.7 Primary Contaminants of Concern

Metal and metalloid analytes monitored under the CFROU monitoring plan in 2010-2011 included total recoverable and dissolved arsenic, cadmium, copper, lead, and zinc (PBSJ 2010; Atkins 2011). Beginning in 2012, total mercury and methylmercury were added to the parameter list, with total mercury analyzed quarterly and methylmercury analyzed in Q2 and Q3 only (Atkins 2012a). The Clark Fork River monitoring plan established performance standards for metals in surface waters based on chronic and acute toxicity criteria for freshwater aquatic life and human health standards for drinking water (Atkins 2012a). The aquatic toxicity standards apply to total recoverable metal concentrations 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 total recoverable concentrations while standards for metals in groundwater are based on dissolved concentrations. Aquatic toxicity standards 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 total recoverable and dissolved metals of concern (total in the case of mercury), which reflect dissolved, adsorbed, and solid phases. Results are presented for arsenic, cadmium, copper, lead, zinc, and mercury at the CFROU monitoring stations for each quarter of 2012.

1.3.7.1 Arsenic

Concentrations of total recoverable and dissolved arsenic at CFROU monitoring stations in 2012 were typically highest in Mill-Willow Creek at Frontage Road, Mill-Willow Bypass, Silver Bow Creek at Warm Springs, and the Clark Fork River mainstem stations near Galen, at Deer Lodge, and near Garrison (Figure 1-26). Concentrations of total recoverable and dissolved arsenic were typically moderate in Flint Creek, Lost Creek, and the Clark Fork River mainstem at Gold Creek and near Drummond (Figure 1-26). The lowest total recoverable and dissolved arsenic concentrations were measured in Rock Creek, Warm Springs Creek, and the Little Blackfoot River (Figure 1-26). Arsenic concentrations consistently decreased in the reach from above to below the confluences of the Little Blackfoot River (at the Gold Creek station) and Rock Creek (at the Turah station) (Figure 1-26), presumably due to dilution effects of the relatively clean tributaries. Excluding the spring snowmelt runoff monitoring event in Q2, the highest overall arsenic concentrations, and the highest proportion of dissolved arsenic, was observed at the Silver Bow Creek at Warm Springs monitoring station.

The highest concentrations of total recoverable arsenic at most of the 15 monitoring stations were measured in Q2, with maximum concentrations in 2012 recorded near Garrison (0.048 mg/L), at Deer Lodge (0.044 mg/L), and in Flint Creek (0.044 mg/L). Second quarter 2011 total recoverable arsenic concentrations were substantially higher than those measured in Q2 of 2012 or 2010, presumably due to higher peak streamflows.

The highest concentrations of dissolved arsenic were measured at each station in either Q2 or Q3, with the highest concentrations recorded in Silver Bow Creek at Warm Springs (0.024 mg/L and 0.034 mg/L) on June 7 and September 13, respectively. The very lowest concentrations of both dissolved and total recoverable arsenic were found at the Rock Creek monitoring station. With the exception of the Q2 2011 monitoring event noted above when streamflows were unusually high, arsenic concentrations at CFROU mainstem monitoring stations in 2012 were comparable to those measured in 2010 and 2011.

A high percentage of arsenic detected at CFROU monitoring stations in 2012 was present in the dissolved form in three of the four 2012 monitoring events (Figure 1-26). However, in Q2, a significant portion of the arsenic measured was present in the non-dissolved (total recoverable) form at Clark Fork River monitoring stations near Galen, at Deer Lodge, near Garrison, at Gold Creek and near Drummond, and in Flint Creek near its mouth (Figure 1-26). Silver Bow Creek at Warm Springs, Mill-Willow Creeks at Frontage Road, and Mill-Willow Bypass had consistently high percentages of dissolved arsenic in each quarterly monitoring event.

During at least one quarter of 2012, total recoverable arsenic concentrations exceeded the human health standard (0.010 mg/L) at 47% (7 of 15) of the CFROU monitoring sites (Table 1-9). None of the measured arsenic concentrations in 2012 exceeded the acute or chronic aquatic life standards. Both the frequency and magnitude of arsenic drinking water standard exceedances at mainstem Clark Fork River monitoring sites was higher in 2011 compared to 2010 and 2012, likely due to the sustained high streamflow conditions and its influence on pollutant transport.

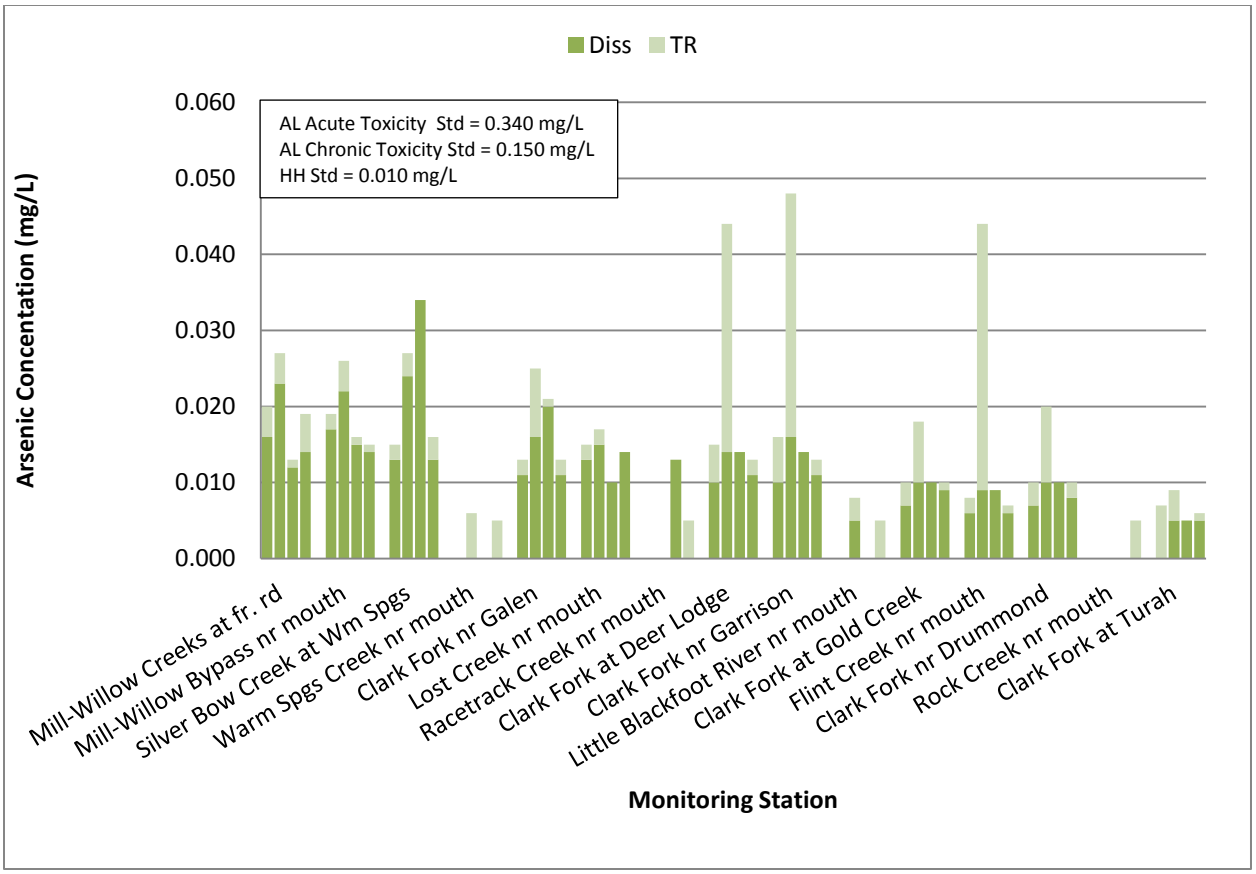

Figure 1-26. Total recoverable and dissolved arsenic concentrations at Clark Fork River Operable Unit monitoring stations, 2012. Human health (HH) and aquatic life (AL) water quality standards for total recoverable arsenic concentration are shown for reference.

Table 1-9. Total recoverable arsenic concentrations (mg/L) compared to remediation performance standards at Clark Fork River Operable Unit monitoring stations, 2012.

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork near Galen
Q1 (April)	0.020	0.019	0.015	ND	0.013
Q2 (June)	0.027	0.026	0.027	0.006	0.025
Q3 (Sept.)	0.013	0.016	0.034	ND	0.021
Q4 (Dec.)	0.019	0.015	0.016	0.005	0.013
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork at Deer Lodge**	**Clark Fork near Garrison**	**Little Blackfoot River near mouth**
Q1 (April)	0.015	ND	0.015	0.016	ND
Q2 (June)	0.017	ND	0.044	0.048	0.008
Q3 (Sept.)	0.010	0.013	0.014	0.014	ND
Q4 (Dec.)	0.014	ND	0.013	0.013	ND
Monitoring Station Calendar Quarter	**Clark Fork at Gold Creek**	**Flint Creek near mouth**	**Clark Fork near Drummond**	**Rock Creek near mouth**	**Clark Fork at Turah**
Q1 (April)	0.010	0.008	0.010	ND	0.007
Q2 (June)	0.018	0.044	0.020	ND	0.009
Q3 (Sept.)	0.010	0.009	0.010	ND	0.005
Q4 (Dec.)	0.010	0.007	0.010	ND	0.006

Remedy performance standard attained
HH performance standard exceeded

Load estimates for total recoverable and dissolved arsenic were calculated from the instream concentration measurement data and daily mean streamflows obtained from the USGS for co-located streamflow gauging stations or from manually gauged streamflows (Figure 1-27). These load estimates provide some insight into temporal and spatial characteristics of arsenic loading to the upper Clark Fork River. 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 instream conditions during some monitoring events. Those factors may account for some of the apparent gains or losses in arsenic loading between monitoring stations in any of the four monitoring events in 2012.

The load data show that peak rates of total recoverable and dissolved arsenic transport likely occurred during spring snowmelt runoff (Figure 1-27). Total recoverable and dissolved arsenic loads in Q2 were an order of magnitude greater than in other quarters (Figure 1-27). During all quarterly monitoring events, loading tended to increase in from the Clark Fork River headwaters at Warm Springs downstream to the near Garrison or Gold Creek stations or, in some quarters, beyond to the Turah monitoring station. Large increases in total recoverable arsenic loading occurred in Q2 2012 between the near Galen and Deer Lodge stations (111 lbs/day), and between the Deer Lodge and near Garrison stations (73 lbs/day).

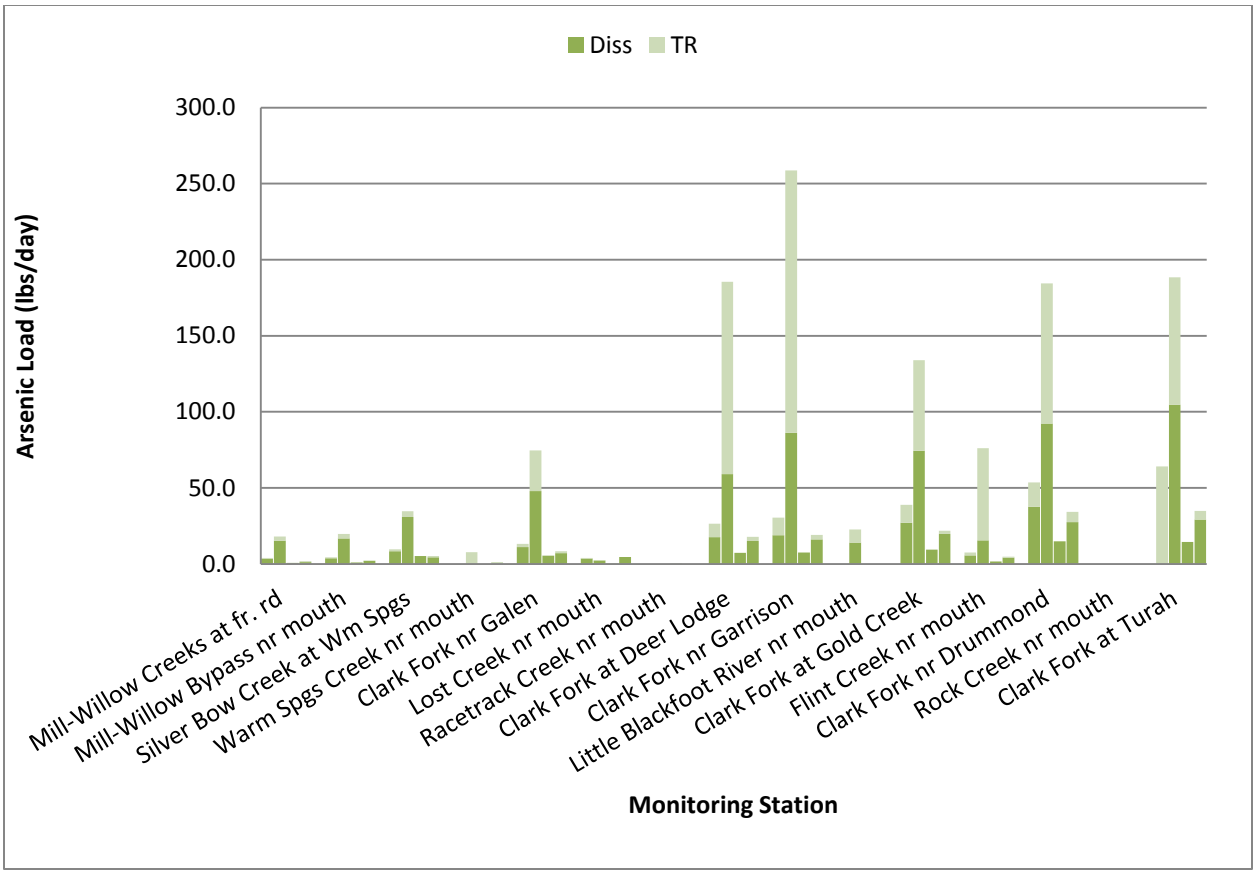

Figure 1-27. Total recoverable and dissolved arsenic loads at Clark Fork River Operable Unit monitoring stations, 2012.

To provide an additional interpretive tool to help understand metal transport dynamics in the upper Clark Fork River system, simple linear regression models of metal concentrations on total suspended sediment concentrations were fit. In total, 72 observations were included from the Clark Fork River mainstem stations (i.e., 6 stations, 4 monitoring events per year, for 3 years from 2010-2012).

The relationship between total suspended sediment and total recoverable arsenic was relatively weak (compared to other metal COCs) for the CFROU mainstem monitoring stations (r^2 = 0.67) (Figure 1-28). Arsenic tends to have a higher dissolved component than cadmium, copper, lead or zinc, which may explain the relatively poor fit. When individual monitoring station data are analyzed separately (12 data pairs for each station) the resulting fits were highly variable with r^2 ranging from 0.51-0.96 among those six sites (Table 1-10). The Clark Fork River near Garrison and near Drummond stations had particularly good fits (r^2 = 0.96 and 0.91 for each station respectively). These stations also had slightly higher than average total recoverable to dissolved arsenic ratios (Figure 1-26), which may explain the relatively strong relationship between arsenic and total suspended solids at those sites.

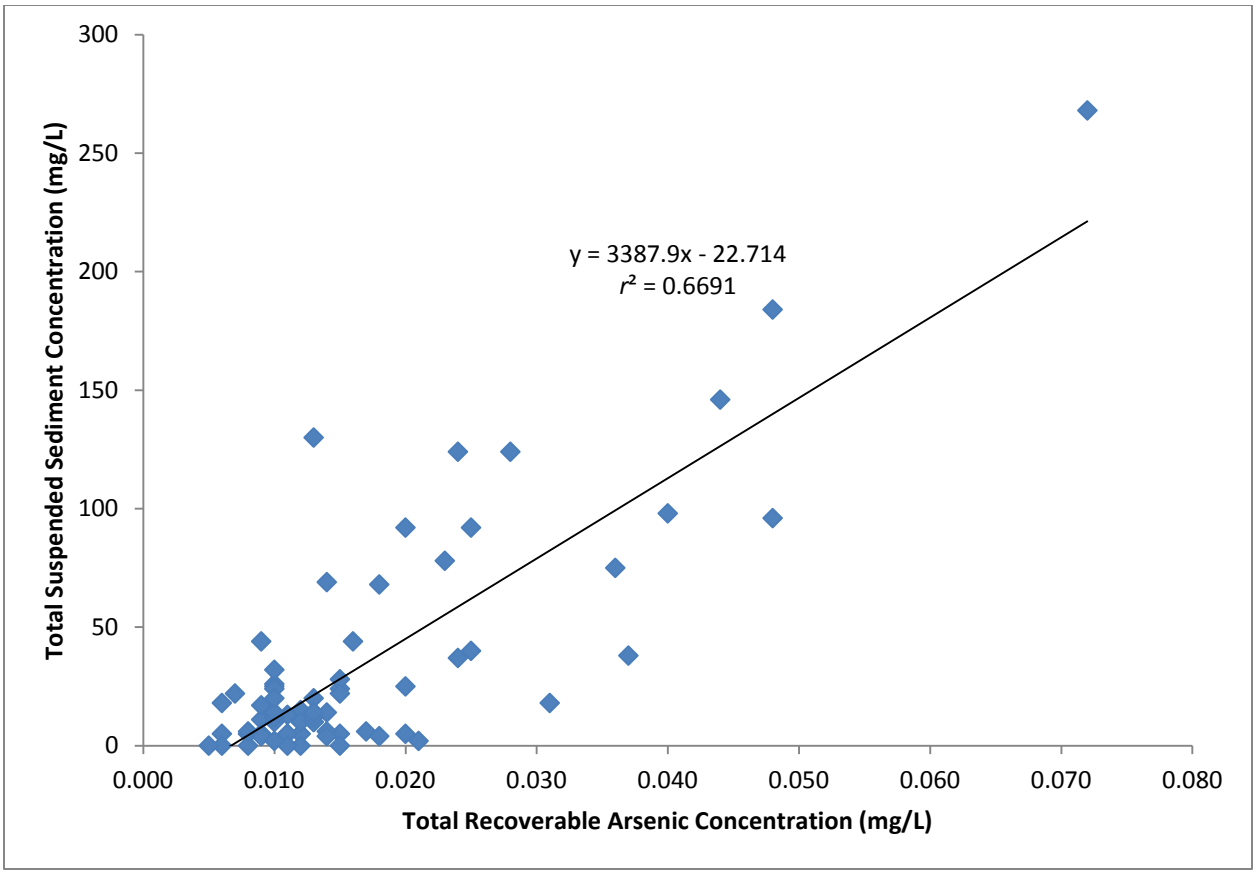

Figure 1-28. Simple linear regression of total suspended sediment concentration on total recoverable arsenic concentration at Clark Fork River Operable Unit monitoring stations, 2010-2012. Quarterly sample data pooled in this analysis.

Table 1-10. Coefficients of determination (r^2) from simple linear regression of total suspended sediment concentration on total recoverable arsenic concentration at individual Clark Fork River Operable Unit monitoring stations, 2010-2012.*

Clark Fork River near Galen	Clark Fork River at Deer Lodge	Clark Fork River near Garrison
0.5174	0.7747	0.9629
Clark Fork River at Gold Creek	**Clark Fork River near Drummond**	**Clark Fork River at Turah**
0.8260	0.9068	0.0685

**Four quarterly monitoring events per year.*

1.3.7.2 Cadmium

Concentrations of total recoverable cadmium in 2012 were highest at the Clark Fork River at Deer Lodge and near Garrison monitoring stations. Total recoverable cadmium concentrations in Mill-Willow Creek, Mill-Willow Bypass, Silver Bow Creek at Warm Springs, and the mainstem Clark Fork River stations near Galen, at Gold Creek and near Drummond stations were intermediate and more or less comparable. The lowest total recoverable cadmium concentrations were observed in Rock Creek, Lost Creek, and Racetrack Creek (Figure 1-29).

Total recoverable cadmium concentrations generally decreased 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 dilution from the cleaner tributaries. Concentrations of dissolved cadmium were consistently below detection in 2012 monitoring events at all 15 CFROU monitoring stations. The majority of the cadmium was present in the sediment-associated state (i.e., total recoverable).

The highest concentrations of total recoverable cadmium were measured in Q2, with maximum concentrations in 2012 recorded near Garrison (0.00095 mg/L), at Deer Lodge (0.00081 mg/L), in Flint Creek (0.00039 mg/L), and near Drummond (0.00037 mg/L). Total recoverable cadmium concentrations measured in Q2 at the Clark Fork River mainstem monitoring sites were usually double the concentrations measured in the other three quarterly monitoring events. The lowest concentrations of total recoverable cadmium were observed in Q3, when concentrations were below the analytical detection limit at all 15 monitoring stations. Concentrations of total recoverable cadmium were below detection in three or four quarterly monitoring events at 6 of 15 stations, including Mill-Willow Bypass, Lost Creek, Racetrack Creek, Little Blackfoot River, Flint Creek, and Rock Creek.

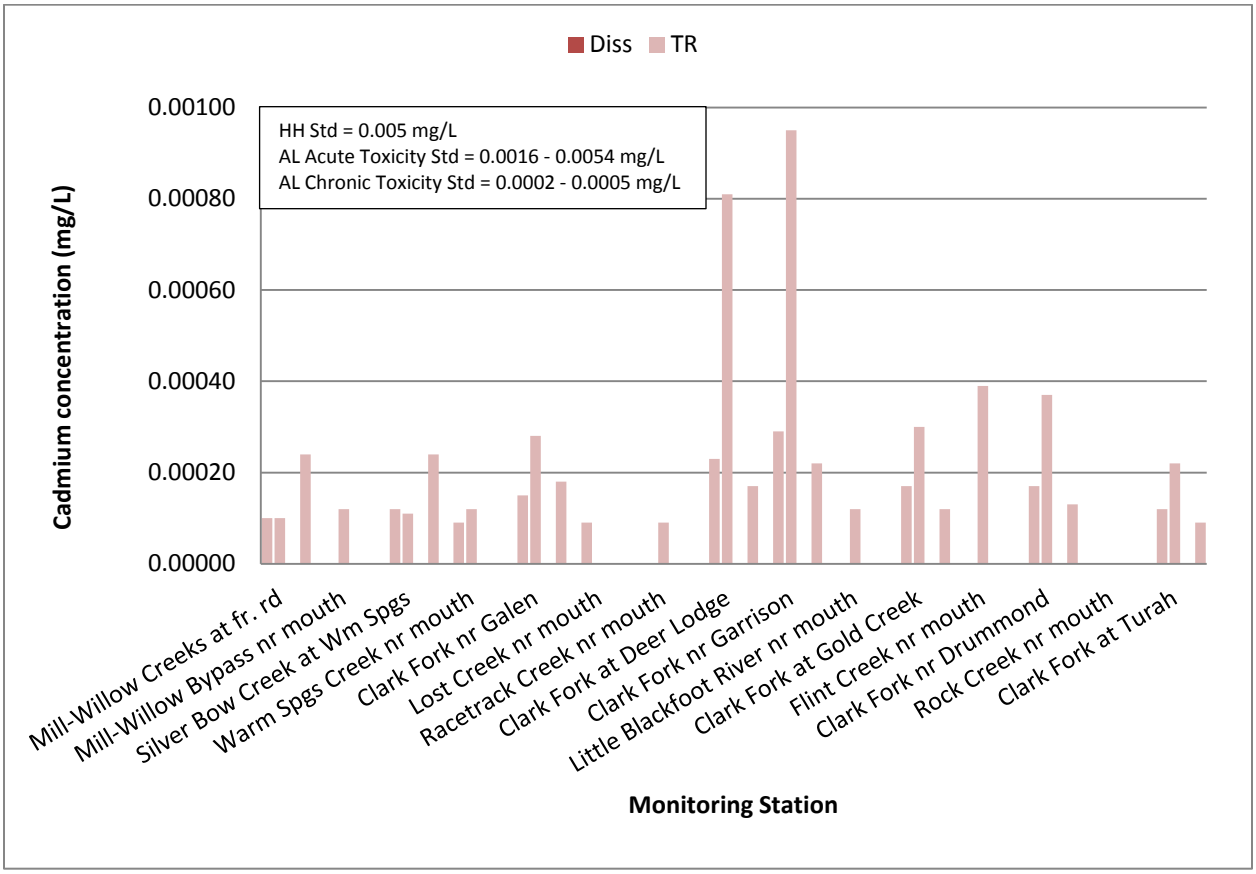

Figure 1-29. Total recoverable and dissolved cadmium concentrations at Clark Fork River Operable Unit monitoring stations, 2012. Human health (HH) and aquatic life (AL) water quality standards for total recoverable cadmium concentration are shown for reference.

Total recoverable cadmium concentrations measured in 2012 exceeded the hardness-based aquatic life chronic toxicity standard at 27% (4 of 15) of the CFROU monitoring stations in Q2. Stations exceeding the standard included the Clark Fork River at Deer Lodge, near Garrison,

and near Drummond, and Flint Creek near mouth (Table 1-11). Exceedances ranged from about 1.1-2.8 times the standard. All other monitoring stations were below the aquatic life standard in all quarterly monitoring events in 2012. No measured cadmium 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 standard exceedances in 2012 were lower than in 2011 and comparable to 2010.

Table 1-11. Total recoverable cadmium concentrations (mg/L) compared to remediation performance standards at Clark Fork River Operable Unit monitoring stations, 2012.

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork River near Galen
Q1 (April)	0.00010	ND	0.00012	0.00009	0.00015
Q2 (June)	0.00010	0.00012	0.00011	0.00012	0.00028
Q3 (Sept.)	ND	ND	ND	ND	ND
Q4 (Dec.)	0.00024	ND	0.00024	ND	0.00018
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork River at Deer Lodge**	**Clark Fork River near Garrison**	**Little Blackfoot River near mouth**
Q1 (April)	0.00009	ND	0.00023	0.00029	ND
Q2 (June)	ND	0.00009	0.00081	0.00095	0.00012
Q3 (Sept.)	ND	ND	ND	ND	ND
Q4 (Dec.)	ND	ND	0.00017	0.00022	ND
Monitoring Station Calendar Quarter	**Clark Fork River at Gold Creek**	**Flint Creek near mouth**	**Clark Fork River near Drummond**	**Rock Creek near mouth**	**Clark Fork River at Turah**
Q1 (April)	0.00017	ND	0.00017	ND	0.00012
Q2 (June)	0.00030	0.00039	0.00037	ND	0.00022
Q3 (Sept.)	ND	ND	ND	ND	ND
Q4 (Dec.)	0.00012	ND	0.00013	ND	0.00009

Remedy performance standard attained *ND = Not detected at parameter reporting limit*
Aquatic life chronic toxicity performance standard exceeded

Load estimates for total recoverable and dissolved cadmium were determined from the instream concentration and USGS daily mean streamflow data or gauged streamflow data (Figure 1-30). Cadmium load estimates indicated that the highest rates of total recoverable cadmium transport occurred in Q2, most likely in association with high total suspended sediment loads. Loading increased from the headwaters at Warm Springs downstream to near Garrison, followed by a decline at the Clark Fork River at Gold Creek station and subsequent increases at the Clark Fork River near Drummond and Turah stations. The largest apparent increases in cadmium loading in Q2 occurred between the near Galen and Deer Lodge sites (2.58 lbs/day increase), and from Deer Lodge to near Garrison (1.71 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 instream conditions and timing of actual monitoring relative to river travel times during any given quarterly monitoring event.

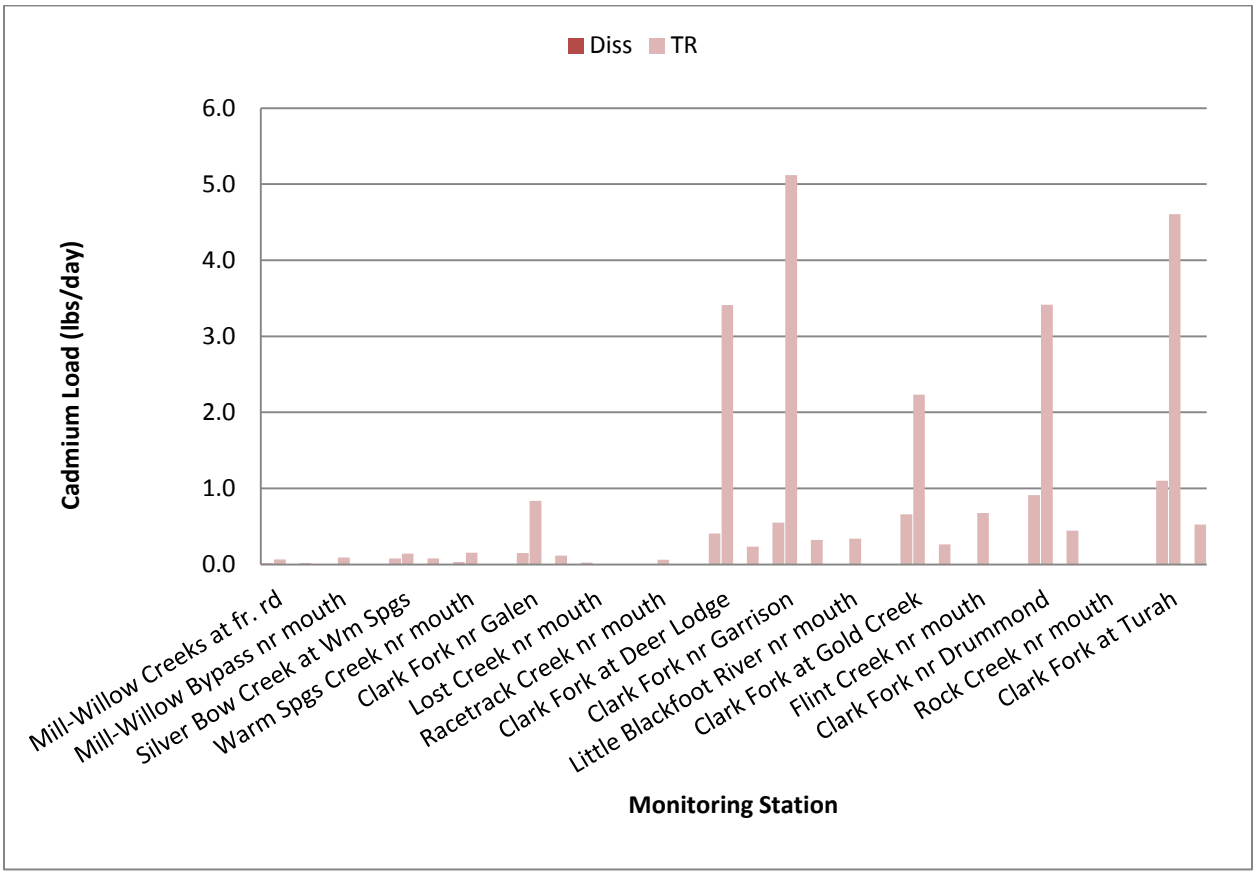

Figure 1-30. Total recoverable and dissolved cadmium loads at Clark Fork River Operable Unit monitoring stations, 2012.

Similar to arsenic, a regression of total recoverable cadmium concentration on total suspended sediment concentration for the six mainstem Clark Fork River monitoring stations was fit. Results indicated a strong correlation between total recoverable cadmium concentration and total suspended sediment concentration (r^2 = 0.86; Figure 1-31).

Regressions were also fit for the individual monitoring stations and, as with arsenic, the strength of the fitted models were highly variable among sites (Table 1-12). Several of the monitoring stations, notably the Clark Fork River stations near Drummond, at Gold Creek, and near Garrison, had strong correlations between total suspended sediment and total recoverable cadmium concentrations (r^2 = 0.95, 0.94, and 0.94 at each station respectively). The weakest correlation between total suspended sediment and total recoverable cadmium concentrations among individual stations was at the Clark Fork River near Galen station (r^2 = 0.71).

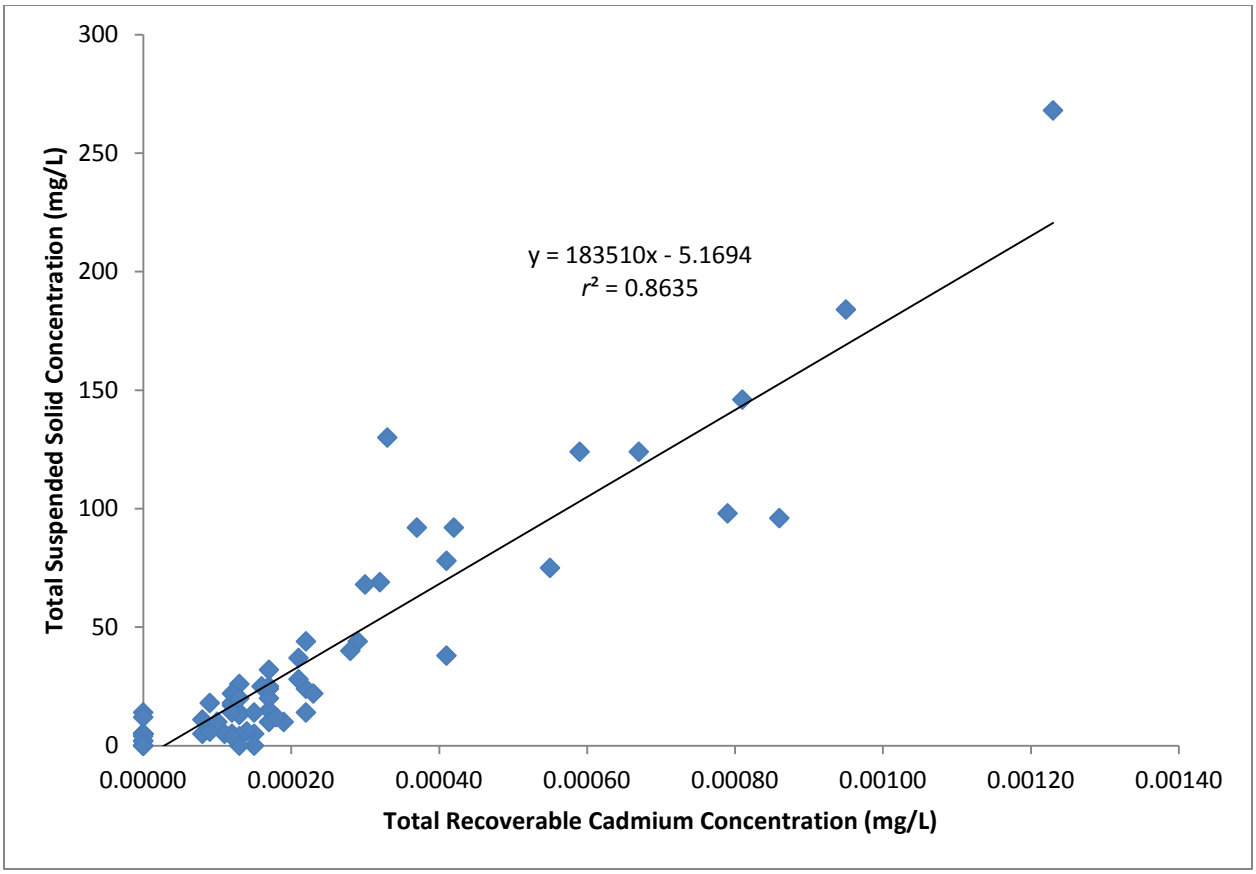

Figure 1-31. Simple linear regression of total suspended sediment concentration on total recoverable cadmium concentration at Clark Fork River Operable Unit monitoring stations, 2010-2012. Quarterly sample data pooled in this analysis.

Table 1-12. Coefficients of determination (r^2) from simple linear regression of total suspended sediment concentration on total recoverable cadmium concentration at individual Clark Fork River Operable Unit monitoring stations, 2010-2012.*

Clark Fork River near Galen	Clark Fork River at Deer Lodge	Clark Fork River near Garrison
0.7147	0.9100	0.9351
Clark Fork River at Gold Creek	**Clark Fork River near Drummond**	**Clark Fork River at Turah**
0.9385	0.9524	0.8318

**Four quarterly monitoring events per year.*

1.3.7.3 Copper

Concentrations of total recoverable and dissolved copper during 2012 were highest at the Clark Fork River near Garrison and Deer Lodge stations; intermediate at the Clark Fork River at Gold Creek, near Drummond, and near Galen stations, and lowest in Rock Creek near its mouth (Figure 1-32). The observed spatial pattern was similar to that observed in 2010 and 2011. Total recoverable and dissolved copper concentrations in 2012 increased in the reach of the Clark Fork River 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 constant, or declined, in the reach bracketing the Flint Creek confluence (Gold Creek to near Drummond).

The highest concentrations of total recoverable copper at most stations were measured during Q2, with maximum concentrations in 2012 recorded near Garrison (0.272 mg/L), and at Deer Lodge (0.252 mg/L). Total recoverable copper concentrations in the Clark Fork River mainstem were several-fold higher in Q2 than in any of the other three quarters. The highest concentrations of dissolved copper at most stations mirrored the pattern for total recoverable copper, with maximum concentrations at each station in Q2, and maximum concentrations in the Clark Fork River near Garrison (0.018 mg/L) and at Deer Lodge (0.015 mg/L). The lowest dissolved copper concentrations occurred in Rock Creek near its mouth.

Dissolved copper was consistently detectable at each station, but was in relatively low concentrations in Q1, Q3, and Q4 compared to Q2 (Figure 1-32). Most of the copper present in Q2 was associated with sediment, with a low proportion of dissolved copper. During the other quarterly monitoring events, dissolved copper accounted for approximately 13-75% of the copper present, depending on the monitoring station. The ratio of dissolved to total recoverable copper was highest in Silver Bow Creek at Warm Springs.

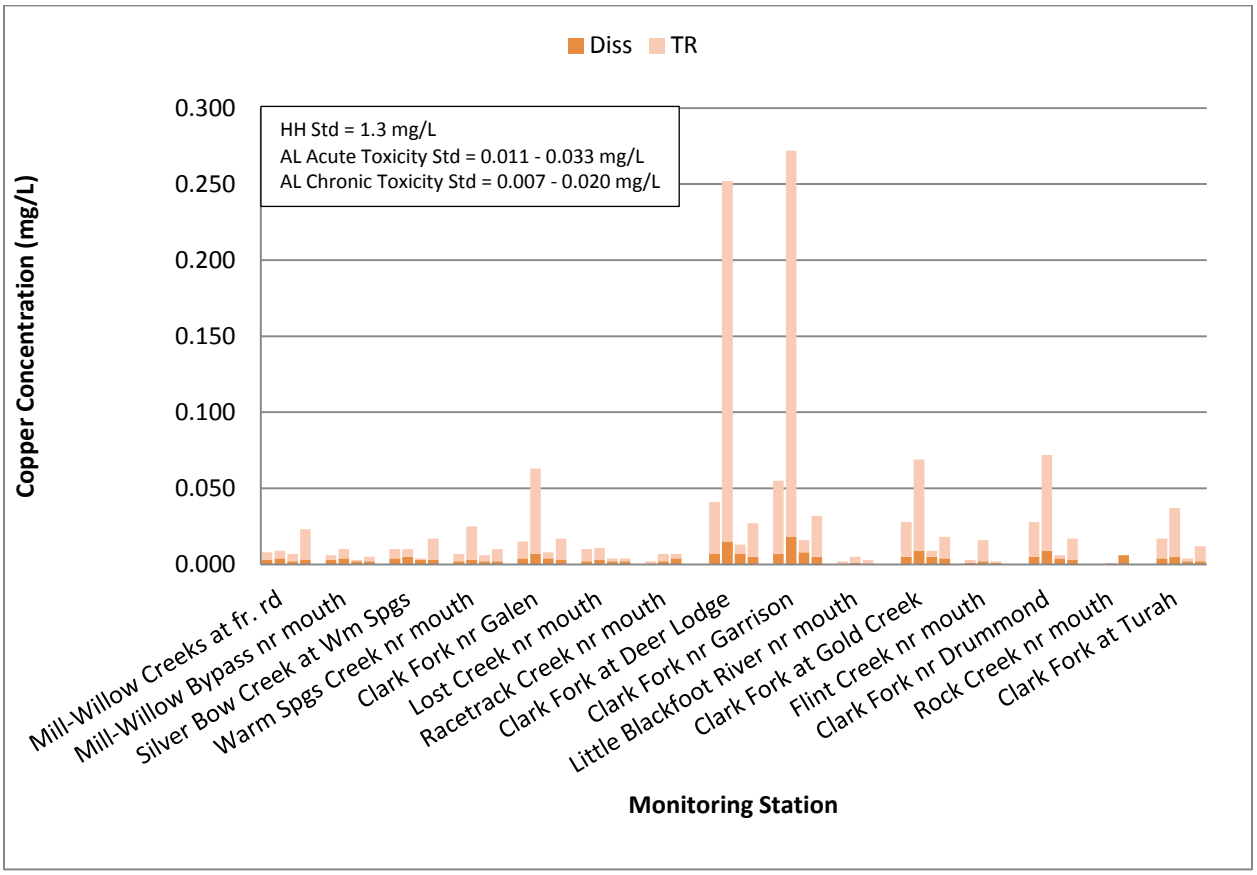

Figure 1-32. Total recoverable and dissolved copper concentrations at Clark Fork River Operable Unit monitoring stations, 2012. Human health (HH) and aquatic life (AL) water quality standards for total recoverable copper are shown for reference.

Total recoverable copper concentrations exceeded aquatic life chronic toxicity standard in 33% (20 of 60) of the samples in 2012 (Table 1-13). The acute toxicity standard was exceeded in

27% (16 of 60) samples. For the mainstem Clark Fork River stations, the frequency of exceedances of the chronic and acute toxicity standards for copper was similar in 2010, 2011 and 2012. Of the 16 acute toxicity standard exceedances in 2012, the majority (63% or 10 of 16) occurred during Q2.

In addition to the high copper concentrations in Q2, relatively low water hardness (presumably due to dilution during runoff) likely contributed to the higher frequency and magnitude of exceedances in Q2. Exceedances of the aquatic life criteria were also common in Q1, when 33% (5 of 15) of the monitoring stations surpassed either the chronic (5 of 15 stations) or acute (4 of 15 stations) toxicity standards. All of the mainstem Clark Fork River monitoring sites from Deer Lodge to Turah exceeded either the chronic or the acute toxicity standards in Q1 and Q2 in each year from 2010-2012. Total suspended sediment concentrations were typically elevated at mainstem Clark Fork River monitoring stations during in Q1 and Q2. When aquatic life standards were not exceeded, total suspended sediment concentrations were generally low.

The lowest incidence of aquatic life standard exceedances was in Q3, when no stations exceeded the standards. Among the seven primary Silver Bow Creek and Clark Fork River mainstem monitoring stations, the lowest frequency of performance standard exceedances occurred at the upper two stations (Silver Bow Creek at Warm Springs and Clark Fork River near Galen). This was the same pattern noted in 2011. None of the measured total recoverable copper concentrations at any station in 2012 exceeded the human health standard.

Table 1-13. Total recoverable copper concentrations (mg/L) compared to remediation performance standards at Clark Fork River Operable Unit monitoring stations, 2012.

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork River near Galen
Q1 (April)	0.008	0.006	0.010	0.007	0.015
Q2 (June)	0.009	0.010	0.010	0.025	0.063
Q3 (Sept.)	0.007	0.003	0.004	0.006	0.008
Q4 (Dec.)	0.023	0.005	0.017	0.010	0.017
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork River at Deer Lodge**	**Clark Fork River near Garrison**	**Little Blackfoot River near mouth**
Q1 (April)	0.010	0.002	0.041	0.055	0.002
Q2 (June)	0.011	0.007	0.252	0.272	0.005
Q3 (Sept.)	0.004	0.007	0.013	0.016	0.003
Q4 (Dec.)	0.004	ND	0.027	0.032	ND
Monitoring Station Calendar Quarter	**Clark Fork River at Gold Creek**	**Flint Creek near mouth**	**Clark Fork River near Drummond**	**Rock Creek near mouth**	**Clark Fork River at Turah**
Q1 (April)	0.028	0.003	0.028	ND	0.017
Q2 (June)	0.069	0.016	0.072	0.001	0.037
Q3 (Sept.)	0.009	0.002	0.006	ND	0.004
Q4 (Dec.)	0.018	0.001	0.017	ND	0.012

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

Load estimates for total recoverable and dissolved copper are presented in Figure 1-33, with the same qualifiers attached as for arsenic and cadmium. The load estimates suggest that much of the copper was transported during Q2, as was observed for arsenic and cadmium. Total recoverable copper loading in Q2 tended to increase from the headwaters at Warm Springs and near Galen downstream to near Garrison, followed by a decline in load at the Clark Fork River at Gold Creek and near Drummond sites. Peak total recoverable copper loading occurred at the Clark Fork River near Garrison site during Q2. Dissolved copper loading peaked at Turah during Q2. The largest increases in total recoverable copper load during Q2 occurred between Galen and Deer Lodge (873 lbs/day). Spatial patterns in copper loading were less distinct during other quarters, but maximum loading always occurred at either the Turah or near Garrison monitoring stations. Estimated copper loads in Q2 2010 and Q2 2012 were about half the loads estimated for Q2 2011 at many of the mainstem Clark Fork River monitoring stations. Loading during the other three quarterly monitoring events of 2012 were comparable to the same periods in 2010 and 2011.

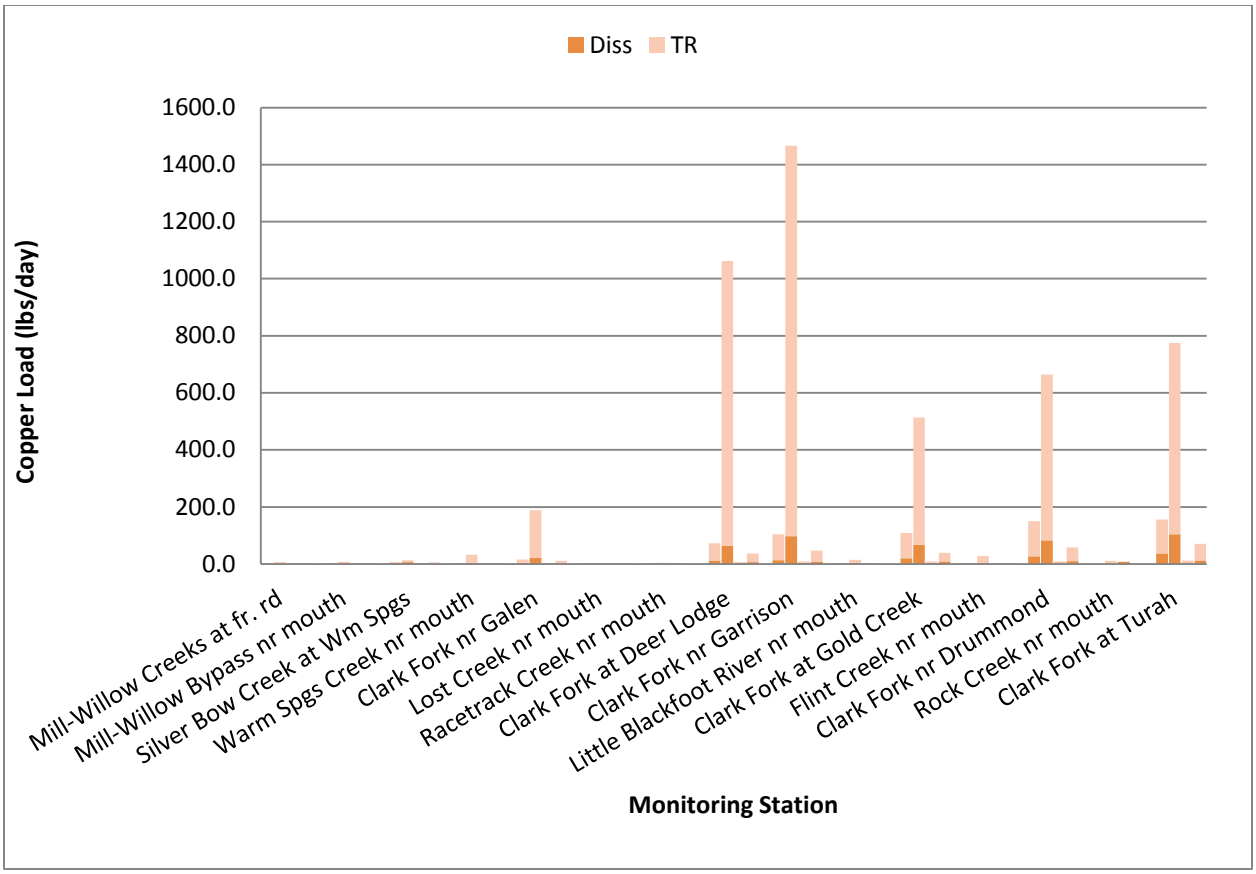

Figure 1-33. Total recoverable and dissolved copper loads at Clark Fork River Operable Unit monitoring stations, 2012.

Regression were fit to total suspended sediment concentration on total recoverable copper concentration for the six mainstem Clark Fork River monitoring stations using observations from each quarterly monitoring event from 2010–2012. There was a strong positive correlation between total suspended sediment concentration and total recoverable copper concentration in 2012 (r^2 = 0.82; Figure 1-34).

Regressions were also fit to total suspended sediment concentration on total recoverable copper concentration for each individual monitoring station (Table 1-14). Several of the monitoring stations, notably the Clark Fork River stations at Deer Lodge, near Drummond, and near Garrison, showed very strong correlations between total suspended sediment and total recoverable copper concentrations (r^2 = 0.98, 0.96, and 0.94, at each station respectively). The weakest correlation among individual stations was the Clark Fork River at Gold Creek (r^2 = 0.83).

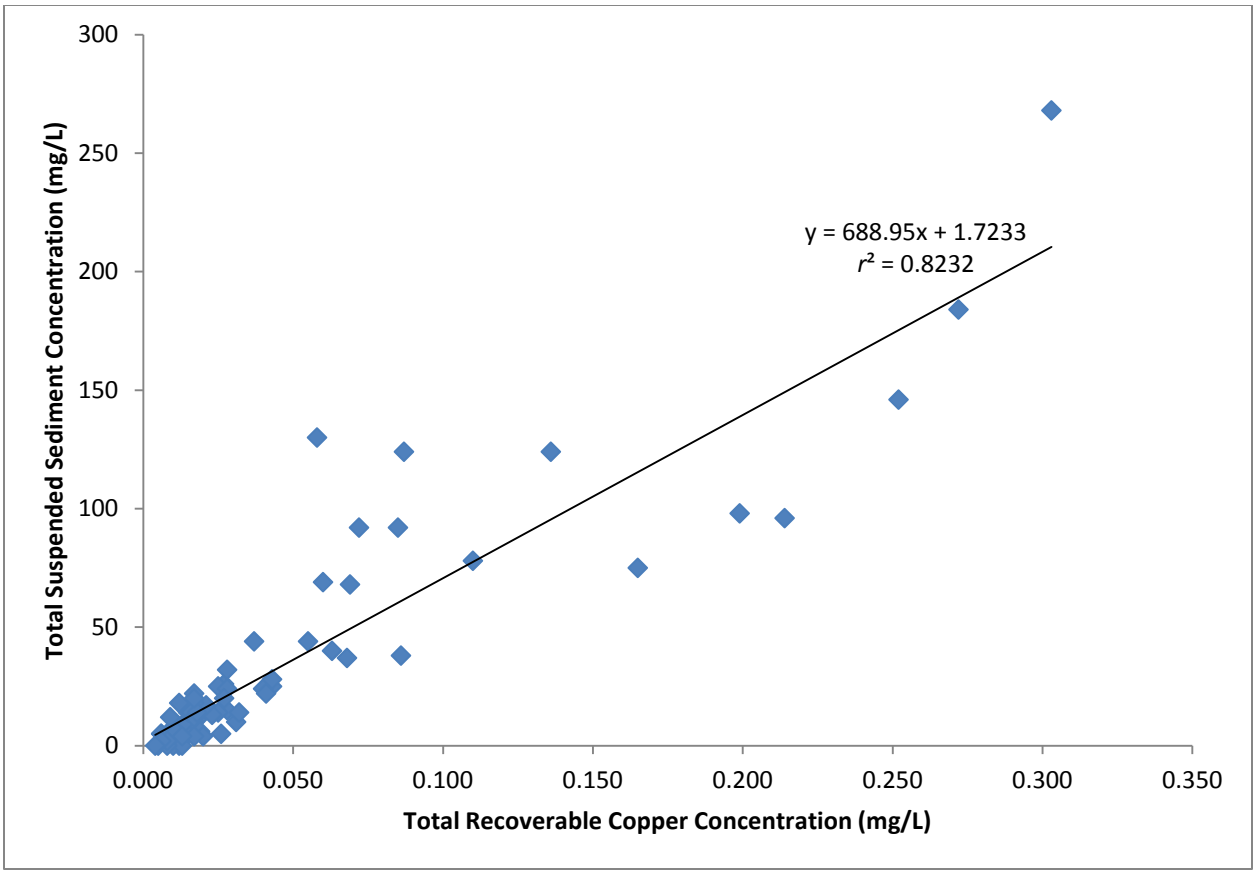

Figure 1-34. Simple linear regression of total suspended sediment concentration on total recoverable copper concentration at Clark Fork River Operable Unit monitoring stations, 2010-2012. Quarterly sample data pooled in this analysis.

Table 1-14. Coefficients of determination (r^2) from simple linear regression of total suspended sediment concentration on total recoverable copper concentration at individual Clark Fork River Operable Unit monitoring stations, 2010-2012.*

Clark Fork River near Galen	Clark Fork River at Deer Lodge	Clark Fork River near Garrison
0.8912	0.9760	0.9419
Clark Fork River at Gold Creek	**Clark Fork River near Drummond**	**Clark Fork River at Turah**
0.8312	0.9629	0.8472

**Four quarterly monitoring events per year.*

1.3.7.4 Lead

The highest mean total recoverable lead concentration in 2012 occurred at the Clark Fork River near Garrison, at the Flint Creek near mouth, and at the Clark Fork River at Deer Lodge monitoring stations; the next highest concentrations occurred at the Clark Fork River near Drummond, at Gold Creek and near Galen stations. The lowest total recoverable lead concentrations occurred in Rock Creek near its mouth. The spatial pattern for instream lead concentrations were of increasing concentrations from the headwaters area at Warm Springs and near Galen downstream to Garrison, with localized decreases in concentrations apparently caused by dilution from the Little Blackfoot River and Rock Creek inflows (Figure 1-35). The

largest increases in total recoverable lead concentrations occurred from the near Galen station to the near Garrison station. Elevated total recoverable lead concentrations appeared to be associated with elevated total suspended sediment concentrations. Dissolved lead concentrations were below the analytical detection limit at all 15 monitoring stations during 2012.

The highest total recoverable lead concentrations occurred at most stations in Q2. The maximum total recoverable lead concentrations in 2012 occurred in Flint Creek (0.016 mg/L), in the Clark Fork River near Garrison (0.0366 mg/L), in the Clark Fork River at Deer Lodge (0.0332 mg/L), and near Drummond (0.0126 mg/L). Total recoverable lead concentrations at CFROU monitoring stations were frequently several-fold to more than twenty-fold higher during Q2 compared to other quarters. The lowest total recoverable lead concentrations were measured in Q3, when 60% (9 of 15) of the stations had non-detectable concentrations. The second highest total recoverable lead concentrations in 2012 were typically in Q1. One exception to that pattern was the Mill-Willow Creek at Frontage Road station, which had the highest total recoverable lead concentration in Q4. In Q4, stream channel remediation activities were occurring immediately upstream from the Mill-Willow Creek at Frontage Road station, which presumably caused the spike in the Q4 total recoverable lead concentration. Total recoverable lead concentrations measured at mainstem Clark Fork River monitoring stations in 2012 were within the range of concentrations observed in 2010 and 2011.

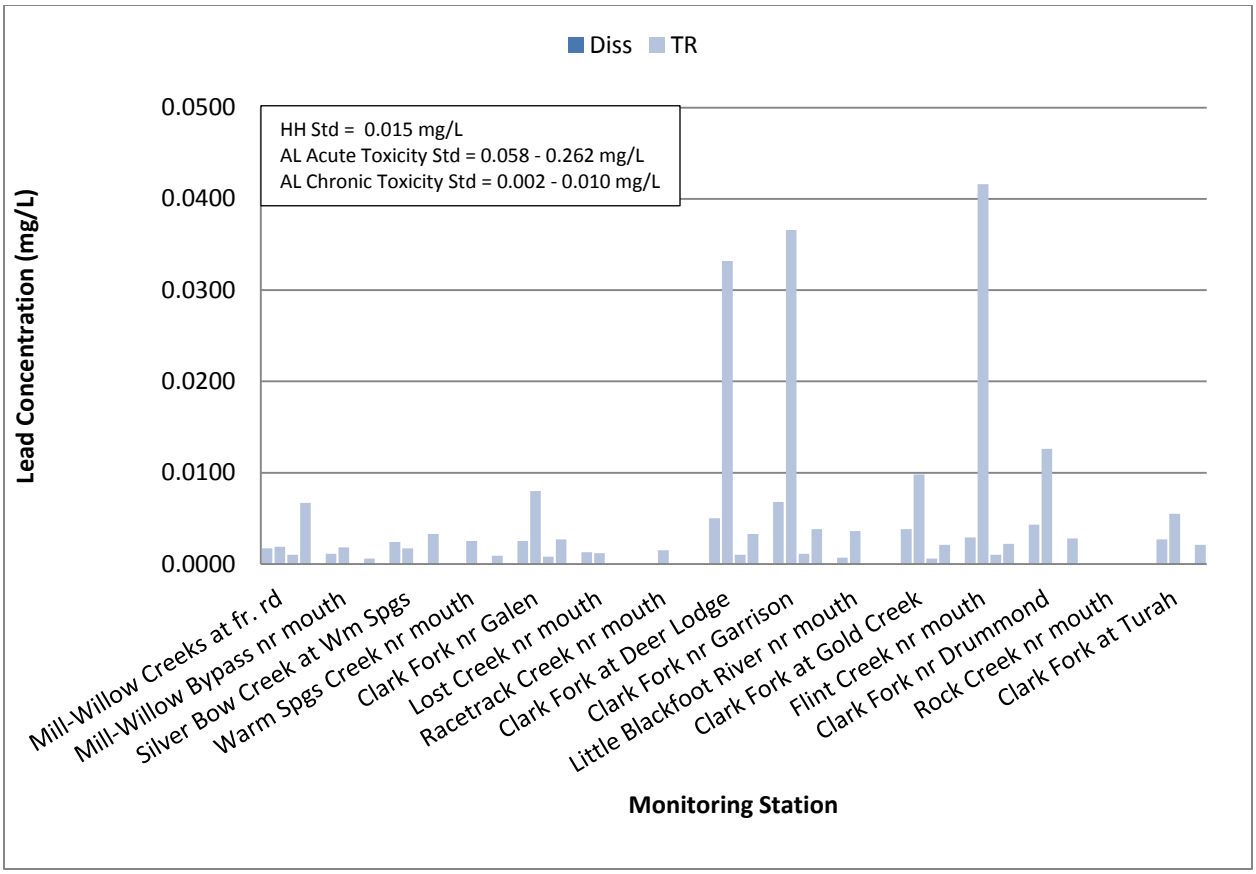

Figure 1-35. Total recoverable and dissolved lead concentrations at Clark Fork River Operable Unit monitoring stations, 2012. Human health (HH) and aquatic life (AL) water quality standards for total recoverable lead are shown for reference.

Total recoverable lead concentrations exceeded the aquatic life chronic toxicity standard at 67% (10 of 15) of the CFROU monitoring stations in Q2 2012. All of the mainstem Clark Fork River monitoring sites from near Galen to Turah exceeded the chronic standard in Q2 2012. Total recoverable lead concentrations in Q2 also exceeded the human health standard at 20% (3 of 15) of the CFROU stations (Table 1-15). During the other three quarterly monitoring events in 2012, only one station (Mill-Willow Creek at Frontage Road in Q4) exceeded the chronic standard for total recoverable lead. This exceedance was likely associated with upstream channel remediation activities.

Table 1-15. Total recoverable lead concentrations (mg/L) compared to remediation performance standards at Clark Fork River Operable Unit monitoring stations, 2012.

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork River near Galen
Q1 (April)	0.0017	0.0011	0.0024	ND	0.0025
Q2 (June)	0.0019	0.0018	0.0017	0.0025	0.0080
Q3 (Sept.)	0.0010	ND	ND	ND	0.0008
Q4 (Dec.)	0.0067	0.0006	0.0033	0.0009	0.0027
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork River at Deer Lodge**	**Clark Fork River near Garrison**	**Little Blackfoot River near mouth**
Q1 (April)	0.0013	ND	0.0050	0.0068	0.0007
Q2 (June)	0.0012	0.0015	0.0332	0.0366	0.0036
Q3 (Sept.)	ND	ND	0.0010	0.0011	ND
Q4 (Dec.)	ND	ND	0.0033	0.0038	ND
Monitoring Station Calendar Quarter	**Clark Fork River at Gold Creek**	**Flint Creek near mouth**	**Clark Fork River near Drummond**	**Rock Creek near mouth**	**Clark Fork River at Turah**
Q1 (April)	0.0038	0.0029	0.0043	ND	0.0027
Q2 (June)	0.0098	0.0416	0.0126	ND	0.0055
Q3 (Sept.)	0.0006	0.0010	ND	ND	ND
Q4 (Dec.)	0.0021	0.0022	0.0028	ND	0.0021

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 total recoverable and dissolved lead are presented in Figure 1-36. The load data suggest that the only appreciable transport of total recoverable lead was during elevated streamflows, as occurred in Q2. Estimated total recoverable lead loads in the Clark Fork River in Q2 2012 increased downstream from the headwaters at Warm Springs to near Garrison, and from Gold Creek to Drummond. Total recoverable lead loads in Q2 2012 peaked near Drummond and then remained fairly stable to Turah. The largest increases in total recoverable lead load between stations in the mainstem Clark Fork River in Q2 occurred between Galen and Deer Lodge (116 lbs/day), Deer Lodge to near Garrison (57.4 lbs/day), and from Gold Creek to near Drummond (43.3 lbs/day). Total recoverable lead loads in the Clark Fork River peaked at the near Garrison (Q2, Q3) or Turah (Q1, Q4) monitoring stations in 2012. Overall, total recoverable lead transport appeared to be lower in 2012 and 2010 than in 2011 based on the quarterly load estimates, presumably due to higher streamflows in 2011.

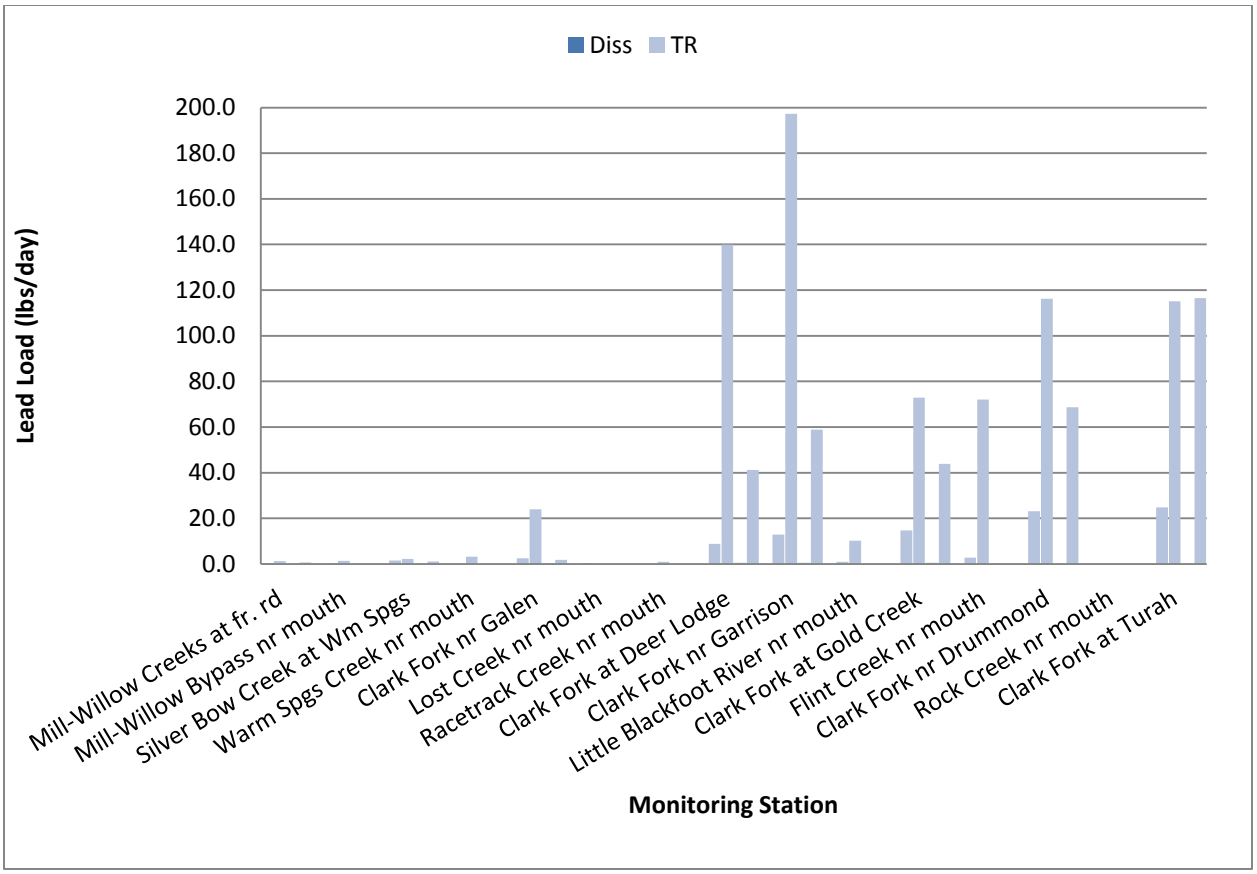

Figure 1-36. Total recoverable and dissolved lead loads at Clark Fork River Operable Unit monitoring stations, 2012.

Total recoverable lead and total suspended sediment concentrations were strongly correlated when observations from all Clark Fork River mainstem stations between 2010-2012 were pooled (r^2 = 0.89; Figure 1-37), as were total recoverable zinc and copper with total suspended sediment concentration. Regressions were also fit for each individual monitoring station (Table 1-16), and generally the regression fits were better and less variable for total recoverable lead and total suspended sediment than for arsenic and cadmium and total suspended sediment. Several of the monitoring stations, notably the Clark Fork River stations at Deer Lodge, near Garrison, near Drummond, and near Galen had very strong correlations between total recoverable lead and total suspended sediment concentrations (r^2 = 0.97, 0.97, 0.96 and 0.94, at each station respectively). The weakest correlation among individual Clark Fork River mainstem stations was at Turah (r^2 = 0.85).

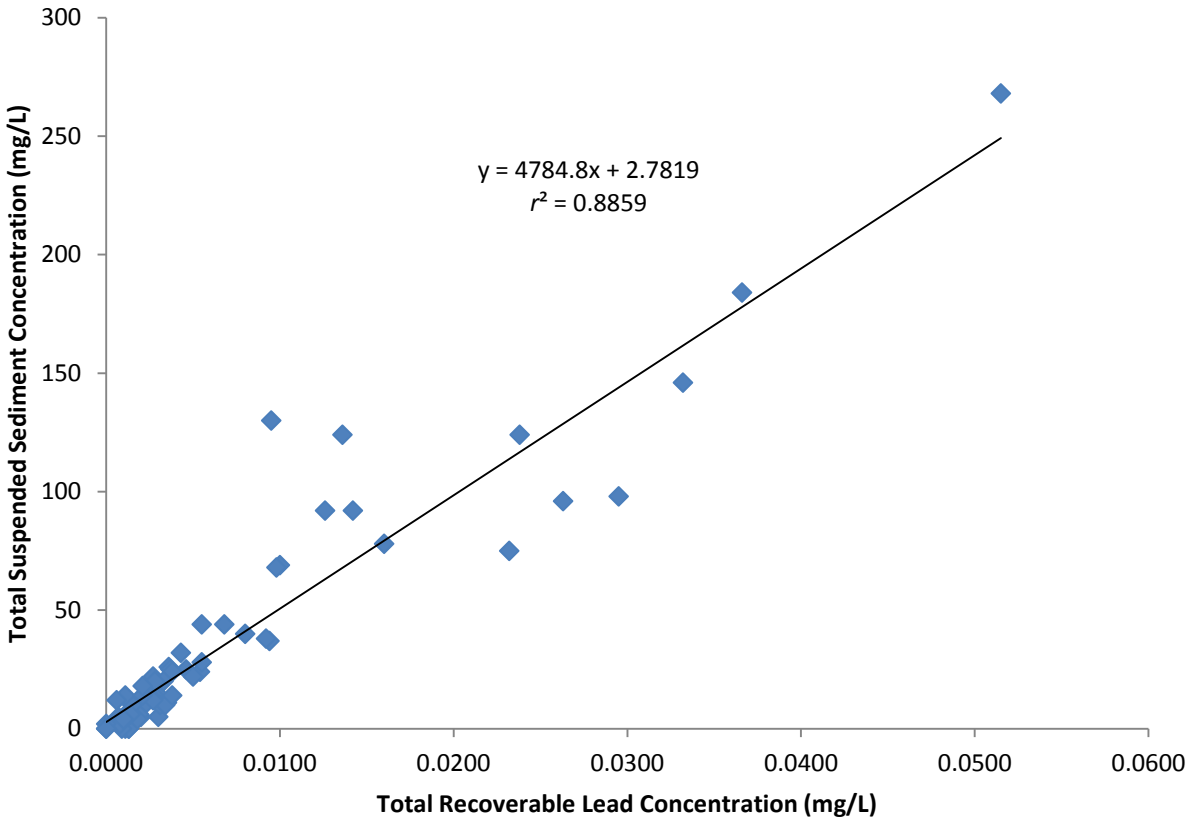

Figure 1-37. Simple linear regression of total suspended sediment concentration on total recoverable lead concentration at Clark Fork River Operable Unit monitoring stations, 2010-2012. Quarterly sample data pooled in this analysis.

Table 1-16. Coefficients of determination (r^2) from simple linear regression of total suspended sediment concentration on total recoverable lead concentration at individual Clark Fork River Operable Unit monitoring stations, 2010-2012.*

Clark Fork River near Galen	Clark Fork River at Deer Lodge	Clark Fork River near Garrison
0.9407	0.9684	0.9663
Clark Fork River at Gold Creek	**Clark Fork River near Drummond**	**Clark Fork River at Turah**
0.8566	0.9650	0.8497

**Four quarterly monitoring events per year.*

1.3.7.5 Zinc

Total recoverable zinc concentrations during base streamflow sample periods (Q1, Q3, Q4) in 2012 ranged from less than the analytical reporting level (0.01 mg/L) to 0.05 mg/L. The highest total recoverable zinc concentrations were observed in Q2, when concentrations at most stations were several-fold higher than during base streamflow sample periods (Figure 1-38). The highest total recoverable zinc concentrations in 2012 occurred at the Clark Fork River near Garrison (0.22 mg/L) and Deer Lodge (0.18 mg/L) stations in Q2. The lowest total recoverable zinc concentrations were observed at the Lost, Racetrack, Rock, and Warm Springs Creeks

monitoring sites. Spatially, total recoverable zinc concentrations increased from the headwaters area downstream to the Clark Fork River near Garrison station, decreased below the Little Blackfoot River, and increased below Flint Creek. Dilution from the Little Blackfoot River during all 2012 quarterly monitoring events appeared to be responsible for the decreased concentrations at Gold Creek. The Rock Creek inflow also appeared to contribute to lower zinc concentrations in the Clark Fork River at Turah in Q1 and Q2.

Dissolved zinc concentrations were relatively consistent at many of the CFROU monitoring stations during most of the quarterly monitoring events. Seasonal increases in zinc concentrations, notably during Q2, were due to increasing total recoverable (sediment associated) zinc but not dissolved zinc. Based on the 2010-2012 monitoring data, most zinc in the upper Clark Fork River appears to be transported in a sediment-associated state.

Overall, total recoverable and dissolved zinc concentrations were comparable in 2010, 2011 and 2012.

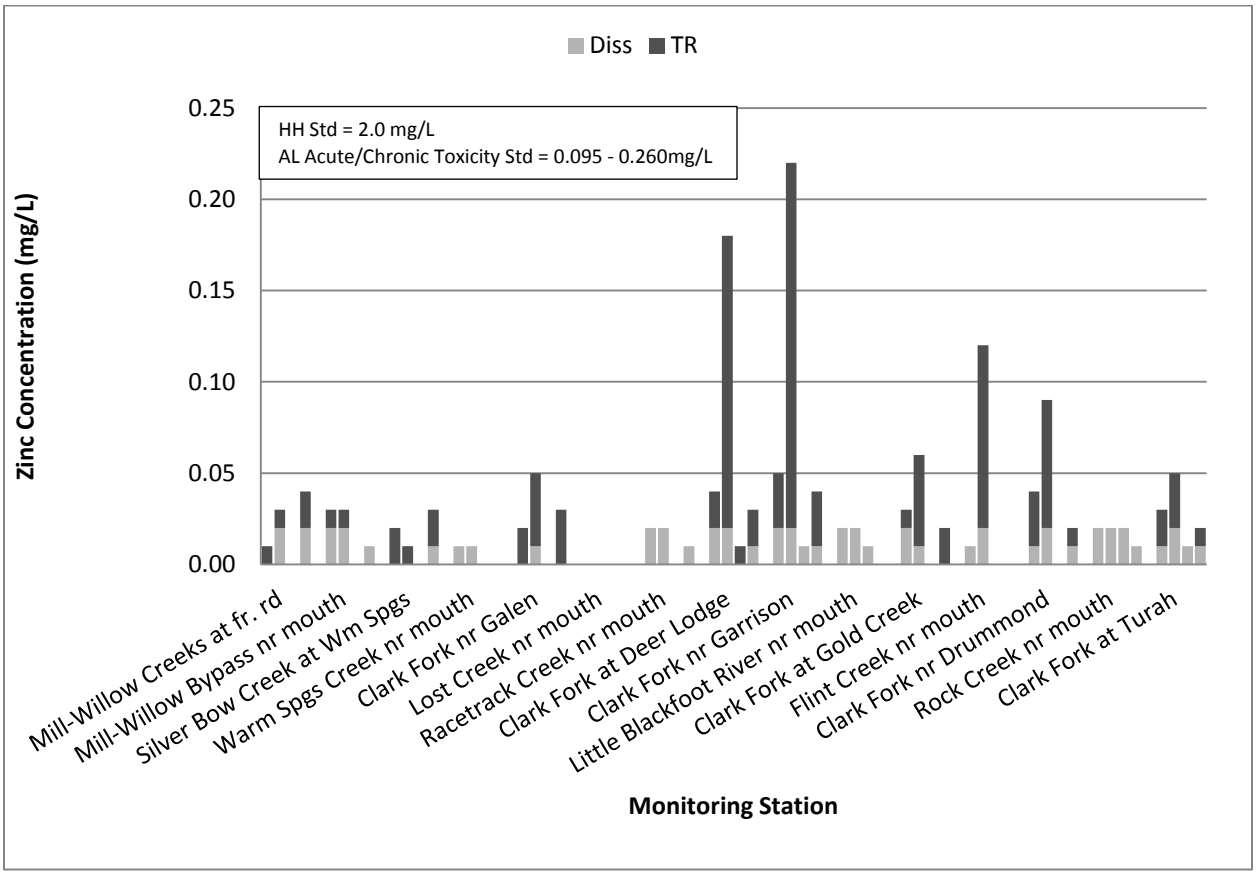

Figure 1-38. Total recoverable and dissolved zinc concentrations at Clark Fork River Operable Unit monitoring stations, 2012. Human health (HH) and aquatic life (AL) water quality standards for total recoverable zinc are shown for reference.

Total recoverable zinc concentrations in 2012 exceeded the acute aquatic life standard at 20% (3 of 15) of the CFROU monitoring stations in Q2, but no exceedances occurred during any other quarter (Table 1-17). The magnitude of the exceedances ranged from 116-147% of the standard. Exceedances occurred in the Clark Fork River near Garrison and at Deer Lodge, and in Flint Creek near mouth (Table 1-17). No other 2012 total recoverable zinc concentrations exceeded aquatic life standards, and no samples exceeded the human health standard. Total

recoverable zinc exceedances in 2010 and 2011 were to 2012; two of the mainstem Clark Fork River monitoring stations (near Garrison and near Drummond) exceeded the aquatic life standard in Q2 of 2010 and 2011.

Table 1-17. Total recoverable zinc concentrations (mg/L) compared to remediation performance standards at Clark Fork River Operable Unit monitoring stations, 2012.

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork River near Galen
Q1 (April)	0.01	0.01	0.02	ND	0.02
Q2 (June)	0.01	0.01	0.01	0.01	0.05
Q3 (Sept.)	ND	ND	ND	ND	ND
Q4 (Dec.)	0.04	ND	0.03	ND	0.03
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork River at Deer Lodge**	**Clark Fork River near Garrison**	**Little Blackfoot River near mouth**
Q1 (April)	ND	ND	0.04	0.05	ND
Q2 (June)	ND	ND	0.18	0.22	0.02
Q3 (Sept.)	ND	ND	0.01	0.01	ND
Q4 (Dec.)	ND	ND	0.03	0.04	ND
Monitoring Station Calendar Quarter	**Clark Fork River at Gold Creek**	**Flint Creek near mouth**	**Clark Fork River near Drummond**	**Rock Creek near mouth**	**Clark Fork River at Turah**
Q1 (April)	0.03	0.01	0.04	ND	0.03
Q2 (June)	0.06	0.12	0.09	ND	0.05
Q3 (Sept.)	ND	ND	ND	ND	ND
Q4 (Dec.)	0.02	ND	0.02	ND	0.02

Remedy performance standard attained *ND = Not detected at parameter reporting limit*
Aquatic life acute toxicity performance standard exceeded

Load estimates for total recoverable and dissolved zinc are presented in Figure 1-39. Similar to other metal COCs, most of the total recoverable zinc load was transported during Q2 and was associated with elevated total suspended sediment loads. Total recoverable zinc loads in the Clark Fork River in Q2 2012 generally increased downstream from the headwaters at the Silver Bow Creek at Warm Springs monitoring station to the Clark Fork River near Garrison monitoring station. Zinc loads declined at the Clark Fork River at Gold Creek station, then increased at the Clark Fork River near Drummond and Clark Fork River at Turah monitoring sites. The largest increases in total recoverable zinc loads in Q2 occurred between the Clark Fork River near Galen and Deer Lodge stations (609 lbs/day), between the Clark Fork River at Deer Lodge to near Garrison stations (427 lbs/day), and between the Clark Fork River at Gold Creek and near Drummond stations (384 lbs/day). Total recoverable zinc loads in Q1 and Q4 of 2012 consistently increased at each downstream station in the mainstem Clark Fork River between Galen and Turah (Figure 1-38). Zinc loads in Q3 2012 were negligible. Zinc loads in Q2 2012 were lower than in Q2 2010 and Q2 2011.

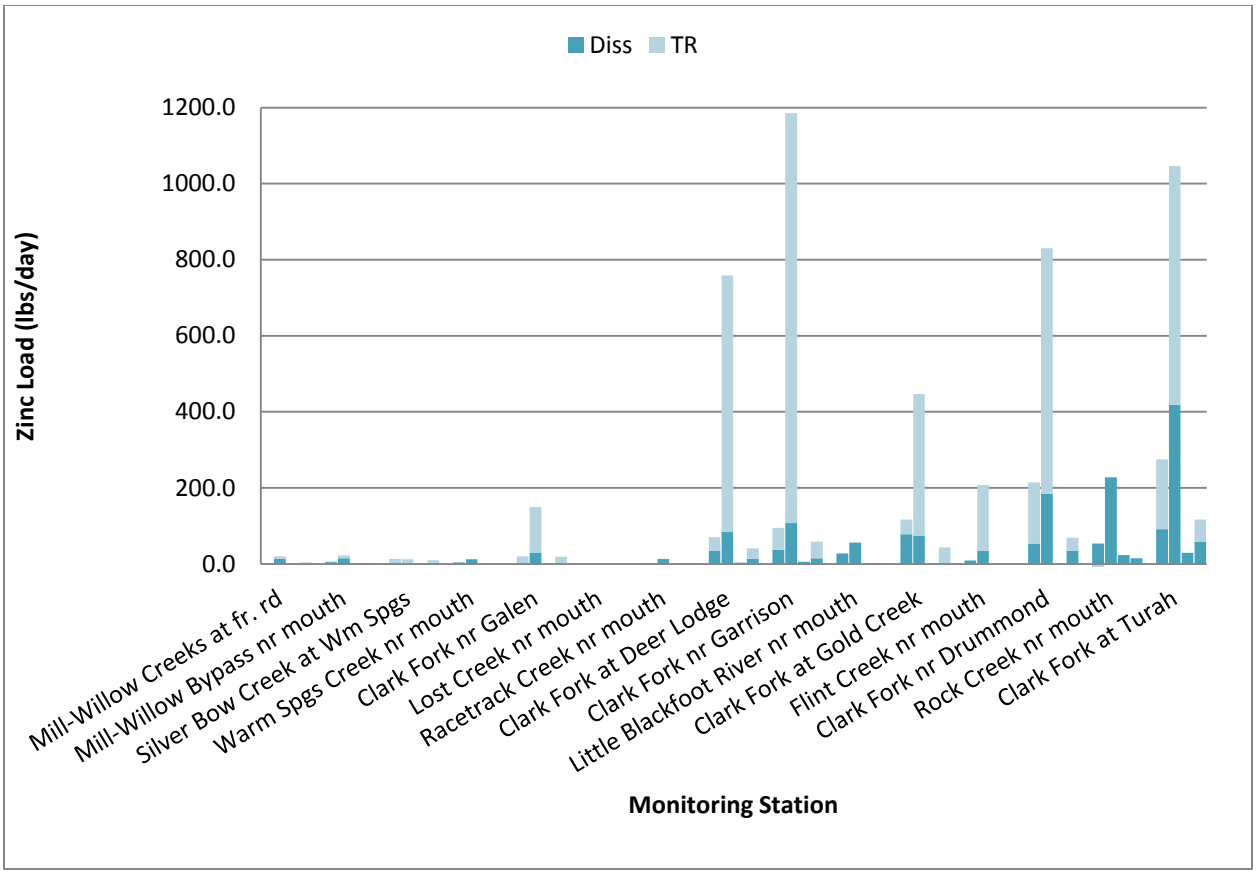

Figure 1-39. Total recoverable and dissolved zinc loads at Clark Fork River Operable Unit monitoring stations, 2012.

The regression of total suspended sediment on total recoverable zinc concentrations from pooled Clark Fork River mainstem stations for each quarter from 2010–2012 demonstrated a reasonably strong positive correlation (r^2 = 0.89) (Figure 1-40). Regressions fit to the individual monitoring station data were more conclusive than for the pooled data at some sites. Several of the monitoring stations, specifically the Clark Fork River stations near Drummond, at Deer Lodge, and near Garrison, had very strong correlations between total suspended sediment and total recoverable zinc concentrations (r^2 = 0.96, 0.96, and 0.95, at each station respectively). The weakest correlation between total suspended sediment and total recoverable zinc concentrations at any individual station was the Clark Fork River at Turah (r^2 = 0.78).

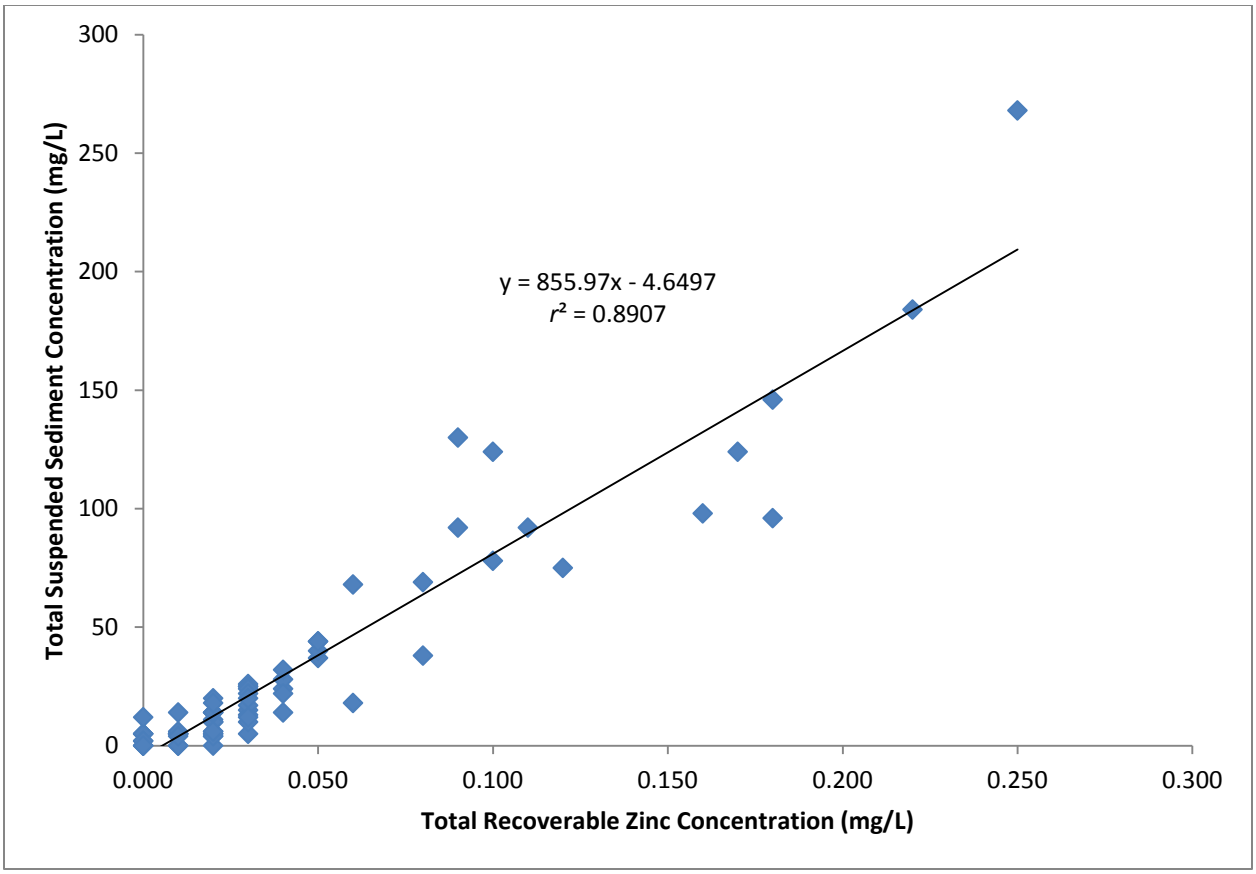

Figure 1-40. Simple linear regression of total suspended sediment concentration on total recoverable zinc concentration at Clark Fork River Operable Unit monitoring stations, 2010-2012. Quarterly sample data pooled in this analysis.

Table 1-18. Coefficients of determination (r^2) from simple linear regression of total suspended sediment concentration on total recoverable zinc concentration at individual Clark Fork River Operable Unit monitoring stations, 2010-2012.*

Clark Fork River near Galen	Clark Fork River at Deer Lodge	Clark Fork River near Garrison
0.8374	0.9577	0.9454
Clark Fork River at Gold Creek	**Clark Fork River near Drummond**	**Clark Fork River at Turah**
0.8837	0.9613	0.7781

**Four quarterly monitoring events per year.*

1.3.7.6 Mercury

Monitoring for total mercury at CFROU stations began in 2012. Total mercury concentrations were below the detection limit in 70% (42 of 60) of the samples. However, total mercury was detectable at all six mainstem Clark Fork River monitoring stations, as well as the Mill-Willow Creek at Frontage Road, Silver Bow Creek at Warm Springs, Little Blackfoot River near mouth, and Flint Creek and Rock Creek stations during at least one of the monitoring events in 2012. The highest frequency (67%, or 10 of 15) of detectable total mercury sample concentrations

occurred in Q1. However, the highest concentrations of total mercury were observed in Q2 (Figure 1-41). The highest total mercury concentrations in 2012 occurred in Flint Creek near its mouth in Q2 (0.00150 mg/L). Clark Fork River mainstem monitoring sites at Deer Lodge, near Garrison, and near Drummond had the next highest total mercury concentrations, with Q2 concentrations ranging from 0.00010-0.00015 mg/L. Total mercury concentration in Flint creek in Q2 was an order of magnitude higher than in any other sample (0.00150 mg/L). Elevated total mercury in Flint Creek appeared to increase concentrations in the Clark Fork River at the downstream, near Drummond monitoring station. Although mercury was detectable in Rock Creek during at least one quarterly monitoring event in 2012, its inflow appeared to dilute mercury concentrations in the Clark Fork River at the Turah station. Similarly, total mercury concentrations were also lower in the Clark Fork River below the Little Blackfoot River confluence, even though mercury was occasionally detectable in the Little Blackfoot River itself.

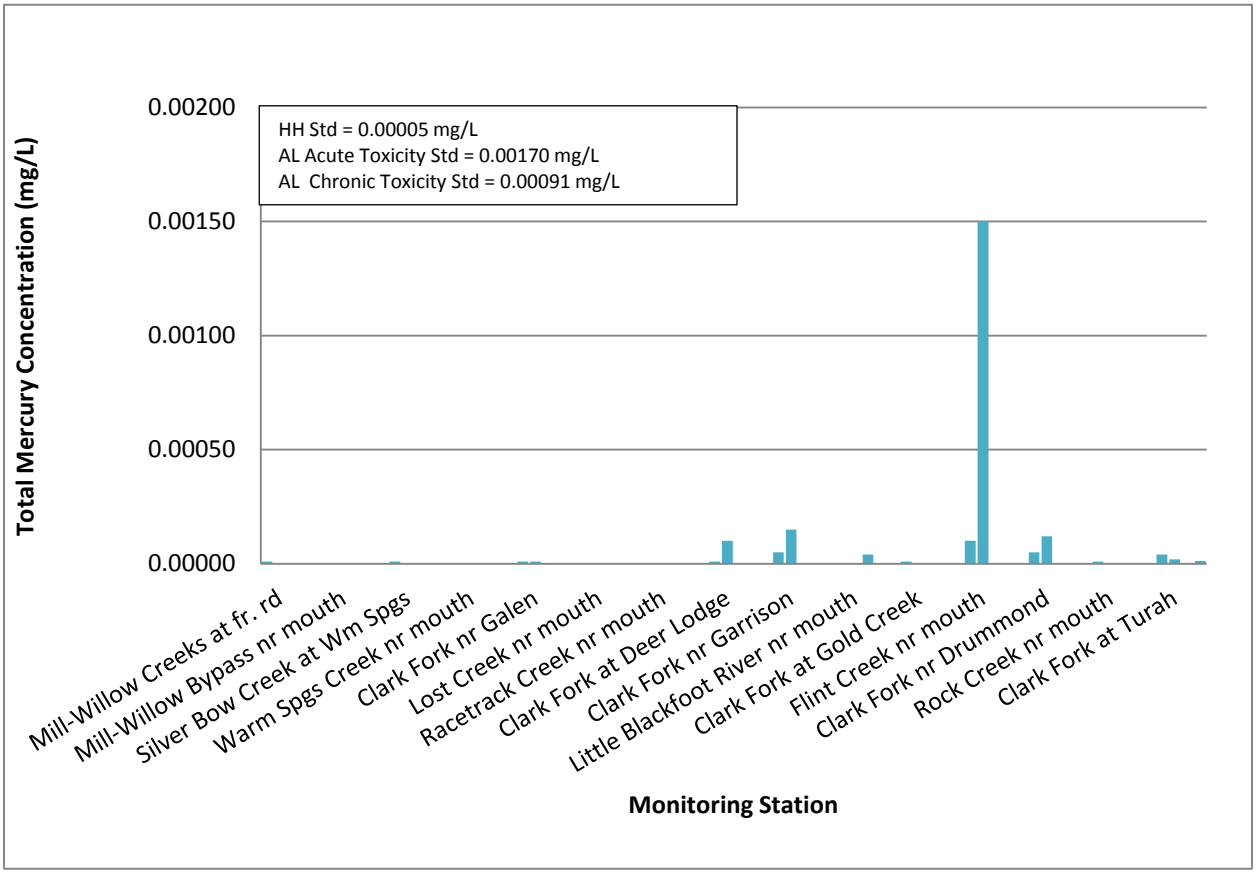

Figure 1-41. Total mercury concentrations at Clark Fork River Operable Unit monitoring stations, 2012. Human health (HH) and aquatic life (AL) water quality standards for total mercury are shown for reference.

Total mercury concentrations exceeded the human health standard at three Clark Fork River mainstem sites in Q2 2012. Exceedances occurred at the Clark Fork River at Deer Lodge, near Garrison, and near Drummond stations (Table 1-19). Flint Creek exceeded the human health standard for total mercury in Q1 and Q2 of 2012, and also exceeded the chronic aquatic life standard in Q2. Total mercury concentration in Flint Creek in Q2 2012 (0.00150 mg/L) also closely approached the acute aquatic life standard (0.00170 mg/L).

Table 1-19. Total mercury concentrations (mg/L) compared to remediation performance standards at Clark Fork River Operable Unit monitoring stations, 2012.

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork River near Galen
Q1 (April)	0.00001	ND	0.00001	ND	0.00001
Q2 (June)	ND	ND	ND	ND	0.00001
Q3 (Sept.)	ND	ND	ND	ND	ND
Q4 (Dec.)	ND	ND	ND	ND	ND
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork River at Deer Lodge**	**Clark Fork River near Garrison**	**Little Blackfoot River near mouth**
Q1 (April)	ND	ND	0.00001	0.00005	ND
Q2 (June)	ND	ND	0.00010	0.00015	ND
Q3 (Sept.)	ND	ND	ND	ND	0.000040
Q4 (Dec.)	ND	ND	ND	ND	ND
Monitoring Station Calendar Quarter	**Clark Fork River at Gold Creek**	**Flint Creek near mouth**	**Clark Fork River near Drummond**	**Rock Creek near mouth**	**Clark Fork River at Turah**
Q1 (April)	0.00001	0.00010	0.00005	0.00001	0.00004
Q2 (June)	ND	0.00150	0.00012	ND	0.00002
Q3 (Sept.)	ND	ND	ND	ND	ND
Q4 (Dec.)	ND	ND	ND	ND	0.000012

Remedy performance standard attained *ND = Not detected at parameter reporting limit*
HH performance standard exceeded
HH and aquatic life performance standard exceeded

Load estimates for total mercury are presented in Figure 1-42. Similar to other metals, most of the total mercury transport occurred during Q2. Total mercury loads in the Clark Fork River in Q2 2012 between the Deer Lodge and near Garrison stations increased by approximately 0.40 lbs/day. Most loading to the Clark Fork River downstream from the near Garrison site was likely attributable to the Flint Creek inflow, which contributed an estimated 2.6 lbs/day of total mercury to the Clark Fork River in Q2. The highest estimated total mercury load at any CFROU mainstem monitoring stations in Q2 2012 was at the near Drummond monitoring station located downstream from the Flint Creek confluence.

Regression of total suspended sediment on total mercury concentrations were not performed because there were too few observations available.

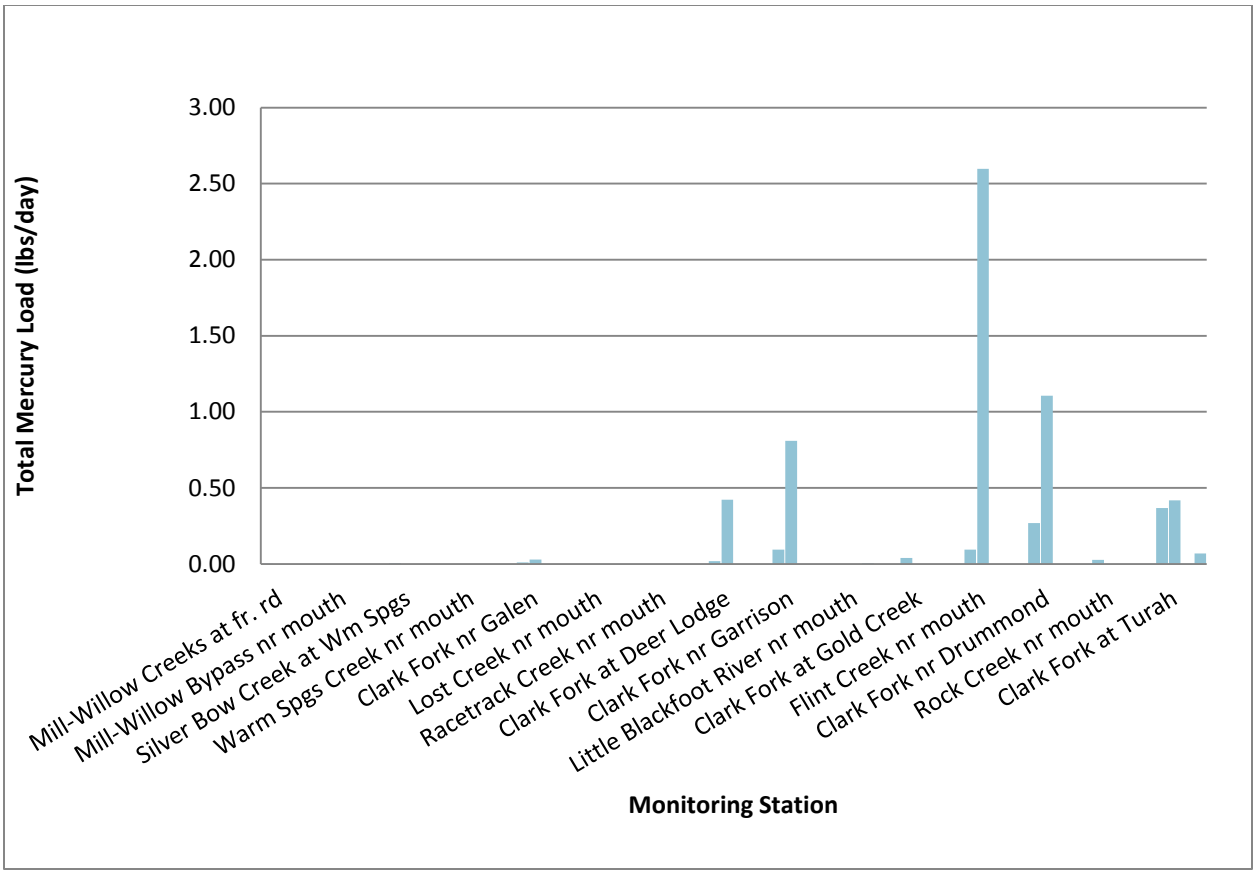

Figure 1-42. Total mercury loads at Clark Fork River Operable Unit monitoring stations, 2012.

1.3.7.7 Methylmercury

Monitoring for methylmercury at CFROU monitoring stations began in 2012 at the request of Montana Fish Wildlife and Parks. Inorganic mercury is converted to methylmercury in aquatic systems by sulfate and iron reducing bacteria. Methylmercury is a highly toxic form of mercury that biomagnifies in secondary and tertiary consumers such as fish. Fish consumption is the main source of human exposure to methylmercury, and a number of health risks associated with exposure to methylmercury have been identified in humans and animals. The U.S. Environmental Protection Agency (USEPA) has published a human health water quality standard for methylmercury, expressed as a concentration in fish and shellfish tissue. It is not readily practical to translate fish tissue concentrations into water column concentrations because methylmercury biomagnifies in organisms. For purposes of this report, methylmercury concentrations, loads and spatial trends are reviewed, but standard exceedances are not evaluated due to the absence of water column water quality criteria.

Methylmercury concentrations were measured in Q2 and Q3 of 2012. Sampling during those quarters reflected high streamflow conditions in June and base streamflow conditions in September. Methylmercury was analyzed at a detection limit of 0.020 nanograms per liter (ng/L); the reporting limit was 0.052 ng/L. Total mercury concentration (Section 1.3.7.6) has an analytical reporting limit of 0.00001 mg/L (10 ng/L), or 192 times higher than the analytical reporting limit for methylmercury. Methylmercury was detectable at all 15 CFROU monitoring stations during Q2 and Q3 (Figure 1-43; Table 1-20). Methylmercury concentrations were higher at nearly all stations in Q2 compared to Q3. Compared to the other sites, Clark Fork

River mainstem monitoring stations at Deer Lodge, near Garrison, and near Drummond, and in Flint Creek had elevated methylmercury concentrations in Q2. Flint Creek had by far the largest methylmercury concentration among all CFROU monitoring stations in 2012, with a Q2 concentration that was nearly six times greater than any other measured concentration in either quarter. Methylmercury concentrations were consistent with total mercury concentrations in Flint Creek and indicate that Flint Creek is a strong source of mercury to the Clark Fork River.

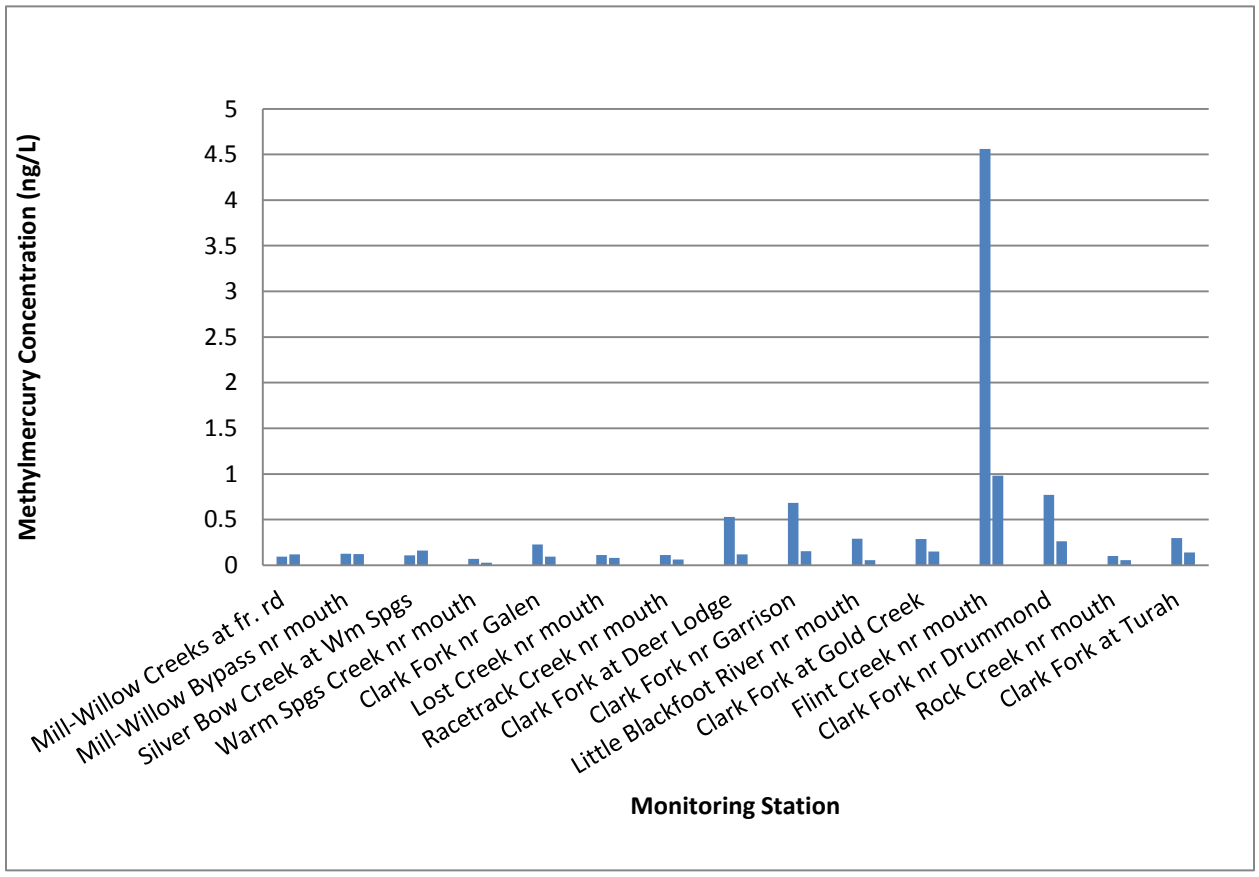

Figure 1-43. Methylmercury concentrations at Clark Fork River Operable Unit monitoring stations, 2012.

Table 1-20. Methylmercury concentrations (ng/L) at Clark Fork River Operable Unit monitoring stations, 2012.

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork River near Galen
Q2 (June)	0.095	0.124	0.107	0.071	0.227
Q3 (Sep.)	0.120	0.123	0.161	0.029	0.094
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork River at Deer Lodge**	**Clark Fork River near Garrison**	**Little Blackfoot River near mouth**
Q2 (June)	0.113	0.113	0.530	0.684	0.290
Q3 (Sep.)	0.080	0.061	0.118	0.153	0.057
Monitoring Station Calendar Quarter	**Clark Fork River at Gold Creek**	**Flint Creek near mouth**	**Clark Fork River near Drummond**	**Rock Creek near mouth**	**Clark Fork River at Turah**
Q2 (June)	0.287	4.56	0.770	0.102	0.297
Q3 (Sep.)	0.151	0.980	0.263	0.056	0.138

Load estimates for methylmercury are presented in Figure 1-44. Similar to total mercury and other COC metals, rates of methylmercury transport were at least an order of magnitude higher in Q2 compared to Q3. As for total mercury, most loading of methylmercury to the Clark Fork River downstream of the near Garrison station appeared to be related to the Flint Creek inflow. Flint Creek discharged an estimated 0.008 lbs/day of methylmercury to the Clark Fork River during the Q2 monitoring event. The highest estimated methylmercury load at CFROU mainstem monitoring sites in Q2 2012 was immediately downstream from the Flint Creek confluence at the near Drummond monitoring station. These loading estimates support other data indicating that Flint Creek is a primary source of mercury to the Clark Fork River.

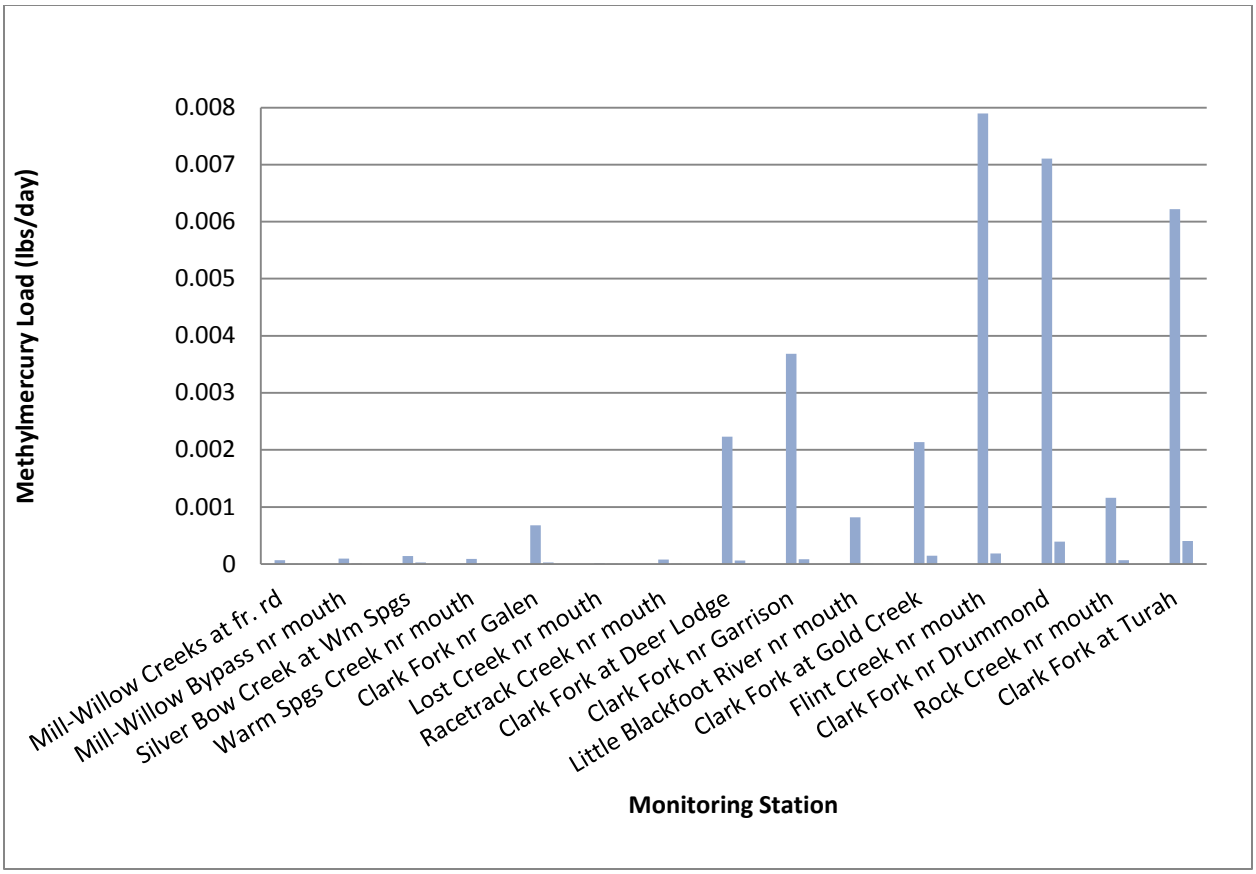

Figure 1-44. Methylmercury loads at Clark Fork River Operable Unit monitoring stations, 2012.

1.4 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 River. To date, remedial measures have not been implemented within the CFROU. Thus, this third year monitoring report represents an assessment of pre-remediation conditions. To assess annual trends in metal concentrations and loads, data from 2012 is compared to the 2010 and 2011 monitoring data.

1.4.1 Data Validation

All data derived from laboratory analysis of surface water samples collected in 2012 at CFROU monitoring locations were validated through field (i.e., field duplicates) and laboratory (i.e., laboratory controls and duplicates) quality control samples. Analysis results for surface water field duplicate samples were within acceptable limits for the majority of chemical parameters during quarterly monitoring in 2012. Exceptions were total nitrogen and total suspended sediment concentrations in Q1; total suspended sediment concentrations in Q2; total recoverable copper, total recoverable lead, total suspended sediment, total nitrogen, and total phosphorous concentrations in Q3, and total suspended sediment and total phosphorous concentrations in Q4. We believe the time lag between collection of the first depth-integrated sample and the duplicate sample were largely responsible for discrepancies in concentrations between the sample and the duplicate which exceeded the established RPD criteria. Beginning in Q4, the duplicate sample was collected simultaneously with the original sample with the use

of separate sample churn splitters. In Q4, sample duplicates had lower RPDs for most of the previously listed parameters.

Field blanks (i.e., deionized water samples) submitted with surface water samples had parameter concentrations that were generally below detection limits in 2012. Exceptions were: dissolved organic carbon and dissolved zinc concentrations (Q1, Q2, Q3), total nitrogen concentration (Q1, Q2); total suspended sediment concentration (Q1, Q3), and total and bicarbonate alkalinity (Q2). In addition, several dissolved zinc concentrations in actual site samples exceeded the associated total recoverable zinc concentration, suggesting that trace level field contamination occurred. Field contamination may have been caused by failure to pre-rinse the field filters. Beginning in Q4, field filters were rinsed with deionized water prior to field filtration of samples. Another corrective measure applied in Q4 was field filtration of dissolved organic carbon samples, rather than lab filtration. Dissolved organic carbon was not detectable in field blank samples beginning in Q4.

Laboratory control samples were within acceptable limits for all surface water parameters during all quarters of 2012. Data quality objectives (i.e., representativeness, comparability, and completeness) were met, and data quality indicators (i.e., sensitivity, precision, bias, and accuracy) were acceptable as established in the CFROU Monitoring Plan (Atkins 2012a). Overall, data quality objectives (DQOs) established in the monitoring plan for data representativeness, comparability, completeness, sensitivity, precision, bias, and accuracy were largely met during all quarters of 2012. A completed QA/QC checklist, summary tables of field duplicate and field blank results, and assessments of data quality objectives are included in Appendix A of this report.

1.4.2 Streamflow Conditions and Representativeness

Total suspended sediment, COC metal, and nutrient concentrations were consistently higher in Q2 than during other quarters, often by an order of magnitude or more. These results suggest that contaminant concentrations in the Clark Fork River were strongly positively related to streamflows. Streamflows for each of the 15 monitoring stations in the newly expanded CFROU monitoring network were determined from USGS streamflow gaging station records for co-located sites or were manually gauged.

Overall, streamflows in the upper Clark Fork River watershed in 2012 were slightly above normal in the first half of 2012, and normal to slightly below normal in the second half of 2012. First quarter surface water quality monitoring was conducted at each of the 15 upper CFROU monitoring locations from April 9-11, 2012, with streamflows slightly above the long-term average for those dates. Second quarter monitoring was performed from June 5-7, 2012, during a rising hydrograph and close to the peak of spring snowmelt runoff. Third quarter monitoring was performed from September 11-13, 2012, during late summer base streamflow conditions. Fourth quarter monitoring performed from December 4-6, 2012, coincided with streamflows that were generally normal for those dates.

1.4.3 Field Parameters

Field parameters (i.e., water temperature, pH, conductivity, and dissolved oxygen concentration) were seasonally appropriate for regional rivers. Results for those parameters generally were consistent with cold, well-oxygenated, neutral pH, and moderately mineralized waters that would not be expected to preclude any designated beneficial water uses. Field parameter measurements were generally similar in each year from 2010-2012.

Temperature monitoring results for upper Clark Fork River monitoring stations in 2012 indicated modest seasonal and spatial variations that were consistently within tolerance range for most

coldwater aquatic species. Tributary inflows, particularly Warm Springs Creek, the Little Blackfoot River, and Rock Creek, provided a cooling effect on the mainstem Clark Fork River downstream from these confluences. Flint Creek, Mill-Willow Creek, Lost Creek, and Racetrack Creek had water temperatures that were similar to those measured nearby in the mainstem Clark Fork River. However, Montana Fish Wildlife and Parks (see Section 5.3.1) observed summer maximum temperatures in the mainstem Clark Fork River that exceeded 20ºC. Water temperatures above 20ºC are stressful to coldwater organisms such as salmonids.

Acidity (pH) in the upper Clark Fork River monitoring stations in 2012 monitoring events ranged from 7.64-9.07. Only one measurement (9.07) exceeded the optimal pH range for the protection of aquatic life (6.5-9.0), and it occurred in Q2 in Silver Bow Creek at Warm Springs. This station is immediately downstream from the Warm Springs Ponds where lime added to increase the pH of the water to precipitate metals. Other researchers have also observed pH above 9.0 in this portion of the Clark Fork River (S. Parker, Montana Tech University, unpublished data; M. Mayfield, Montana State University, unpublished data; Montana Fish Wildlife and Parks, see Section 5.3.7).

Conductivity in the upper Clark Fork River varied seasonally in 2012 and appeared to be negatively related to streamflow. Conductivity was high in Q3 and Q4 when streamflow was relatively low and low in Q2 when streamflow was relatively high. During each quarterly monitoring event, conductivity declined in the Clark Fork River below the confluences of the Little Blackfoot River and Rock Creek. Conductivity at CFROU stations in 2012 ranged from 47-577 µs/cm; the low occurred in Rock Creek in Q2 and the high occurred in Lost Creek in Q3. This range of conductivity represents moderate levels of dissolved solids.

Dissolved oxygen concentrations in the upper Clark Fork River during the quarterly 2012 monitoring events ranged from 8.49 mg/L (at the Clark Fork River near Garrison monitoring station in Q2) to 14.05 mg/L (in Silver Bow Creek at Warm Springs in Q4). None of the measured dissolved oxygen concentrations suggested water quality or water use limitations associated with inadequate dissolved oxygen levels, but pre-dawn measurements (when levels are typically lowest) were not taken.

Turbidity in Q2 of 2012 was elevated compared to other quarters, presumably due to snowmelt runoff. In Q2 turbidity generally increased at each downstream mainstem station, with a peak at the near Garrison monitoring station, followed by lower turbidity at stations below the Little Blackfoot River and Rock Creek but increased turbidity immediately below Flint Creek. Turbidity in Q1, Q3, and Q4 was lower than in Q2, generally ranging from 1-10 NTU. First quarter turbidity was somewhat elevated at many CFROU stations compared to Q3 and Q4. Elevated Q1 turbidity may have been related to higher than normal early season streamflows and the effects of ice scour on streambanks and streambeds.

1.4.4 Suspended Sediment

Total suspended sediment concentrations followed the same temporal pattern as turbidity in 2012. Total suspended sediment concentrations measured in the upper Clark Fork River during 2012 were moderately elevated in Q1, very high at most mainstem stations in Q2, and generally quite low in Q3 and Q4. In Q2, total suspended sediment concentrations generally increased at each downstream segment from 14 mg/L at the Silver Bow Creek at Warm Springs station to 184 mg/L in the Clark Fork River near Garrison. Total suspended sediment concentrations increased most significantly in the reach of the Clark Fork River from near Galen to Deer Lodge during Q2. Total suspended sediment concentrations in Q2 also increased from above to below Flint Creek, presumably in response to high total suspended sediment concentrations in Flint Creek. A decrease in total suspended sediment concentrations was observed from above to

below the Little Blackfoot River and Rock Creek confluences. The highest Q2 total suspended sediment concentrations were observed at five mainstem Clark Fork River stations from Deer Lodge to Turah, with lower concentrations at upstream monitoring stations.

Total suspended sediment concentrations at CFROU mainstem monitoring stations were generally similar in each year from 2010-2012. However, maximum total suspended sediment concentrations recorded at some stations in Q2 2011 were somewhat higher than Q2 2010 and Q2 2012, presumably due to the relatively high streamflows of 2011.

Total suspended sediment concentrations were strongly correlated with total recoverable concentrations of cadmium, copper, lead, and zinc in the upper Clark Fork River in all years from 2010-2012. These relationships were particularly strong for CFROU monitoring stations near Drummond, near Garrison, and at Deer Lodge.

Total suspended sediment load estimates indicated that much of the annual total suspended sediment load was transported during snowmelt runoff. Loads in Q2 far surpassed loads during any of the other quarters. The largest increases in total suspended sediment loading occurred between mainstem monitoring stations in Q2, from the near Galen to Deer Lodge stations, from the Deer Lodge to near Garrison stations, and from the Gold Creek to near Drummond stations. 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 loads in Q2 2011 were frequently two to six times higher than during the same period in 2010 and 2012, presumably due to the relatively high streamflows in 2011.

1.4.5 Common Ions

Based on monitoring from 2010-2012, calcium is the dominant cation at the upper Clark Fork River network monitoring stations. Water hardness at upper Clark Fork River mainstem stations in 2012 would fall into the “hard” to “very hard” categories, except during snowmelt runoff conditions when dilution reduced calcium and magnesium concentrations resulting in lower hardness. Low water hardness in Q2, combined with elevated metal COC concentrations, resulted in the greater frequency and magnitude of metal COC exceedances in Q2. Water hardness was high in Lost Creek, and to a lesser extent Warm Springs Creek, presumably due to the limestone geology of the watersheds. Silver Bow Creek at Warm Springs had high water hardness, presumably due to the addition of lime at several locations upstream. Hardness of these upper tributaries contributed to elevated water hardness in the Clark Fork River. Other Clark Fork River tributaries, including Racetrack Creek and Rock Creek, had “soft” to “moderately hard” water which apparently reduced hardness in the Clark Fork River below the confluences of these tributaries. Hardness in the mainstem Clark Fork River was lowest at the Turah station, below the Rock Creek confluence. Water hardness in 2012 quarterly monitoring events was comparable to hardness in 2010 and 2011.

Total and bicarbonate alkalinity in the upper mainstem Clark Fork River in 2012 increased modestly from the headwaters at Warm Springs to the near Drummond station, with short-term decreases below the Little Blackfoot River and Rock Creek confluences. Among the tributary monitoring stations, Lost Creek had consistently high alkalinity compared to other tributary or mainstem monitoring sites. Racetrack Creek and Rock Creek had low alkalinity, similar to the trend for specific conductance and water hardness at those stations. Based on alkalinity levels, the upper mainstem Clark Fork River appears to be a moderately well buffered system with potential for fish production barring other limitations. Alkalinity was reduced during Q2 and attained highest levels at most of the monitoring stations in Q3. Total and bicarbonate alkalinity at CFROU mainstem monitoring stations during quarterly monitoring events in 2012 were similar to alkalinity levels in 2010 and 2011.

Sulfate concentrations in the mainstem Clark Fork River decreased from the headwaters near Warm Springs downstream to Turah, with a short-term increase below the Flint Creek confluence at the Clark Fork River near Drummond station. Lost Creek had high sulfate concentrations during all quarterly monitoring events. Racetrack Creek and Rock Creek had low sulfate concentrations during all quarters. Sulfate concentrations measured at mainstem Clark Fork River monitoring stations in 2012 were similar to those measured in 2010 and 2011.

1.4.6 Nutrients

Nutrient monitoring at CFROU monitoring stations began in 2011. Parameters analyzed included total nitrogen, nitrate plus nitrite, total phosphorous, and total ammonia. Assessment of nutrient monitoring results included: 1) comparisons of total nitrogen, nitrate plus nitrite, and total phosphorous concentrations to criteria designed to prevent nutrient enrichment and nuisance algae growth in surface waters and their associated impacts to beneficial water uses, 2) examination of spatial patterns for nitrogen and phosphorus loads in the upper Clark Fork River mainstem and its tributaries as indicators of nutrient sources, and 3) evaluation of ammonia toxicity.

Compared to the Clark Fork River nutrient water quality standards, concentrations of total nitrogen were frequently elevated in Silver Bow Creek, in Lost Creek, and in the segment of the Clark Fork River from Deer Lodge to near Garrison in 2012. Exceedances of the standards were observed in Mill-Willow Creek, in Racetrack Creek, in the Clark Fork River at Gold Creek and near Drummond, and in Flint Creek. However, summertime (Q3) exceedances of the total nitrogen standard were observed only at the Silver Bow Creek at Warm Springs and Racetrack Creek monitoring stations. The lowest total nitrogen concentrations were observed in Rock Creek, Warm Springs Creek, the Little Blackfoot River, and in Mill-Willow Creek at Frontage Road. The lowest total nitrogen concentrations in the mainstem Clark Fork River were observed at Turah. The highest total nitrogen concentrations occurred in Lost Creek in Q4.

Concentrations of nitrate plus nitrite were periodically elevated in Lost Creek, Racetrack Creek, and in the Clark Fork River at the Deer Lodge and near Garrison monitoring stations in 2012. Only one exceedance of the MDEQ recommended threshold concentration (0.10 mg/L) was observed during the applicable summertime (Q3) monitoring event, and this exceedance occurred in Racetrack Creek. Nitrate plus nitrite concentration in the mainstem Clark Fork River increased from Galen to Garrison and declined downstream. Nitrate and nitrite concentrations were frequently below the analytical detection limit in Mill-Willow Creek, Silver Bow Creek, the Little Blackfoot River, Flint Creek, and Rock Creek, and in the mainstem Clark Fork River near Galen, at Gold Creek, near Drummond, and at Turah.

Total phosphorus concentrations in the upper Clark Fork River mainstem and its tributaries in 2012 regularly exceeded the Clark Fork River total phosphorous water quality standard (0.020 mg/L) during the quarterly monitoring events. The magnitude of the exceedances was greatest in Q2 when total suspended sediment concentrations were also elevated. Summertime exceedances of the total phosphorous standard (when the standard technically applies) were observed at 53% (8 of 15) of the monitoring stations: Silver Bow Creek at Warm Springs, Racetrack Creek near mouth, Clark Fork River near Galen, near Garrison, at Gold Creek and near Drummond, the Little Blackfoot River, and Flint Creek. Total phosphorous concentrations during low streamflow periods were highest in the Mill-Willow Bypass and in Silver Bow Creek, and tended to be similar throughout much of the mainstem Clark Fork River within the CFROU. The lowest total phosphorous concentrations were observed in tributary monitoring stations on Rock Creek, Lost Creek, and Warm Springs Creek. The lowest mainstem Clark Fork River total phosphorous concentrations were observed at Turah. The highest total phosphorous

concentrations occurred in the Clark Fork River near Garrison during Q2, which also corresponded to the highest total suspended sediment concentrations.

Ammonia concentrations were below the analytical detection limit at all CFROU monitoring stations in all quarters of 2012.

Load estimates for total nitrogen and total phosphorous indicated the highest rates of transport occurred in Q2, likely as a result of cumulative nonpoint source inputs and elevated total suspended sediment concentrations throughout the upper Clark Fork River watershed. Total nitrogen and total phosphorous loads in Q2 increased in a downstream direction with the largest loads observed at Turah. The largest Q2 increases in total nitrogen loads occurred within the segment of the Clark Fork River from Deer Lodge to near Garrison (1,049 lbs/day). The largest Q2 increases in total phosphorous loads occurred within the segment of the Clark Fork River from near Galen to Deer Lodge (521.5 lbs/day). Possible sources of total nitrogen and total phosphorous 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 Silver Bow Creek), Warm Springs, Deer Lodge, and Drummond.

1.4.7 Contaminants of Concern

Metal COCs in the upper Clark Fork River included total recoverable and dissolved arsenic, cadmium, copper, lead, and zinc, and total mercury and methylmercury. The 2012 quarterly monitoring data for each of these contaminants were assessed for spatial and temporal trends in instream concentrations, relationships between dissolved and total recoverable concentrations, performance standard exceedances, spatial and temporal loading patterns, and relationships between total recoverable metal COC and total suspended sediment concentrations.

Total recoverable arsenic, cadmium, copper, lead, and zinc concentrations in the mainstem Clark Fork River generally peaked near Garrison or Deer Lodge, particularly during Q2. For total recoverable arsenic, cadmium, lead, and zinc, the next highest concentrations occurred in Flint Creek near its mouth, or at the Clark Fork River station immediately downstream from the Flint Creek confluence (i.e., the near Drummond site). The highest dissolved arsenic concentration tended to occur in either the headwater tributary stations (Mill-Willow Creek, Mill-Willow Bypass, and Silver Bow Creek at Warm Springs) or in the Clark Fork River near Galen. Total mercury and methylmercury concentrations were highest in Flint Creek, and in the Clark Fork River stations downstream from the Flint Creek confluence (near Drummond and near Garrison). Metal COC sources responsible for increasing mainstem concentrations were primarily apparent in the river reaches between Galen and Garrison and in Flint Creek. Metal COC 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 dilution from these relatively clean tributaries.

The highest concentrations of total recoverable metal COCs occurred in Q2. Total recoverable arsenic, cadmium, copper, lead, and zinc concentration in mainstem Clark Fork River monitoring sites closely corresponded with total suspended sediment concentrations during all quarterly monitoring events. Metal COC concentrations in the Clark Fork River in Q2 2012 were an order of magnitude higher than during the other three quarters. The highest total recoverable arsenic, cadmium, copper, lead, zinc, and total suspended sediment concentrations in Q2 were measured in the Clark Fork River near Garrison. The second highest total recoverable metal COC and total suspended sediment concentrations in Q2 were observed in the Clark Fork River at Deer Lodge.

All detectable sample concentrations of cadmium and lead in the upper Clark Fork River were present in the sediment-associated form (i.e., total recoverable) in 2012. Arsenic was present in a predominantly dissolved form at most of the CFROU monitoring stations, except during Q2 when more than half of the arsenic at some stations was present as sediment-associated, non-dissolved forms. Arsenic at the uppermost monitoring stations (Mill-Willow Creek, Mill-Willow Bypass, Silver Bow Creek at Warm Springs, and the Clark Fork River near Galen), largely occurred in the dissolved phase. The ratio of dissolved to total recoverable copper and zinc varied between monitoring events, with higher fractions of sediment-associated copper and zinc present in Q2 and higher dissolved fractions concentrations in other quarters.

In Q1 2012, monitoring results showed exceedances of the copper aquatic life standard at 33% (5 of 15) of the monitoring stations, of the arsenic human health standard at 47% (7 of 15) of the monitoring stations, and the total mercury standard at 7% (1 of 15) of the monitoring stations.

In Q2 2012, exceedances were frequent for several metal COCs. Copper exceeded the chronic aquatic life standard in 73% (11 of 15) of the monitoring stations and exceeded the acute standard in 67% (10 of 15) of the monitoring stations. Other metal COCs which exceeded the chronic aquatic life standard included: lead (67%; 10 of 15 stations), cadmium (27%; 4 of 15 stations), zinc (20%; 3 of 15 stations), and mercury (7%; 1 of 15 stations). Frequent human health standard exceedances were also noted: arsenic (67%; 10 of 15 stations), mercury (27%; 4 of 15 stations), and lead (20%; 3 of 15 stations).

In Q3 2012, no exceedances of aquatic life standards for metal COCs occurred at any monitoring stations. However, human health standard exceedances occurred for arsenic in 47% (7 of 15) of the monitoring stations. The lower frequency and magnitude of aquatic toxicity exceedances in Q3 was presumably because of lower seasonal streamflows (and thus lower metal COC concentrations) and elevated water hardness (and thus higher toxicity standard values).

In Q4 2012, the chronic aquatic life standard for copper was exceeded in 27% (4 of 15) of the monitoring stations and the acute standard was exceeded in two (13%) of those samples. The chronic standard for lead was exceeded in 7% (1 of 15) of the monitoring stations. The human health standard for arsenic was exceeded in 47% (7 of 15) of the monitoring stations. The aquatic life standard for lead was exceeded in 7% (1 of 15) of the monitoring stations.

Of the 15 CFROU monitoring stations in 2012, the Clark Fork River mainstem stations at Deer Lodge and near Garrison had the highest frequency of metal COC exceedances for either the aquatic life or human health standards (12 each). Other stations with exceedances included: Flint Creek near mouth (9), Mill-Willow Creek at Frontage Road (8), the Clark Fork River stations near Galen and near Drummond (6 each), the Clark Fork River at Gold Creek and the Mill-Willow Bypass (5 each), Silver Bow Creek at Warm Springs (4), the Clark Fork River at Turah, Lost Creek and Racetrack Creek (3 each), and Warm Springs Creek near mouth (1). Rock Creek had no exceedances the aquatic life or human health standards.

Of the performance standards for the metal COCs, the arsenic human health standard was most frequently exceeded with 52% (31 of 60) of the 2012 CFROU samples exceeding the standard. The copper aquatic life standard was exceeded in 33% (20 of 60) of the 2012 CFROU samples. The lead aquatic life standard was exceeded in 18% (11 of 60) of the 2012 CFROU samples. The other metal COCs exceeded the standards less frequently: mercury exceeded the human health standard in 8% (5 of 60) of the samples, cadmium exceeded the aquatic life standard in 7% (4 of 60) of the samples, lead exceeded the human health standard in and zinc exceeded the aquatic life standard in 5% (3 of 60) of the samples, and mercury exceeded the aquatic life in 2% (1of 60) of the samples.

Overall, total recoverable and dissolved metal COC concentrations at CFROU monitoring stations in 2012 were similar to concentrations in 2010 and 2011. However, metal COC concentrations measured in Q2 2011 were generally higher than those measured in Q2 2010 or Q2 2012.

Spatial and temporal patterns in metal COC loads indicated that the largest proportion of the annual arsenic, cadmium, copper, lead, and zinc loads in the Clark Fork River are transported during spring snowmelt runoff conditions in Q2 and these loads are associated with elevated total suspended sediment loads. Loads for most of these metal COCs in Q2 increased from the headwaters area at Warm Springs to near Garrison and from Gold Creek to Turah. Spatial patterns in metal COC loads in the Clark Fork River mainstem were less distinct during other quarters, although peak loads consistently were observed at Turah or near Drummond.

The largest increases in total recoverable arsenic, cadmium, lead, and zinc loads in Q2 occurred between the near Galen and Deer Lodge stations. The second largest increases in loads occurred between the Deer Lodge and near Garrison stations. Flint Creek contributed large loads of total recoverable arsenic, cadmium, lead, zinc, and total mercury and methylmercury to the mainstem Clark Fork River in Q2. Variation in metal COC loads between stations should be interpreted with caution however due to potentially rapid changing instream conditions and the timing of actual monitoring relative to river travel times.

Based on quarterly sampling from 2010-2012 in the Clark Fork River mainstem, total suspended sediment and total recoverable metal COC concentrations appear to be closely related. When all observations from mainstem sample stations were pooled, total suspended sediment and total recoverable metal COC concentrations were highly correlated for some metals, in particular: zinc (r^2 = 0.89), lead (r^2 = 0.89), cadmium (r^2 = 0.86), and copper (r^2 = 0.82). The relationship between total suspended sediment and total recoverable arsenic concentrations (r^2 = 0.67), although weaker than for the other metal COCs, still demonstrated a strong correlation statistically. At individual stations, the strength of the relationships between total suspended sediment and total recoverable metal COC concentrations were more variable, perhaps reflecting the smaller sample sizes. Some stations had very strong relationships between total suspended sediment and a particular total recoverable metal COC concentration (e.g., r^2 = 0.99), whereas others were weaker. However, total suspended sediment concentrations explained at least half (i.e., r^2 >0.50) the variation in total recoverable metal COC concentrations for all metals at all stations with one exception. At the Clark Fork River at Turah station, there was apparently no relationship (r^2 = 0.07) between total suspended sediment and total recoverable arsenic concentration.

2 INSTREAM SEDIMENT

2.1 Introduction

No specific remediation performance standards have been established for metal concentrations in Clark Fork River stream sediments. However mobilization and transport of contaminated sediments originating from streambank erosion, overland flow, and re-suspension of deposited instream sediment are likely pathways for contamination of surface waters, and aquatic and riparian resources. Contaminant concentrations in Clark Fork River bed sediments vary considerably in space and time due to streambed and streambank erosion and deposition of streambed material. Generally, metal and arsenic concentrations are three to five times higher in fine grained sediment classes compared to bulk sediment classes. Sediments from riffles also generally have metal concentrations 30-40% lower than concentrations in depositional areas. Additionally, copper concentrations in streambed sediments decrease as grain size increases (NRDP 2007).

Remediation goals have been established for instream sediments in Silver Bow Creek upstream from the CFROU. Attainment of remediation goals for Silver Bow Creek, coupled with planned remedial actions within the CFROU to remove tailings deposits, curtail streambank erosion, and enhance overall riparian integrity, will likely contribute to reduced metal concentrations for instream sediments in the Clark Fork River. Therefore, instream sediment monitoring has been included as a component of the CFROU monitoring strategy. Numeric standards have not been developed for instream sediment metal concentrations. Currently, Silver Bow Creek remediation goals for instream sediments match the consensus-based sediment quality guidelines developed by freshwater ecologists (MacDonald et al. 2000).

Sediment quality guidelines include threshold of effect concentrations (TECs) and probably effects concentrations (PECs). Both TECs and PECs refer to the effects of metals on sediment-dwelling organisms, and provide a basis for predicting effects of metal concentrations on aquatic life. TECs are concentrations below which no effect on sediment-dwelling organisms are expected, whereas PECs are concentrations at which negative effects on sediment-dwelling organisms are more likely to occur than not. The TEC and PEC goals developed for Silver Bow Creek have been adopted as guidelines for evaluating the ecological effects of instream sediment concentrations within the CFROU. Table 2-1 summarizes the TEC and PEC thresholds by metal COC.

From a management standpoint, stream sediments are unlike surface water in that sediments have a longer residence time. Water moves into and out of the remediation reach of the Clark Fork River fairly rapidly which may cause large variation in surface water quality over short time periods. By contrast, sediments move relatively slowly and contamination in sediments may persist for longer time periods.

Instream sediment samples were collected and analyzed with the goal of preventing exposure of humans and aquatic species to sediments with contaminant concentrations exceeding the risk-based reference concentrations. Trends toward attainment of guidelines in Table 2-1 are likely to improve the quality of fine grained instream sediments in the Clark Fork River, and may eventually achieve full attainment of aquatic life goals.

Although, there are no mandated contaminant concentration goals for instream sediments in the Clark Fork River, the remediation and restoration goals will be considered fully attained when all analytes monitored at each CFROU monitoring station are below the guidelines in Table 2-1, or remain at background concentrations for at least three consecutive years.

Table 2-1. Instream sediment contaminant goals (mg/L) for the Clark Fork River Operable Unit. Goals for sediment contaminant concentrations are on a dry weight basis.

Parameter	Primary Contaminant	TEC[1]	PEC[2]
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] *Threshold of effect concentrations (MacDonald et al. 2000).*
[2] *Probably effects concentrations (MacDonald et al. 2000).*

2.2 Methods

Instream sediments were sampled at the 15 surface water monitoring stations in the upper Clark Fork River watershed in Q3 2012. Sediment sampling locations were the same as for surface water sampling (Table 1-2; Table 1-3; Figure 1-1; Figure 1-2). Samples were collected by compositing subsamples from at least five wadeable deposition zones at each monitoring location. Sediment was collected with a non-metallic spoon following MDEQ standard protocol (MDEQ 2005). Each composite sample was wet sieved in the laboratory into three sediment particle size classes: silts and clays (>0.065 mm), fine sands (0.065–1 mm), and coarse sands (1–2 mm). Samples for the three size classes were analyzed for extractable wet weight (WW) concentrations of arsenic, cadmium, copper, lead, and zinc. The relative proportion (by mass) of each sediment size class (i.e., the sediment gradation) was reported for each stream sediment sample collected. Sediment samples were analyzed by Energy Laboratories, Inc. in Helena, Montana following methods outlined in Table 2-2.

In 2012, all sediment samples collected in the CFROU were analyzed on a wet weight basis at Energy Laboratories. Samples were not dried in the laboratory to obtain the dry weight (DW) analyte concentrations. Wet weight analyte concentrations are lower than dry weight analyte concentrations because the drying process reduces the total mass of the sample without reducing the mass of the analyte. The TEC and PEC goals are expressed on a dry weight basis. Consequently, the frequency and magnitude of exceedances identified in this report may have actually been greater.

Table 2-2. Instream sediment analytes and methods, 2012.

Parameter	Category	Method
Arsenic (mg/kg)	Contaminants of Concern	SW6010B
Cadmium (mg/kg)		SW6020
Copper (mg/kg)		SW6010B
Lead (mg/kg)		SW6010B
Zinc (mg/kg)		SW6010B

Sediment extractable metal concentrations are reported for each size class, and as an aggregate concentration weighted according to the proportional mass of each size class. Comparisons to the TEC and PEC goals are made primarily on the basis of the aggregate concentrations, which is consistent with the reporting methodology adopted for the Silver Bow Creek monitoring program. Aggregate concentrations are determined by, 1) calculating the weighted concentration for each sediment size class, 2) summing the weighted concentration for each sediment size class, and 3) dividing the total mass by the weighted proportional mass of the sample that was contributed by the three sediment size classes. Weighted

concentrations for each size class were calculated by multiplying the reported sediment metal concentrations by the reported class, by mass, for that particular size class. Table 2-3 provides the proportion of each sample that was <2 mm relative to the entire sample collected. Samples containing a higher proportion of sediment <2 mm may be more susceptible to metals contamination due to the affinity of metals to smaller particle sizes. Silver Bow Creek at Warm Springs, located just downstream from the Warm Springs tailings pond system, had the lowest proportion of fine sediment (50.4%). The Clark Fork River near Drummond monitoring station had the highest percentage of fine sediment (99.3%).

Table 2-3. Percent of total sediment sample ≤2 mm in the Clark Fork River Operable Unit, 2012.

Station	Percent
Tributary Stations	
Mill-Willow Creek at Frontage Road	81.1
Mill-Willow Creek at Frontage Road (duplicate)	80.2
Mill-Willow Bypass near mouth	69.6
Silver Bow Creek at Warm Springs	50.4
Warm Springs Creek near mouth	88.5
Lost Creek near mouth	63.7
Racetrack Creek near mouth	85.2
Little Blackfoot River near mouth	95.9
Flint Creek near mouth	92.2
Rock Creek near mouth	88.1
Mainstem Stations	
Clark Fork River near Galen	89.5
Clark Fork River at Deer Lodge	84.7
Clark Fork River at Deer Lodge (duplicate)	90.0
Clark Fork River above Little Blackfoot River near Garrison	93.4
Clark Fork River at Gold Creek	99.0
Clark Fork River near Drummond	99.3
Clark Fork River at Turah	89.4

Variation in sediment metal concentrations between stations were analyzed by comparison with two duplicate samples collected during the same sampling event. Relative percent differences (RPDs) were calculated between duplicate samples and actual samples for each metal in each sediment size class. Among the metal analytes, relative percent differences ranged from 0-47% for the first duplicate sample and from 0-25% for the second duplicate sample. In 2012, the overall mean difference for all metals and all sediment size classes for the two duplicate samples was 10%, an intermediate sampling precision. In 2010, the RPD range was 0-15% with a mean of 6%. In 2011, the RPD range was 0-54% with a mean of 18%. The largest RPDs in each of the three years were observed in the largest fine sediment size class (1-2 mm).

Variability in sediment metal concentrations at any given monitoring station may be attributed to the complexity of the channel morphology and depositional processes, which influence the distribution of the sample across the respective size classes. Table 2-4 provides the distribution of 2012 sediment samples among the three sediment particle size classes that were analyzed for metals. Sediment sample fractionation varied widely between samples, particularly between samples from different monitoring stations, but also for duplicate samples collected from the same station (Table 2-4). Variability in sediment sample fractionation effects reported sediment

metals concentrations because COC concentrations are not consistent across sediment size classes. Smaller size classes 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 class tested (<0.065 mm) to have metal concentrations an order of magnitude higher than the largest (1–2 mm) sediment size class. In combination, these effects increase the variability of COC concentrations in stream sediment samples.

Table 2-4. Size class distribution for instream sediment samples in the Clark Fork River Operable Unit, 2012. *

Station	Proportion of sample in each size class (%)		
	<0.065 mm	0.065–1 mm	1–2 mm
Tributary Stations			
Mill-Willow Creek at Frontage Road	1.9	56.4	22.8
Mill-Willow Creek at Frontage Road (duplicate)	1.7	52.4	26.1
Mill-Willow Bypass near mouth	1.4	38.6	29.6
Silver Bow Creek at Warm Springs	0.9	28.3	21.2
Warm Springs Creek near mouth	12.5	72.7	3.3
Lost Creek near mouth	11.2	43.1	9.4
Racetrack Creek near mouth	3.1	55.4	26.7
Little Blackfoot River near mouth	14.2	71.8	9.9
Flint Creek near mouth	27.5	59.8	4.9
Rock Creek near mouth	13.5	71.7	2.9
Mainstem Stations			
Clark Fork River near Galen	6.1	50.4	33.0
Clark Fork River at Deer Lodge	11.0	44.2	29.5
Clark Fork River at Deer Lodge (duplicate)	12.3	54.0	23.7
Clark Fork River above Little Blackfoot River near Garrison	2.8	52.8	37.8
Clark Fork River at Gold Creek	31.8	63.9	3.3
Clark Fork River near Drummond	5.2	66.8	27.3
Clark Fork River at Turah	7.7	78.6	3.1

**Percent of size class, by mass, for sediment ≤2 mm.*

2.3 Results and Discussion

Concentrations of arsenic, cadmium, copper, lead, and zinc extractable from sediments in three size classes (<0.065 mm, 0.065–1 mm, 1–2 mm), together with aggregate concentrations for each CFROU monitoring station are presented in Figure 2-1 through Figure 2-5. The figures also include relevant TECs and PECs. Aggregate metal concentrations from sediment samples at each monitoring station in relation to the TECs and PECs are summarized in Table 2-5 through Table 2-9. Spatial and temporal trends in sediment metal concentrations, and comparisons to reference concentrations, are also discussed in the following sections.

2.3.1 Arsenic

Sediment arsenic concentrations were highest in the smallest sediment size class at 80% (12 of 15) of the stations in the CFROU monitoring network (Figure 2-1). The Little Blackfoot River, Flint Creek, and Rock Creek were exceptions to this pattern; sediment arsenic concentrations at those stations were similar in each size class at those locations (Figure 2-1).

In general, arsenic concentrations decreased at each downstream mainstem station in most sediment size classes and in aggregate sediment concentrations (Figure 2-1). Silver Bow Creek at Warm Springs had sediment arsenic concentrations that were lower than in the Clark

Fork River near Garrison, and similar to concentrations measured in the Clark Fork River at Deer Lodge. The 2012 sediment arsenic concentrations for the mainstem Clark Fork River were generally within the range of concentrations observed in 2010-2011. However, aggregate concentrations of sediment arsenic at the four mainstem Clark Fork River stations from near Garrison to Turah in 2012 were about half of those observed in 2011.

Several tributary monitoring stations (Mill-Willow Creek at Frontage Road, Mill-Willow Bypass, Warm Springs Creek, Lost Creek, Racetrack Creek, and Flint Creek) had elevated sediment arsenic concentrations, particularly in the <0.065 mm sediment size class. The Little Blackfoot River and Rock Creek stations had the lowest sediment arsenic concentrations of the tributaries monitored.

The Mill-Willow Bypass, Clark Fork River near Galen, and Mill-Willow Creek at Frontage Road stations had the highest sediment arsenic concentrations in the smallest sediment size class (<0.065 mm; Figure 2-1). The highest aggregate sediment arsenic concentrations were measured in the Clark Fork River near Galen (36 mg/kg), Flint Creek near mouth (19 mg/kg), Warm Spring Creek near mouth (18 mg/kg), and in the Clark Fork River at Deer Lodge (17 mg/kg and 19 mg/kg in duplicate samples).

Aggregate arsenic concentrations exceeded the TEC in Mill-Willow Creeks, Mill-Willow Bypass, Silver Bow Creek at Warm Springs, Warm Springs Creek, Lost Creek, Flint Creek, and in the Clark Fork River near Galen, at Deer Lodge, and near Garrison (Figure 2-1; Table 2-5). Arsenic concentrations in the smallest size class exceeded the TEC concentration at 67% (10 of 15) of the CFROU monitoring stations. Stations not exceeding the TEC in any sediment size class included the Little Blackfoot River near mouth, Clark Fork River at Gold Creek, Clark Fork River near Drummond, Rock Creek near mouth, and Clark Fork River at Turah. Arsenic concentrations in the smallest size class exceeded the PEC at the Mill-Willow Creeks, Mill-Willow Bypass, Silver Bow Creek at Warm Springs, Warm Springs Creek near mouth, Clark Fork River near Galen, and Clark Fork River at Deer Lodge (1 of 2 duplicate samples) stations. However, aggregate sediment arsenic concentrations exceeded the PEC only at the Clark Fork River near Galen, which was consistent with the pattern observed in 2010 and 2011.

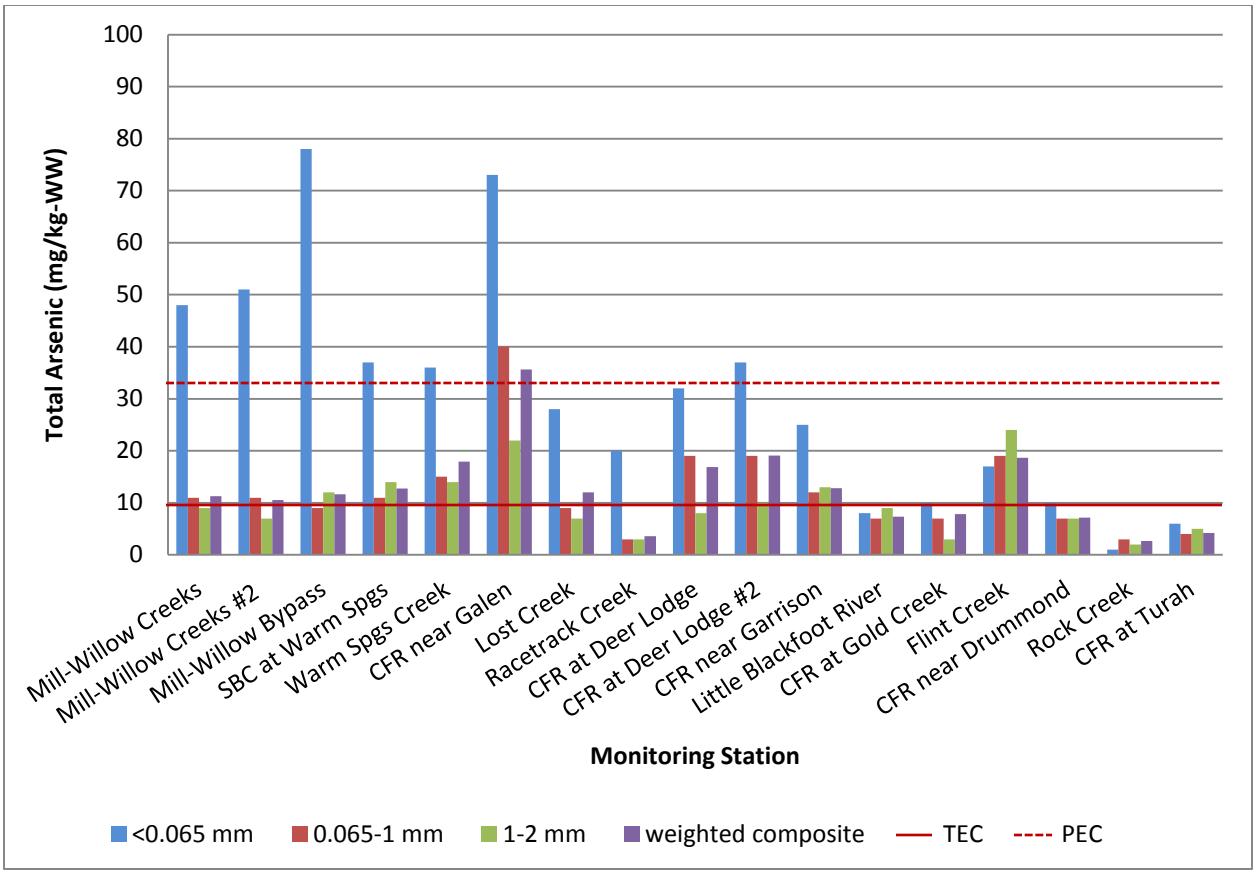

Figure 2-1. Arsenic concentrations (wet weight) for instream sediment samples in the Clark Fork River Operable Unit, September 2012. Remediation goals are the threshold of effect (TEC) and probably effect (PEC) concentrations (dry weight) from MacDonald et al. (2000).

Table 2-5. Arsenic concentrations (wet weight) for instream sediment samples* compared to remediation goals for the Clark Fork River Operable Unit, September 2012. Remediation goals are the threshold of effect (TEC) and probably effect (PEC) concentrations (dry weight) from MacDonald et al. (2000).

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork River near Galen
Q3 (Sept.)	11	12	13	18	36
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork River at Deer Lodge**	**Clark Fork River near Garrison**	**Little Blackfoot River near mouth**
Q3 (Sept.)	12	3.62	17	13	7.35
Monitoring Station Calendar Quarter	**Clark Fork River at Gold Creek**	**Flint Creek near mouth**	**Clark Fork River near Drummond**	**Rock Creek near mouth**	**Clark Fork River at Turah**
Q3 (Sept.)	7.83	19	7.16	2.66	4.21

TEC (9.79 mg/kg) exceeded.
TEC not exceeded.

**Aggregate concentration.*

2.3.2 Cadmium

Cadmium was detected at all monitoring stations except Rock Creek near mouth in Q3 2012 (Figure 2-2). Sediment cadmium concentrations were consistently highest in the <0.065 mm size class, and lowest in either the largest (1–2 mm) sediment size class (14 of 15 stations) or the intermediate (0.065–1 mm) size class (1 of 15 stations). There was no distinct spatial trend for cadmium in sediment at CFROU monitoring stations in 2012; peak concentrations for the <0.065 mm size class ranged from <1-2.7 mg/kg at all monitoring stations. The highest concentration was observed at the Clark Fork River near Garrison monitoring station, and the next highest concentrations were in the Clark Fork River at Deer Lodge (duplicate sample) and near Galen, and in Silver Bow Creek at Warm Springs.

Among the tributary monitoring stations, Flint Creek, Little Blackfoot River, and Rock Creek had the lowest concentrations of sediment cadmium (in decreasing order of concentrations). Warm Springs Creek, Lost Creek, and Racetrack Creek had intermediate concentrations of sediment cadmium. Mill-Willow Creeks and the Mill-Willow Bypass had the highest sediment cadmium concentrations among tributary monitoring stations.

Sediment cadmium concentrations at the mainstem Clark Fork River monitoring stations in 2012 were within the range of concentrations observed during 2010 and 2011.

Aggregate concentrations of extractable cadmium did not exceed the TEC or PEC at any of the CFROU monitoring stations in 2012 (Figure 2-2; Table 2 6). However, extractable cadmium concentrations in the <0.065 mm size class exceeded the TEC at 11 of 15 stations. Only the Little Blackfoot River, Clark Fork River at Gold Creek, Flint Creek, and Rock Creek did not exceed the TEC threshold concentration for sediment cadmium in any of the three sediment size classes. No exceedances of the PEC were observed at any of the stations in Q3 2012.

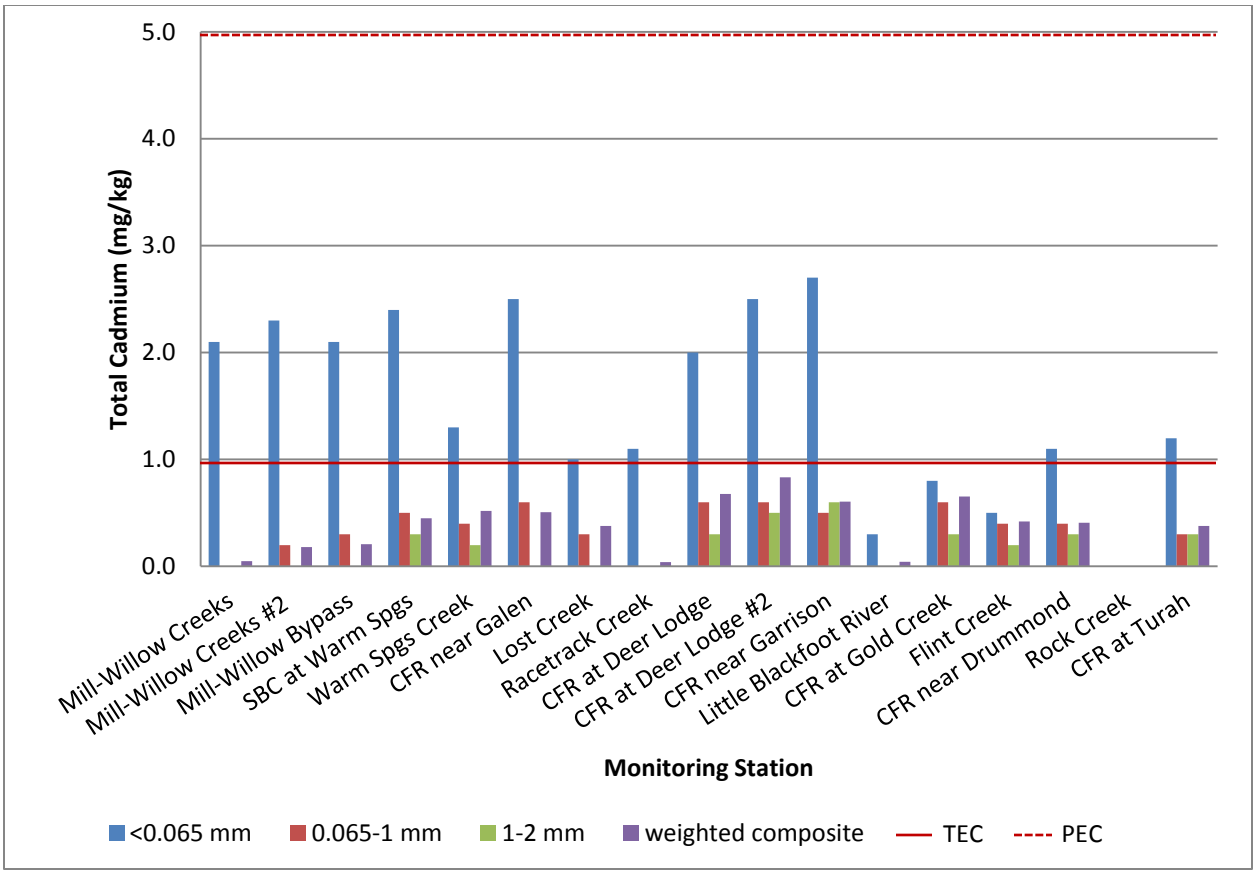

Figure 2-2. Cadmium concentrations (wet weight) for instream sediment samples in the Clark Fork River Operable Unit, September 2012. Remediation goals are the threshold of effect (TEC) and probably effect (PEC) concentrations (dry weight) from MacDonald et al. (2000).

Table 2-6. Cadmium concentrations (wet weight) for instream sediment samples* compared to remediation goals in the Clark Fork River Operable Unit, September 2012. Remediation goals are the threshold of effect (TEC) and probably effect (PEC) concentrations (dry weight) from MacDonald et al. (2000).

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork River near Galen
Q3 (Sept.)	0.05	0.21	0.45	0.52	0.51
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork River at Deer Lodge**	**Clark Fork River near Garrison**	**Little Blackfoot River near mouth**
Q3 (Sept.)	0.38	0.04	0.68	0.61	0.04
Monitoring Station Calendar Quarter	**Clark Fork River at Gold Creek**	**Flint Creek near mouth**	**Clark Fork River near Drummond**	**Rock Creek near mouth**	**Clark Fork River at Turah**
Q3 (Sept.)	0.65	0.42	0.41	0.00	0.38

TEC not exceeded.

**Aggregate concentrations.*

2.3.3 Copper

Sediment extractable copper concentrations were consistently highest in the smallest sediment size class (<0.065 mm) at all CFROU monitoring stations, and lowest in the largest (1–2 mm) size class (Figure 2-3). The spatial trend for sediment copper in the mainstem Clark Fork River was consecutive declining concentrations from the Clark Fork River near Galen station to the Deer Lodge, near Garrison, Gold Creek, near Drummond, and Turah stations. The lowest mainstem sediment copper concentrations were observed in the Clark Fork River at Turah. Sediment copper concentrations at the tributary stations were highly variable, ranging from elevated in Warm Springs Creek, moderately elevated in Mill-Willow Creeks, Mill-Willow Bypass, Lost Creek, and Racetrack Creek, and low in the Little Blackfoot River, Flint Creek, and Rock Creek. Sediment copper concentrations at the Silver Bow Creek at Warm Springs station were moderately elevated.

The highest sediment copper concentrations in the smallest sediment size class were observed at the Clark Fork River near Garrison station, in Warm Springs Creek near its mouth, and in the Clark Fork River at Deer Lodge and near Garrison (ranked highest to lowest). The lowest sediment copper concentrations in the smallest sediment size class were observed in Rock Creek near its mouth. Sediment copper concentrations at the mainstem Clark Fork River monitoring stations during 2012 were generally within the range of concentrations observed during 2010-2011. However, aggregate concentrations at the four Clark Fork River stations from near Garrison to Turah during 2012 were much lower than aggregate concentrations measured in 2011.

Aggregate sediment copper concentrations exceeded the copper TEC threshold at 9 of 15 stations, including Silver Bow Creek at Warm Springs, Warm Springs Creek near mouth, Lost Creek near mouth, and in the Clark Fork River near Galen, at Deer Lodge, near Garrison, at

Gold Creek, near Drummond, and at Turah (Figure 2-3; Table 2-7). Copper concentrations in the smallest sediment size class exceeded the TEC threshold concentration at 12 of the 15 stations, with only Rock Creek, Flint Creek, and the Little Blackfoot River having all size classes of sediment falling below the TEC concentration. Aggregate sediment copper concentrations exceeded the PEC concentration in Warm Springs Creek near mouth, and in the Clark Fork River near Galen and at Deer Lodge.

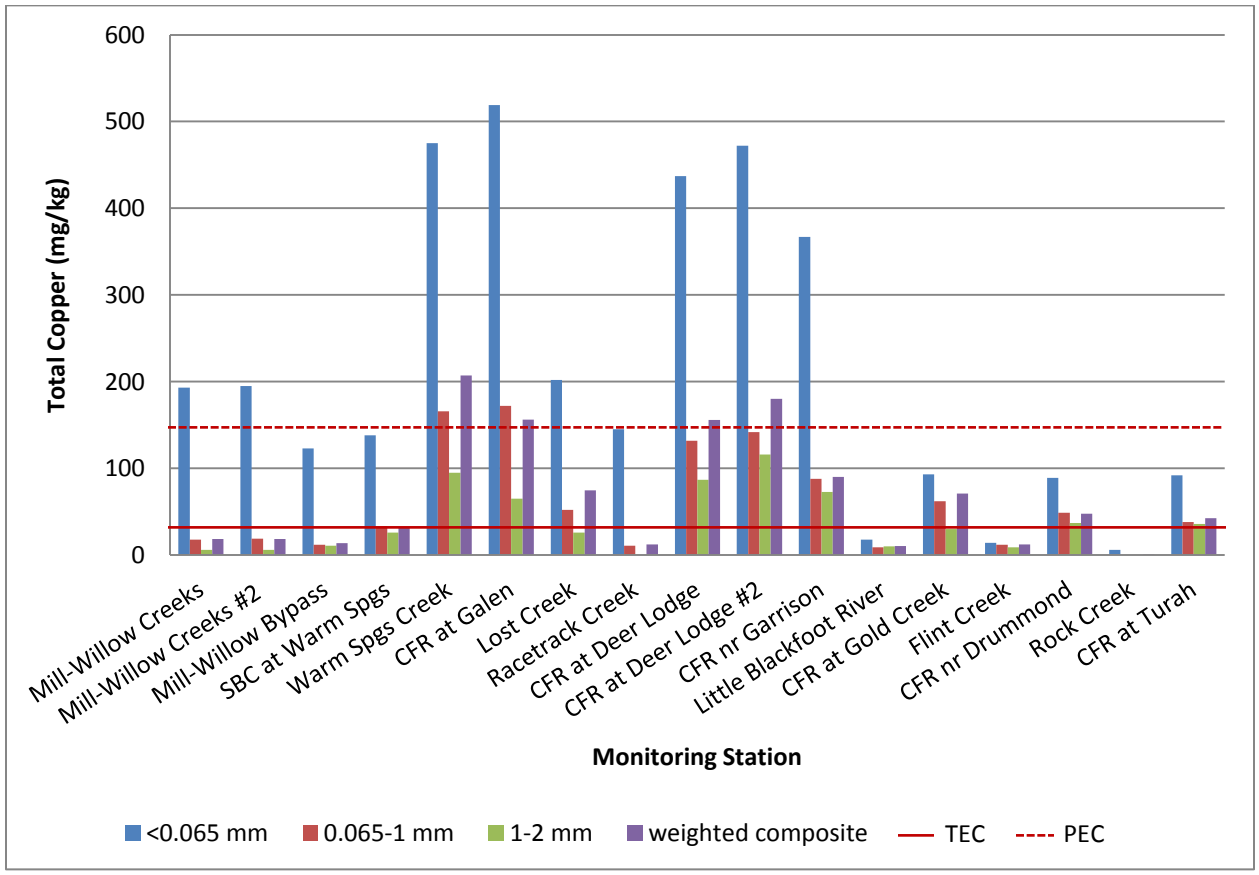

Figure 2-3. Copper concentrations (wet weight) for instream sediment samples in the Clark Fork River Operable Unit, September 2012. Remediation goals are the threshold of effect (TEC) and probably effect (PEC) concentrations (dry weight) from MacDonald et al. (2000).

Table 2-7. Copper concentrations (wet weight) for instream sediment samples* compared to remediation goals in the Clark Fork River Operable Unit, September 2012. Remediation goals are the threshold of effect (TEC) and probably of effect (PEC) concentrations (dry weight) from MacDonald et al. (2000).

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork River near Galen
Q3 (Sept.)	19	14	32	207	156
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork River at Deer Lodge**	**Clark Fork River near Garrison**	**Little Blackfoot River near mouth**
Q3 (Sept.)	75	12	156	90	10
Monitoring Station Calendar Quarter	**Clark Fork River at Gold Creek**	**Flint Creek near mouth**	**Clark Fork River near Drummond**	**Rock Creek near mouth**	**Clark Fork River at Turah**
Q3 (Sept.)	71	12	48	0.9	43

TEC not exceeded.
TEC (31.6 mg/kg) exceeded.
PEC (149 mg/kg) exceeded.

**Aggregate concentrations.*

2.3.4 Lead

Sediment extractable lead concentrations were highest in the smallest sediment size class (<0.065 mm) at all CFROU monitoring stations, and lowest in either the intermediate (0.065–1 mm) and large (1–2 mm) size classes. Sediment lead concentrations at Clark Fork River mainstem monitoring stations were similar, and elevated, at the near Galen and Deer Lodge stations. Sediment lead concentrations were lower near Garrison, at Turah, and at Gold Creek. The lowest mainstem Clark Fork River sediment lead concentrations (aggregate concentrations and <0.065 mm size class concentrations) were observed at the Gold Creek station. The highest mainstem aggregate concentrations were observed at the Deer Lodge station; the highest <0.065 mm size class concentrations were observed at the near Galen station (Figure 2-4).

Tributary sediment lead concentrations in the <0.065 mm sediment size class were elevated at Mill-Willow Creek at Frontage Road, Mill-Willow Bypass, Warm Springs Creek, Lost Creek, Racetrack Creek, and Flint Creek. Silver Bow Creek at Warm Springs also had elevated sediment lead concentrations in the <0.065 mm sediment size class. Elevated sediment lead concentrations in Flint Creek appeared to be responsible for elevated lead concentrations at downstream Clark Fork River monitoring stations near Drummond and at Turah. Rock Creek near its mouth had the lowest sediment lead concentrations of all of the CFROU monitoring stations in 2012.

Aggregate sediment lead concentrations at four mainstem Clark Fork River monitoring stations near Galen and from near Garrison to near Drummond were lower in 2012 compared to concentrations in 2010 and 2011. Aggregate concentrations at the Deer Lodge and Turah stations were similar from 2010-2012.

Aggregate concentrations of extractable lead exceeded the TEC at only 1 of 15 monitoring stations in 2012; at the Clark Fork River at Deer Lodge station (Figure 2-4; Table 2-8). Three mainstem Clark Fork River stations exceeded or approached the TEC in 2010 and 2011. Extractable lead concentrations in the smallest size class exceeded the TEC at 11 of 15 monitoring stations in 2012. Only the Little Blackfoot River, Clark Fork River at Gold Creek, and Clark Fork River near Drummond, and Rock Creek monitoring stations had sediment lead concentrations in the <0.065 mm size class below the TEC. The PEC was not exceeded for any sediment size class or aggregate concentration at any of the monitoring stations from 2010-2012.

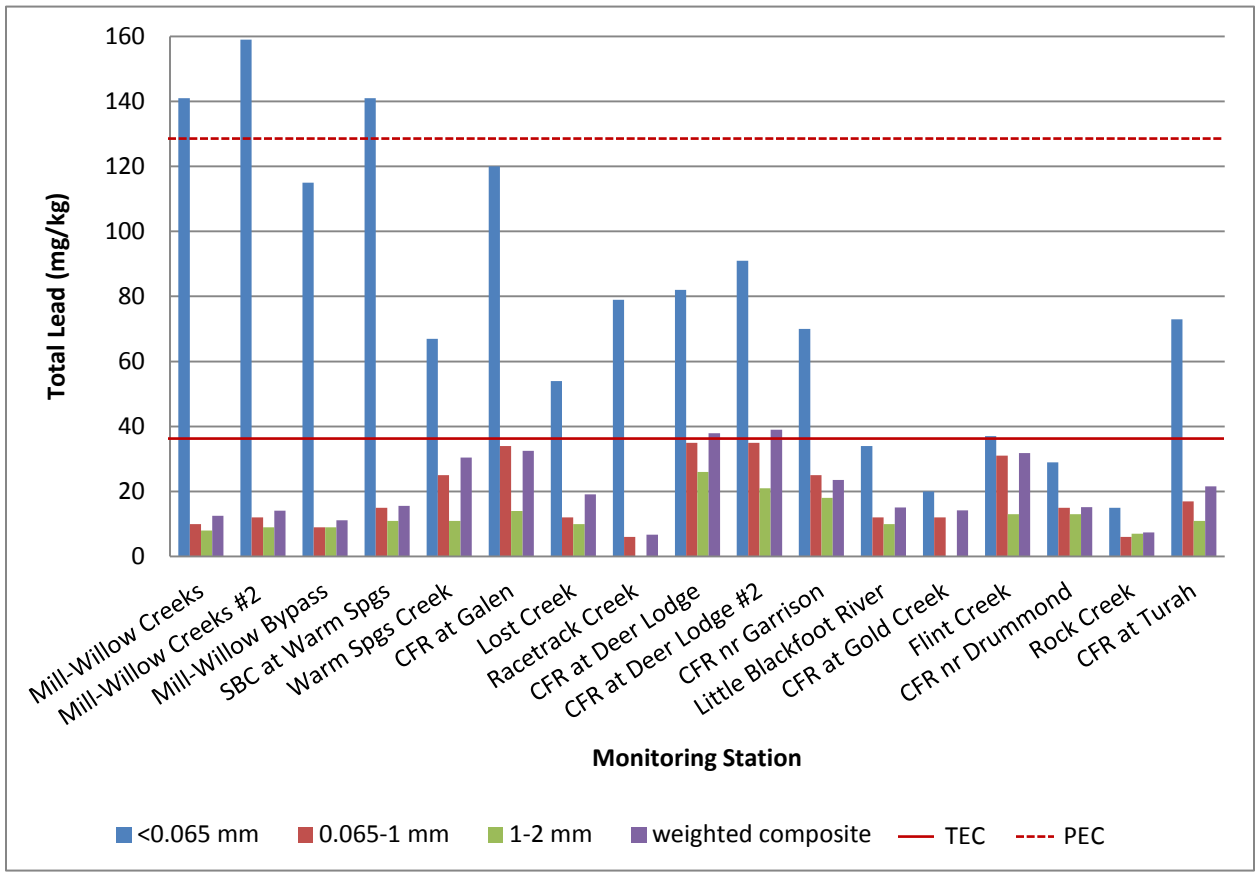

Figure 2-4. Lead concentrations (wet weight) for instream sediment samples in the Clark Fork River Operable Unit, September 2012. Remediation goals are the threshold of effect (TEC) and probably effect (PEC) concentrations (dry weight) from MacDonald et al. (2000).

Table 2-8. Lead concentrations (wet weight) for instream sediment samples* compared to remediation goals for the Clark Fork River Operable Unit, September 2012. Remediation goals are the threshold of effect (TEC) and probably effect (PEC) concentrations (dry weight) from MacDonald et al. (2000).

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork River near Galen
Q3 (Sept.)	12.5	11.1	15.6	30.4	32.5
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork River at Deer Lodge**	**Clark Fork River near Garrison**	**Little Blackfoot River near mouth**
Q3 (Sept.)	19.1	6.8	38.0	23.5	15.1
Monitoring Station Calendar Quarter	**Clark Fork River at Gold Creek**	**Flint Creek near mouth**	**Clark Fork River near Drummond**	**Rock Creek near mouth**	**Clark Fork River at Turah**
Q3 (Sept.)	14.2	31.8	15.2	7.4	21.6

TEC not exceeded.
TEC (35.8 mg/kg) exceeded.
**Aggregate concentrations.*

2.3.5 Zinc

Sediment zinc concentrations in the smallest (<0.065 mm) size class were the highest of all size classes at all stations. All but 2 of 15 stations had the lowest sediment zinc concentrations in the largest (1-2 mm) sediment size class. Sediment zinc concentrations at Clark Fork River mainstem monitoring stations in 2012 were elevated at upper mainstem stations and low at stations below the Little Blackfoot River, including Gold Creek, near Drummond, and at Turah. Among the tributary stations, Mill-Willow Creek at Frontage Road, Mill-Willow Bypass, Warm Springs Creek, Lost Creek, and Racetrack Creek had elevated sediment zinc concentrations in the <0.065 mm sediment size class. Silver Bow Creek at Warm Springs also had elevated sediment zinc concentrations in the <0.065 mm size class (Figure 2-5).

Aggregate sediment zinc concentrations were highest at the cluster of three mainstem Clark Fork River stations from near Galen to near Garrison (Figure 2-5). The next highest aggregate concentrations were observed at the Clark Fork River near Drummond and Turah stations, Silver Bow Creek at Warm Springs, Warm Springs Creek near mouth, and Flint Creek near its mouth (in decreasing order of concentration). The lowest aggregate sediment zinc concentrations were measured in Rock Creek, Racetrack Creek, Little Blackfoot River, Mill-Willow Creeks, Lost Creek, and Mill-Willow Bypass (in increasing order of concentration). Aggregate sediment zinc concentrations at several mainstem Clark Fork River monitoring stations were lower in 2012 than in 2010 or 2011.

Aggregate sediment zinc concentrations exceeded the zinc TEC at 4 of 6 mainstem Clark Fork River monitoring stations in 2012; near Galen, at Deer Lodge, near Garrison, and near Drummond. Aggregate sediment zinc concentrations at all other CFROU monitoring stations were below the TEC. Zinc concentrations in the smallest sediment size class (<0.065 mm)

exceeded the TEC at 12 of 15 monitoring stations, with only the Little Blackfoot, Flint Creek, and Rock Creek <0.065 mm size class concentrations below the TEC (Figure 2-5; Table 2-9). Zinc concentrations in the 1–2 mm sediment size class at the near Garrison, near Galen, and near Drummond monitoring stations, and in the 0.065-1 mm size class at the near Galen, Deer Lodge, near Garrison, near Drummond, and Silver Bow Creek at Warm Springs stations exceeded the PEC in 2012. None of the 2012 aggregate sediment zinc concentrations exceeded the PEC. However, the <0.065 mm sediment size class concentrations at the Clark Fork River near Galen and near Garrison stations exceeded, or very nearly exceeded, the PEC.

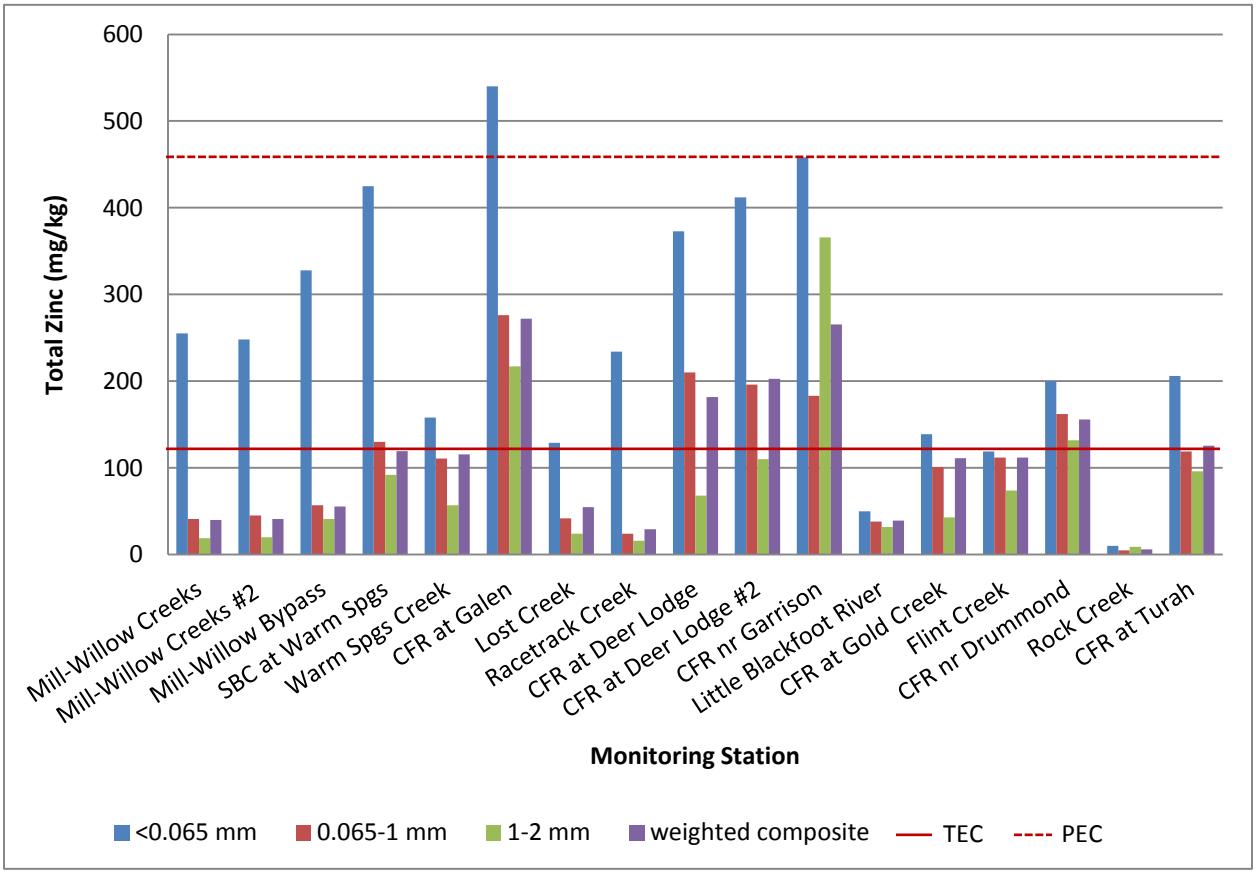

Figure 2-5. Zinc concentrations (wet weight) for instream sediment samples in the Clark Fork River Operable Unit, September 2012. Remediation goals are the threshold of effect (TEC) and probably effect (PEC) concentrations (dry weight) from MacDonald et al. (2000).

Table 2-9. Zinc concentrations (wet weight) for instream sediment samples* compared to remediation goals for the Clark Fork River Operable Unit, September 2012. Remediation goals are the threshold of effect (TEC) and probably effect (PEC) concentrations (dry weight) from MacDonald et al. (2000).

Monitoring Station Calendar Quarter	Mill-Willow Creeks at Frontage Road	Mill-Willow Bypass near mouth	Silver Bow Creek at Warm Springs	Warm Springs Creek near mouth	Clark Fork River near Galen
Q3 (Sept.)	40	56	119	116	272
Monitoring Station Calendar Quarter	**Lost Creek near mouth**	**Racetrack Creek near mouth**	**Clark Fork River at Deer Lodge**	**Clark Fork River near Garrison**	**Little Blackfoot River near mouth**
Q3 (Sept.)	55	29	182	265	39
Monitoring Station Calendar Quarter	**Clark Fork River at Gold Creek**	**Flint Creek near mouth**	**Clark Fork River near Drummond**	**Rock Creek near mouth**	**Clark Fork River at Turah**
Q3 (Sept.)	111	112	156	6	126

TEC not exceeded.
TEC (121 mg/kg) exceeded.
**Aggregate concentrations.*

2.4 Conclusions

For most of the five metal COCs at the 15 CFROU monitoring stations, there appeared to be a strong inverse relationship between the sediment particle size and the metal concentration. Spatially, the highest sediment metal concentrations tended to occur at the upper Clark Fork River mainstem monitoring stations, particularly (in decreasing order) at the near Galen, Deer Lodge, near Garrison, Gold Creek (for cadmium), and near Drummond (for zinc) monitoring stations. The lowest mainstem sediment metal concentrations were observed in the Clark Fork River at Turah. The highest sediment metal concentrations in the Clark Fork River tributaries CFROU monitoring network occurred in Flint Creek (arsenic and lead) and Warm Springs Creek (arsenic, cadmium, copper, and lead), and the lowest sediment concentrations occurred in Rock Creek near its mouth. Sediment metal concentrations in 2012 were lower than concentrations measured in 2010 and 2011 at many of the mainstem Clark Fork River monitoring locations.

Aggregate wet weight concentrations of extractable arsenic, copper, lead, and zinc exceeded the TEC, PEC, or both, at several of the Clark Fork River monitoring stations in 2012. Aggregate sediment copper concentrations had the highest frequency of TEC or PEC exceedance, with all six mainstem Clark Fork River stations and 3 of 9 tributary stations exceeding the TEC (9 of 15 stations) or the PEC (3 of 15 stations). Aggregate sediment arsenic concentrations also frequently exceeded the TEC with 3 of 6 mainstem Clark Fork River stations, and 6 of 9 tributary stations, exceeding the TEC (9 of 15 stations total). Aggregate sediment zinc concentrations ranked third in frequency of performance standards exceedances, with 4 of the 6 mainstem Clark Fork River stations but no tributaries exceeding the TEC (4 of 15 stations total) threshold. Aggregate sediment lead concentrations exceeded the TEC less frequently than each of the sediment size classes, with 1 of 6 mainstem Clark Fork River stations and 0 of 9 tributary stations exceeding the TEC. Aggregate sediment cadmium

concentrations had no exceedances of the TEC or PEC threshold concentrations at any of the 15 CFROU monitoring stations in Q3 2012.

Duplicate sediment metal samples collected at the Mill-Willow Creek at Frontage Road and at the Clark Fork River at Deer Lodge stations had an intermediate level of variability for most of the metals and sediment size classes in 2012, relative to the duplicate samples for 2010 and 2011. In 2012, the RPD between the original samples and the duplicate samples ranged from 0-47% for all metals and sediment size classes, with an average RPD of 10%. By comparison, the RPD range in 2010 was 0-15% with an average of 6% and in 2011 ranged from 0-54% with an average of 18%. The largest RPDs in each of the three years of monitoring were observed in the largest sediment size class (1-2 mm).

3 MACROINVERTEBRATES[1]

3.1 Introduction

This report describes the analysis of benthic macroinvertebrate samples collected from sites within the Clark Fork River Operable Unit in September (Q3) 2012. 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 most of these sites. Remediation activities have commenced on Silver Bow Creek.

The benthic invertebrate fauna was analyzed using a group of indices developed by D. McGuire and applied over a long course of sampling in the Clark Fork River dating to 1986. In an appendix to this report, results from other bioassessment tools are reported, including an index (MMI) (Jessup et al. 2006) and a predictive model (RIVPACS, Hawkins 2005), and 2 historic indices: the MVFP (Bollman 1998) and another multimetric index (Bukantis 1998) developed for use in foothill and valley regions of western Montana.

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

3.2 Methods

3.2.1 Sampling

Benthic macroinvertebrates were sampled at 4 Clark Fork River headwater sites, 6 sites on the mainstem Clark Fork River, and 5 sites on tributaries of the Clark Fork from September 11-13, 2012. Four macroinvertebrate sample replicates were collected at each site, using a Hess sampling device. Sites are described in Table 3-1. Samples were collected by Atkins and were delivered to Rhithron Associates, Inc. for processing and identification.

Table 3-1. Macroinvertebrate sampling sites in the Clark Fork River basin, September 11-13, 2012. Sites are listed in upstream-to-downstream order relative to the flow of the Clark Fork River.

Site description	Site No.	USGS Site No.	Latitude	Longitude
Mill -Willow Creek	MCWC-MWB	NA	46.42649	-112.79876
Mill -Willow Bypass near mouth	MWB-SBC	NA	46.17839	-112.78270
Warm Springs Creek near mouth	WSC-SBC	12323770	46.18041	-112.78592
Silver Bow Creek at Warm Springs	SS-25	12323750	46.18275	-112.77722
Clark Fork near Galen	CFR-03A	12323800	46.20833	-112.76639
Lost Creek near mouth	LC-7	12323850	46.22665	-112.76017
Racetrack Creek near mouth	RTC-1	NA	46.28406	-112.74484
Clark Fork at Deer Lodge	CFR-27H	12324200	46.39778	-112.74194
Clark Fork above Little Blackfoot River near Garrison	CFR-42G	12324400	46.51111	-112.78889
Little Blackfoot River near Garrison	LBR-CFR	12325500	46.51964	-112.79312
Clark Fork at Gold Creek	CFR-53C	12324680	46.59056	-112.92778
Flint Creek near mouth	FC-CFR	NA	46.62891	-113.15151
Clark Fork near Drummond	CFR-84F	12331500	46.71222	-113.33000

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

Rock Creek near mouth	RC-CFR	12334510	46.72153	-113.68169
Clark Fork at Turah	CFR-116A	12334550	46.82611	-113.81330

3.2.2 Laboratory analysis

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 2011), densities of abundant taxa were not estimated, but actual counts were obtained for all organisms. Caton trays (Caton 1991) were used to distribute the samples for sorting. 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% ethanol for subsequent identification.

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

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% ethanol in labeled vials, and archived at the Rhithron laboratory.

Midges and worms were morphotyped using 10x–80x stereoscopic dissecting microscopes (Leica S8E) 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.

3.2.3 Quality assurance systems

Quality control procedures for macroinvertebrate sample processing involved checking sorting efficiency. These checks were conducted on the first 15 samples (25% of all samples) by independent observers who microscopically re-examined at least 20% 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 is the sorting efficiency (expressed as a percentage), n_1 is the total number of specimens in the first sort, and n_2 is the total number of specimens expected in the second sort based on the results of the re-sorted 20%.

Quality control procedures for taxonomic determinations of invertebrates involved checking accuracy, precision, and enumeration. Six samples (10% of all 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 (Bray and Curtis 1957) for each selected sample. The percent taxonomic disagreement (PTD) and percent difference in enumeration (PDE) were also calculated (Stribling et al. 2003).

Quality control and quality assurance (QA/QC) results are reported in Appendix E.

3.2.4 Data analysis

Taxa lists and counts for each sample were constructed. Standard metric calculations were made using customized database software. McGuire's indices are "...specifically designed to evaluate water quality in the Clark Fork River Basin." (McGuire 2010). They are composed of 11 metrics. Two subsets of 3 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 2012a).

Four additional bioassessment indices were also calculated and scored; these results are given in Appendix G.

3.2.5 Ecological interpretations: approach

Narrative interpretations of the taxonomic and functional composition of invertebrate assemblages are based on demonstrated associations between assemblage components and habitat and water quality variables 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 non-point 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 this 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 dissolved oxygen, pH, and conductivity (e.g., Bollman 1998; Fore et al. 1996; Wisseman 1996). The Hilsenhoff Biotic Index (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 and 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 (McGuire 2010) are cited as evidence of enrichment or impairment.

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 dissolved oxygen 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.

Metals sensitivity for some groups, especially the heptageniid mayflies, is well-known (e.g., Kiffney and 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.

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 and 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. This index and its interpretation are modified in this report, based on the author's professional judgment, to more effectively characterize the Clark Fork River and tributaries in the sampled reaches.

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" (Vannote et al. 1980) in the narratives. 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

Mean bioassessment scores over all replicates and their associated impairment classifications, are given in Table 3-2. Raw scores for each macroinvertebrate replicate sample are given in Appendix F.

Table 3-2. Mean macroinvertebrate bioassessment scores and impairment classifications: McGuire's indices for general biointegrity, nutrient/organic impairment, and metals impairment. Scores are mean values over 4 replicate samples, and are expressed as the percent of maximum score. Clark Fork River basin, September 11-13, 2012.

Site name	Site identifier	McGuire biointegrity metrics (McGuire 2010)		McGuire metals-sensitive subset (McGuire 2010)		McGuire organic/nutrient-sensitive subset (McGuire 2010)	
		score	impairment class	score	impairment class	score	impairment class
Mill -Willow Creek	MCWC-MWB	94.70	None	95.83	None	93.06	None
Mill -Willow Bypass near mouth	MWB-SBC	76.89	Slight	81.94	None	73.61	Slight
Warm Springs Creek near mouth	WSC-SBC	83.71	Slight	87.50	None	76.39	Slight
Silver Bow Creek at Warm Springs	SS-25	71.97	Slight	50.00	Moderate	68.06	Slight
Clark Fork near Galen	CFR-03A	88.26	Slight	94.44	None	84.72	None
Lost Creek near mouth	LC-7	71.97	Slight	75.00	Slight	68.06	Slight
Racetrack Creek near mouth	RTC-1	84.47	Slight	97.22	None	65.28	Slight
Clark Fork at Deer Lodge	CFR-27H	85.61	Slight	79.17	Slight	80.56	None
Clark Fork above Little Blackfoot River near Garrison	CFR-42G	92.80	None	94.44	None	88.89	None
Little Blackfoot River near Garrison	LBR-CFR	84.47	Slight	75.00	Slight	86.11	None
Clark Fork at Gold Creek	CFR-53C	90.91	None	87.50	None	87.50	None
Flint Creek near mouth	FC-CFR	97.35	None	100.00	None	94.44	None
Clark Fork near Drummond	CFR-84F	85.23	Slight	80.56	None	81.94	None
Rock Creek near mouth	RC-CFR	85.98	Slight	77.78	Slight	93.06	None
Clark Fork at Turah	CFR-116A	89.39	Slight	91.67	None	93.06	None

3.3.1 Overall Biointegrity

Mean scores for McGuire's overall biointegrity index (Table 3-2) indicate unimpaired biological integrity at the headwaters site on Mill-Willow Creek (MCWC-MWB), at the Clark Fork River sites above the Little Blackfoot River (CFR-42G) and at Gold Creek (CFR-53C), and at the tributary site on Flint Creek (FC-CFR). All other sites are classified as slightly impaired using this index. There was little variation in overall biological integrity scores among sample replicates. The mean coefficient of variation (CV) among replicates for this index (scores as percent of maximum score) was 0.05. Mean, maximum, and minimum scores with 95% confidence intervals are graphed in Figure 3-1.

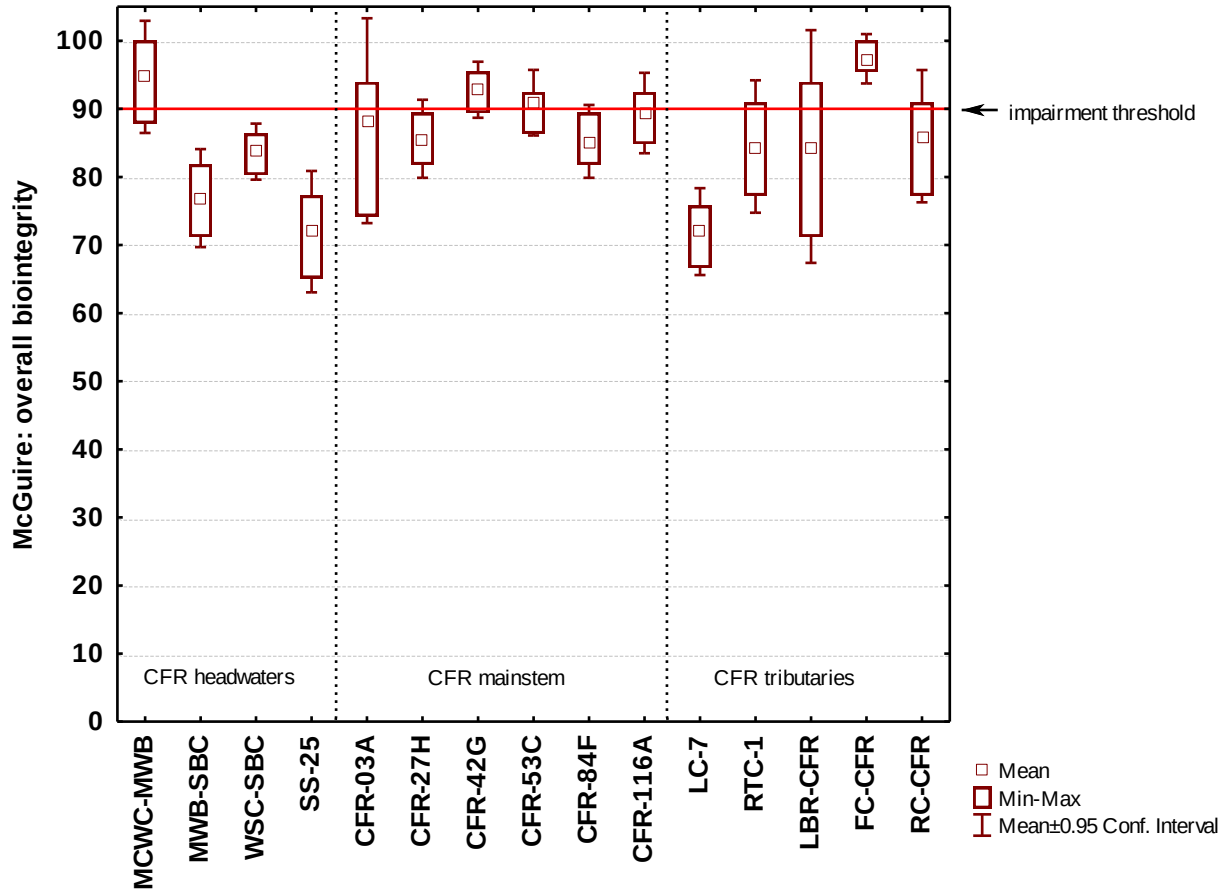

Figure 3-1. Variability among replicates: mean scores, maximum and minimum scores, and 95% confidence intervals for McGuire's overall biointegrity index. Clark Fork River basin, September 11-13, 2012.

3.3.2 Nutrient Sensitivity

Mean scores for McGuire's organic/nutrient index (Table 3-2) indicate unimpaired conditions at the headwaters site on Mill-Willow Creek (MCWC-MWB), at all of the Clark Fork River mainstem sites, and at tributary sites on the Little Blackfoot River (LBR-CFR), Flint Creek (FC-CFR), and Rock Creek (RC-CFR). Scores indicated slight impairment at all other studied sites. The mean CV among replicates for the organic/nutrient subset index score (scores as percent of maximum score) was 0.06, indicating little variation in these scores. Mean, maximum, and minimum scores with 95% confidence intervals are graphed in Figure 3-2.

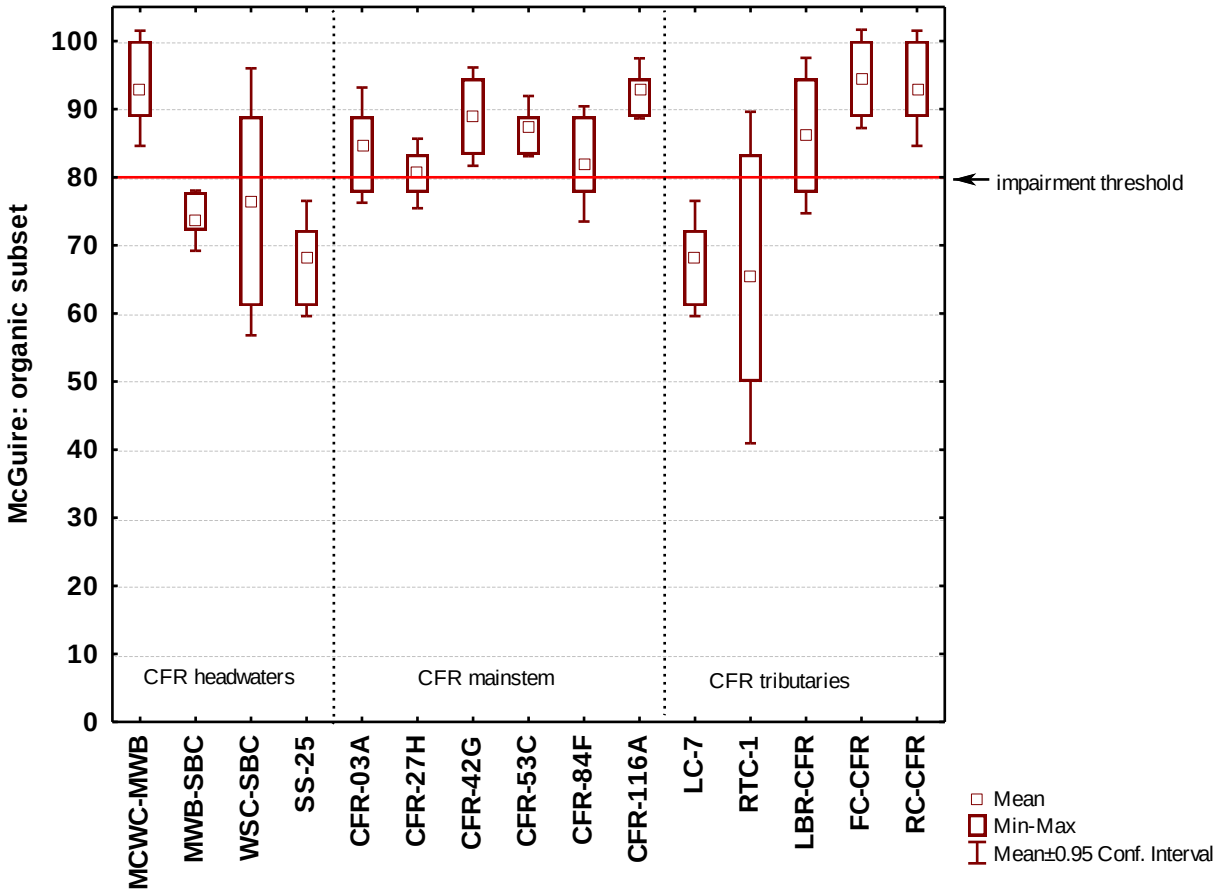

Figure 3-2. Variability among replicates: mean scores, maximum and minimum scores, and 95% confidence intervals for McGuire's organic/nutrient pollution metric subset. Clark Fork River basin, September 11-13, 2012.

3.3.3 Metals Sensitivity

Mean scores for McGuire's metals index (Table 3-2) indicate unimpaired conditions at all but 5 sites: metals impairment was indicated at the headwaters site on Silver Bow Creek (SS-25), where scores indicated moderate impairment, and at the Clark Fork River mainstem site at Deer Lodge (CFR-27H), and at tributary sites on Lost Creek (LC-7), the Little Blackfoot River (LBR-CFR), and Rock Creek (RC-CFR), where slight impairment was indicated. The mean CV among replicates for the metals subset index score (scores as percent of maximum score) was 0.08, indicating little variation in these scores. Mean, maximum and minimum scores, with 95% confidence intervals are graphed in Figure 3-3.

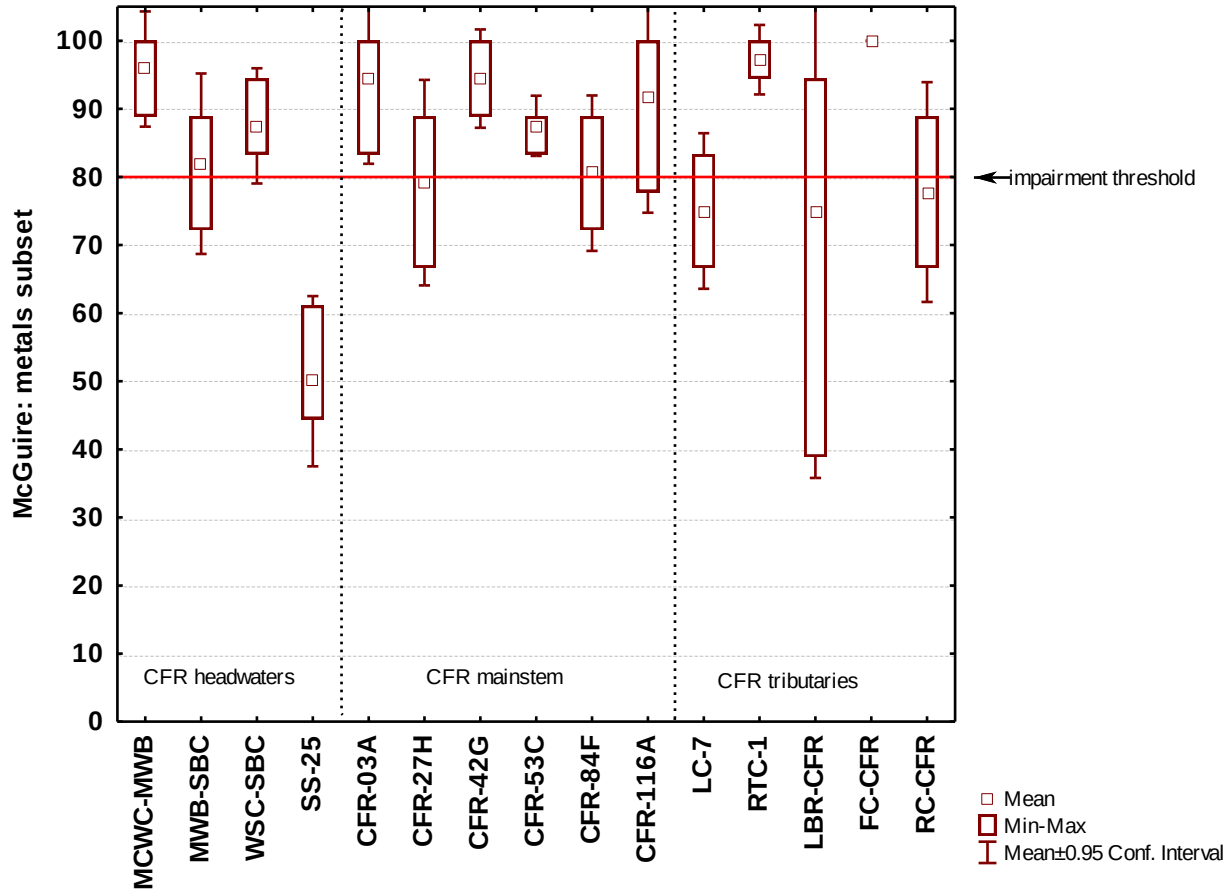

Figure 3-3. Variability among replicates: mean scores, maximum and minimum scores, and 95% confidence intervals for McGuire's metals pollution metric subset. Clark Fork River basin, September 11-13, 2012.

3.3.4 Ecological interpretation of aquatic invertebrate assemblages

3.3.4.1 MCWC-MWB: Mill-Willow Creek

Mayfly taxa richness (7) in samples collected from the Mill-Willow Creek site was similar to expectations for a low-order valley stream. The HBI value (3.33) indicated a moderately sensitive benthic assemblage. These metric indicators of water quality suggest minimal pollution here. However, the metals tolerance index value (3.50) was higher than the biotic index value. Heptageniid mayflies were represented by a single taxon (*Rhithrogena* sp.), which accounted for 1.15% of sampled animals. The metals-sensitive caddisfly *Lepidostoma* sp. was abundant. These findings give contradictory results: metals contamination cannot be ruled out in the reach. The calculated thermal preference for the assemblage was 14.7ºC.

At least 17 caddisfly taxa and 32 "clinger" taxa were supported here; it seems likely that sediment deposition did not limit colonization of stony substrates. The FSBI value (4.39) indicated a moderately sediment-sensitive fauna. Overall taxa richness (58) was slightly lower than expected for a low-order stream in the Middle Rockies ecoregion; this may be related to moderately impaired instream habitats. Catastrophes such as dewatering, sediment scour, or thermal stress probably were not influential, since 8 semivoltine taxa were collected. Filterers, especially the caddisfly *Brachycentrus occidentalis*, dominated the functional mix, suggesting that suspended organic fines were an important energy source. Shredders such as *Lepidostoma* sp. were notably abundant, and all other expected feeding groups were present as well.

3.3.4.2 MWB-SBC: Mill-Willow Bypass near mouth

Mayfly taxa richness was lower than expected at the Mill-Willow Bypass near mouth. Five taxa were collected, but only the ubiquitous *Baetis tricaudatus* was common. The biotic index value (4.85) indicated a moderately tolerant assemblage. The samples were dominated by filter-feeding caddisflies, especially early-instar *hydropsychids*, and by midges in the genera *Cricotopus* spp. and *Orthocladius* spp., common associates of filamentous algae. This pattern in the taxonomic composition of a low-order stream suggests nutrient enrichment. The metals tolerance index value (5.50) exceeded the biotic index value (4.85), and although the metals-sensitive taxon *Lepidostoma* sp. was present, it was not common, and heptageniid mayflies were poorly represented. Metals contamination cannot be ruled out here. The thermal preference for the assemblage was estimated at 15.6ºC.

Sediment deposition was probably not an important influence on the composition of the benthic assemblage here. Ten caddisfly taxa and 22 "clinger" taxa were counted in the collections. The FSBI value (3.80) indicated a moderately sediment-tolerant assemblage. Overall taxa richness (52) was lower than expected for a low-order stream in the Middle Rockies ecoregion. This suggests that instream habitats may have been monotonous or disturbed. Seven semivoltine taxa indicate that dewatering, thermal extremes or scouring sediment pulses were not influential. Filter-feeders (especially immature hydropsychid caddisflies and later-instar *Hydropsyche occidentalis*) and gatherers (especially among the midges) dominated the functional composition of the assemblage. This pattern is sometimes interpreted as evidence for water quality impairment. All other expected feeding groups were present in the mix.

3.3.4.3 WSC-SBC: Warm Springs Creek near mouth

Replicate samples collected from Warm Springs Creek near its mouth yielded 7 unique mayfly taxa, but the biotic index value (5.04) was higher than expected for a small stream in the Middle Rockies ecoregion. The dominant taxa were midges in the genera *Orthocladius* spp. and *Cricotopus* spp.; there were also significant numbers of naidid oligochaetes. Altogether these groups accounted for at least 45% of the sampled assemblage. Their abundance suggests that large crops of filamentous algae may characterize this site; this in turn suggests nutrient enrichment. The metals tolerance index value (5.36) exceeded the biotic index value (5.04), and heptageniid mayflies (*Cinygmula* sp. and immature instars) and *Lepidostoma* sp. together represented less than 2% of the animals in samples. Metals contamination cannot be ruled out at this site. The temperature preference calculated for this assemblage was 14.7ºC.

Ten caddisfly taxa and 29 "clinger" taxa suggest that sediment deposition did not limit colonization of stony substrate habitats. The FSBI value (4.84) indicates a moderately sediment-sensitive fauna. Overall taxa richness (50) was lower than expected for a low-order stream in the Middle Rockies ecoregion; instream habitats may have been monotonous or disrupted. The site supported at least 8 semivoltine taxa. Recent catastrophes such as dewatering, thermal stress, or toxic pollutants seem unlikely. Gatherers, especially among the midges, dominated the functional composition of the samples. This pattern is sometimes interpreted as evidence of water quality impairment. All other expected feeding groups were present.

3.3.4.4 SS-25: Silver Bow Creek at Warm Springs

Mayflies were neither diverse nor common in samples collected from Silver Bow Creek at Warm Springs. Only 4 mayfly taxa were noted, and these accounted for only 0.1% of sampled animals. The biotic index value (5.23) indicated an assemblage more tolerant than expected for a functioning low-order valley stream. Impaired water quality may be indicated. Large numbers of midges in the genera *Cricotopus* spp. and *Orthocladius* spp. were collected; these taxa are often associated with filamentous algae. Large crops of filamentous algae may result from nutrient enrichment. The abundance of invertebrates in samples was exceptionally high compared to all other sites sampled for this study; this finding is consistent with nutrient pollution. Other water quality problems may also be influential at this site; the metals tolerance index value (5.60) was higher than the biotic index value, and not a single heptageniid mayfly was present in the samples. *Lepidostoma* sp., a metals-sensitive caddisfly, was rare. Metals contamination cannot be ruled out at this site. The thermal preference calculated for the fauna was 16.7ºC.

Ten caddisfly taxa were counted, but only 16 "clinger" taxa were present. Sediment deposition may further stress the biological integrity at this site. The FSBI value (3.87) indicated a moderately sediment-tolerant assemblage. Overall taxa richness (54) was moderately depressed; instream habitats may have been monotonous or disrupted. The presence of 5 semivoltine taxa suggests that dewatering or thermal stress did not interrupt long life cycles. Filter-feeders, especially immature hydropsychid caddisflies, and mature *Ceratopsyche cockerelli* and *Hydropsyche occidentalis*, dominated the functional components of the fauna. All other expected feeding groups were represented. Suspended organic particulates were probably an important energy source in this reach.

3.3.4.5 CFR-03A: Clark Fork River near Galen

The 4 composite samples collected from the Clark Fork River site at Galen yielded 4 unique mayfly taxa; this is considerably fewer than expected for a small-to-mid-order river in the Middle Rockies ecoregion. The biotic index value (4.30) was only slightly elevated, compared to expectations for a mid-order river in the Middle Rockies ecoregion. These findings are consistent with mild nutrient pollution. Similar to the assemblages encountered in 2011, the midge *Cricotopus nostococladius* dominated. This midge is associated with the blue-green alga *Nostoc* sp. Twenty-three percent of the animals in the collection were *C. nostococladius*; the blue-green alga was likely the main component of the benthic substrate here. Despite the evidence for mild nutrient enrichment, abundant *Nostoc* sp. contrarily suggests that water quality was good, and that nitrogen was a limiting nutrient. Evidence for metals contamination, noted in 2011, was not apparent in the 2012 samples. The metals tolerance index value was lower than the biotic index value, and although not abundant, the heptageniid mayfly *Rhithrogena* sp. was present, along with other comparatively metals-sensitive taxa. The thermal preference calculated for the assemblage was 15.3ºC.

It seems likely that sediment deposition did not appreciably influence colonization of stony substrates, since 13 caddisfly taxa and 22 “clinger” taxa were counted. The FSBI value (4.43) indicated moderate sensitivity to sediment. Overall taxa richness was lower than expected for a small-to-mid-order stream; only 43 taxa were collected. This finding may be related to monotonous instream habitats, perhaps reflecting dense clumps of *Nostoc* sp. The site supported at least 7 semivoltine taxa, suggesting that scouring sediment pulses, thermal stress, dewatering, or other catastrophes that would limit long life cycles probably did not influence the benthic invertebrate assemblage in the reach. All expected feeding groups were present, and proportions of each group seemed appropriate for a functioning stream. Shredders, especially *Cricotopus nostococladius*, were abundant.

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

Seven mayfly taxa were counted in the samples collected at the Clark Fork River site at Deer Lodge, which is somewhat fewer than expected, while the biotic index value (4.54) was somewhat higher than expected for a small-to-mid order stream in the Middle Rockies ecoregion. Some nutrient enrichment may be indicated by these findings. This hypothesis is supported by the abundance of midges in taxa that may be associated with filamentous algae, including *Cricotopus* spp. and *Orthocladius* spp. Large crops of filamentous algae may be an indication of nutrient enrichment. Additionally, the fauna included several hemoglobin-bearing taxa, the most abundant of which was *Microtendipes* sp. This suggests substrate areas of hypoxia, which could be a consequence of nutrient enrichment and subsequent support of algal growth; warm water temperatures may also be implicated. Metals contamination cannot be ruled out at this site; the metals tolerance index value (4.90) exceeded the biotic index value, and heptageniid mayflies were not encountered in the samples. Tanytarsine midges were also scarce, but the relatively metals-sensitive caddisfly *Lepidostoma* sp. was present. The thermal preference of the assemblage was calculated at 15.8ºC.

Twenty-five “clinger” taxa and 13 caddisfly taxa were collected, suggesting that sediment deposition did not deter colonization of stony substrate habitats. The FSBI value (4.58) indicated a moderately sediment-sensitive fauna. Overall taxa richness (56) was within expectations; instream habitats may have been diverse and intact. Semivoltine taxa (6) were well-represented, indicating the unlikelihood of recent dewatering, scour, or toxic pollutants. Filter-feeders, especially among the hydropsychid caddisflies (e.g., *Hydropsyche occidentalis*,

Ceratopsyche cockerelli, and others, still in early instars) dominated the functional composition, suggesting that fine suspended organic particulates were a major energy source in this reach. The abundance of these animals is not unexpected for a mid-sized river in a wide valley setting. All other expected functional groups were also present.

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

Somewhat depressed mayfly taxa richness (7) at the Clark Fork River site above the Little Blackfoot River was coupled with a biotic index value (4.10) that was similar to expectations for a riverine site. Mild water quality impairment may be present, although there was little evidence to suggest large crops of filamentous algae. Heptageniid mayflies (*Rhithrogena* sp.) were scarce, but the relatively metals-sensitive caddisfly *Lepidostoma* sp. was not uncommon. The metals tolerance index was within expected limits. There appears to be minimal influence of metals contamination at this site. The thermal preference of the benthic fauna was calculated at 15.6ºC.

The site supported no fewer than 13 caddisfly taxa and 23 “clinger” taxa, making it seem likely that sediment deposition did not appreciably limit colonization of stony substrate habitats. The FSBI value (4.60) indicated a moderately sediment-sensitive assemblage. Overall taxa richness (50) was slightly lower than expected; instream habitats may have been somewhat homogeneous. The presence of 6 semivoltine taxa indicates that long life cycles were not aborted by catastrophic events such as dewatering, thermal extremes, or scour. Similar to the site near Deer Lodge, the fauna here was dominated by filter-feeders, and these were mostly immature hydropsychid caddisflies as well as identifiable specimens of *Ceratopsyche cockerelli*, *Hydropsyche occidentalis*, and *Cheumatopsych*e sp. All other expected feeding groups were represented, and proportions of all groups seemed appropriate for a functional riverine environment.

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

Ten mayfly taxa were collected in samples from the Clark Fork River at Gold Creek. Although richness in this group was within expectations for a mid-order river in the Middle Rockies ecoregion, the biotic index value (4.76) indicated a moderately-tolerant fauna. There were moderate numbers of midge taxa that may be associated with filamentous algae (e.g., *Cricotopus* sp. and *Orthocladius* spp.). In addition, there were substantial numbers of hemoglobin-bearing midges, especially *Microtendipes* sp., which accounted for 8% of sampled animals. These midges are tolerant of low oxygen conditions, and suggest that areas of hypoxic sediments may characterize the site. Nutrient enrichment, warm water temperatures, or both, may be present. The faunal thermal preference was 15.3ºC.

Samples yielded 29 “clinger” taxa and 12 caddisfly taxa. Sediment deposition probably did not substantially influence the benthic invertebrate assemblage. The presence of the hyporheic stonefly *Paraperla* sp., although rare in the samples, also suggests that interstitial spaces were not clogged with fine sediment. The FSBI value (4.65) indicated a moderately sediment-sensitive fauna. Overall taxa richness (63) was within expectations for a mid-order river in the Middle Rockies ecoregion; this may reflect diverse, intact instream habitats. Eight semivoltine taxa were counted, indicating stable instream conditions, without recent catastrophic scour, dewatering, or toxicity. Both filterers (especially the hydropsychid caddisflies characteristic of the upstream Clark Fork River sites) and shredders (especially *Cricotopus* sp.) were amply represented in the functional composition of the samples. All other expected feeding groups were also accounted for.

3.3.4.9 CFR-84F: Clark Fork River near Drummond

Metric indicators of water quality gave conflicting results for samples collected from the Clark Fork River near Drummond. Mayfly taxa richness (9) was relatively high, which suggests good water quality, but the biotic index value (5.23) was elevated compared to expectations, indicating a relatively tolerant invertebrate assemblage. The dominant taxon was *Microtendipe*s sp., a hemoglobin-bearing midge that accounted for 24% of sampled animals. The abundance of this midge suggests that hypoxic sediments characterized the reach; nutrient enrichment with enhancement of algal growth, warm water temperatures, or both, could account for low oxygen conditions. Although there was evidence indicating the possibility of metals contamination in 2011, such evidence could not be discerned in 2012. The thermal preference calculated for the benthic fauna was 16.6ºC.

Fourteen caddisfly taxa and 21 "clinger" taxa were counted in samples, suggesting that sediment deposition did not limit colonization of stony substrate habitats. The FSBI value (4.56) indicated a moderately sediment-sensitive fauna. Overall taxa richness (50) was slightly depressed, perhaps related to somewhat monotonous instream habitats. It seems likely that catastrophes such as dewatering, thermal extremes, or scour were not influential, since the site supported at least 6 semivoltine taxa. Filterers, especially *Microtendipes* sp., immature hydropsychid caddisflies, and later instar *Hydropsyche occidentalis* and *Cheumatopsych*e sp. dominated the functional mix, which is not unexpected in a mid-order riverine environment. All other expected feeding groups were also present.

3.3.4.10 CFR-116A: Clark Fork River at Turah

Relatively high mayfly taxa richness (9) and a low biotic index value (3.77) suggest that water quality in the Clark Fork River at Turah was good. Although the metals tolerance index value (4.11) exceeded the biotic index value, it seems unlikely that metals contamination influenced the biological integrity here; heptageniid mayflies (*Rhithrogena* sp.) were common in the samples, and the metals-sensitive caddisfly *Lepidostoma* sp. was also collected here. The thermal preference of the sampled assemblage was calculated to be 14.9ºC. This is the lowest thermal preference calculation among the Clark Fork River sites in 2012.

Both caddisflies (11 taxa) and "clingers" (26 taxa) were well-represented, strongly suggesting that stony substrate habitats were not inundated by deposited sediment. The FSBI value (5.30) indicates a sediment-sensitive fauna. Overall taxa richness (56) was within expectations for a riverine environment. This suggests that instream habitats were diverse and undisrupted. Similar to the other Clark Fork River sites, ample numbers of semivoltine taxa (7) were evident. Filter-feeders dominated the functional composition of the samples, and all other expected feeding groups were also present. Suspended fine organic particulates were probably an important energy source in this reach.

3.3.4.11 LC-7: Lost Creek near mouth

Metric indicators of water quality suggest poor conditions at the Lost Creek near mouth site. Mayflies were rare in the replicate samples; only 9 individuals were collected and only 3 taxa were represented. The biotic index value (6.34) indicated the most tolerant fauna of any in this study. Highly tolerant organisms accounted for 42% of sampled animals, and included leeches (e.g., *Helobdella stagnalis*), tolerant amphipods (*Gammarus* sp.), and snails. There was no discernible evidence of metals contamination, but the taxonomic composition of the fauna suggests nutrient pollution, organic pollution, or both. Warm water temperatures may also be

indicated; no cold stenotherms were collected, and the thermal preference of the assemblage was calculated at 17.0ºC, suggesting the warmest thermal conditions of any site in this study.

Sediment deposition may also have influenced the benthic assemblage here; caddisfly taxa richness (7) was lower than expected, and only 16 "clinger" taxa were counted. The FSBI value (3.21) indicated a sediment-tolerant fauna. Overall taxa richness (42) was low; monotonous or disrupted instream habitats may account for this. The site supported at least 7 semivoltine taxa; dewatering, thermal extremes, or scouring sediment pulses seem unlikely. Gatherers and scrapers overwhelmed the functional composition of the assemblage; poorly balanced functional mix may be due to water quality degradation or loss of habitat integrity.

3.3.4.12 RTC-1: Racetrack Creek near mouth

Mayfly taxa richness (7) in samples collected from the Racetrack Creek near mouth site was similar to expectations for a low-order stream in the Middle Rockies ecoregion, and the biotic index value (3.86) indicated a moderately sensitive invertebrate fauna. These findings suggest good water quality; however, the metals tolerance index value (4.60) was higher than the biotic index value. Although a few heptageniid mayflies (*Cinygmula* sp.) were collected, metals contamination cannot be ruled out in this reach. The dominant taxon in samples was the midge *Pagastia* sp., which is assigned a high metals tolerance value (9); *Pagastia* sp. accounted for 15% of sampled animals. The thermal preference calculated for the assemblage was 16.1ºC.

Caddisfly taxa richness (9) and "clinger" taxa richness (26) were both within expectations for a valley stream without appreciable sediment deposition. The FSBI value (4.62) indicated a moderately sediment-sensitive fauna. Moderately depressed overall taxa richness (57) may be related to monotonous or disrupted instream habitats. It seems likely that surface streamflow persisted year-round, and that the benthic invertebrate assemblage was not influenced by events that would abort long life cycles; the site supported at least 7 semivoltine taxa. Gatherers, especially among the chironomids (e.g., *Pagastia* sp.) and mayflies (e.g., *Baetis tricaudatus*) dominated the functional mix. Filterers were rare.

3.3.4.13 LBR-CFR: Little Blackfoot River near Garrison

Six mayfly taxa were collected in samples collected from the Little Blackfoot River near Garrison, but the biotic index value (5.84) was higher than expected for a low-to-mid order stream in the Middle Rockies ecoregion. This indicates a relatively tolerant assemblage, and suggests impaired water quality. Large numbers of oligochaetes in the sub-family Naidinae and abundant midges in the genera *Eukiefferiella* spp. and *Tvetenia* spp. suggest the presence of filamentous algae. Large crops of filamentous algae may be an indication of nutrient enrichment. The thermal preference for the assemblage was calculated at 15.5ºC.

Caddisflies (13 taxa) and "clingers" (29 taxa) were well-represented, suggesting that stony substrate habitats were not inundated by deposited sediment. The FSBI value (4.11) indicated a moderately sediment-sensitive fauna. Overall taxa richness (69) was within expectations for a stream with diverse and intact instream habitats. Eleven semivoltine taxa were counted in samples, suggesting that recent dewatering or thermal extremes did not influence the assemblage here. Gatherers and filterers were the most abundant functional components; this pattern is sometimes interpreted as evidence for water quality degradation. All other expected feeding groups were present.

3.3.4.14 FC-CFR: Flint Creek near mouth

The sampled site on Flint Creek near mouth supported at least 9 mayfly taxa, and the biotic index value (3.63) indicated a relatively sensitive fauna. The metals tolerance index value (3.64) exceeded the biotic index by a very small amount. A few heptageniid mayflies (*Heptagenia* sp. and *Rhithrogena* sp.) were present, and the metals-sensitive caddisfly *Lepidostoma* sp. was common in samples. These contrary findings suggest that metals contamination cannot be ruled out at this site. The thermal preference calculated for the assemblage was 15.2ºC.

It seems likely that sediment deposition did not appreciably limit colonization of stony substrates, since 12 caddisfly taxa and 26 "clinger" taxa were counted in the samples. The FSBI value (4.52) indicated a moderately sediment-sensitive fauna. Overall taxa richness (58) was somewhat lower than expected for a low-order stream in the Middle Rockies ecoregion; this finding may be related to monotonous or disturbed instream habitats. Semivoltine taxa were well-represented; 9 such taxa were collected. Year-round surface streamflow and stable instream conditions are indicated. Filterers dominated the functional composition of the assemblage. Dominance by this group is suggestive of water quality impairment in low-order systems; suspended fine organic particulates were probably an important energy source in the reach. All other expected functional groups were accounted for.

3.3.4.15 RC-CFR: Rock Creek near mouth

Eleven unique mayfly taxa were supported at this site on Rock Creek near mouth, but the biotic index value (6.01) indicated a tolerant invertebrate assemblage. Oligochaetes in the subfamily Naidinae dominated the samples, accounting for 34% of animals. Large numbers of midges in the genera *Eukiefferiella* spp. and *Orthocladius* spp. were present, as were numerous early instar midges in the subfamily Orthocladiinae. These taxa are often associated with filamentous algae, and are possibly indications of nutrient enrichment at this site. The thermal preference calculated for the fauna was 15.0ºC.

Sediment deposition apparently did not appreciably limit access to stony substrate habitats, since 11 caddisfly taxa and 30 "clinger" taxa were counted. The FSBI value (4.53) indicated a moderately sediment-sensitive assemblage. Overall taxa richness (62) was similar to expectations for a lower-order stream in the Middle Rockies ecoregion. Long-lived semivoltine taxa were well-represented (10 taxa). Gatherers, especially naidid oligochaetes, the midge *Micropsectra* sp. and immature orthoclad midges, strongly dominated the functional composition of the fauna, accounting for 79% of the mix. This pattern is sometimes interpreted as evidence for water quality degradation. Other functional groups were poorly represented.

3.4 Conclusions

- Among headwaters and mainstem Clark Fork River sites, 2 sites did not meet the remedial actions goal stated in the Clark Fork River Monitoring Plan (i.e., a score >80% for the metals pollution subset). These sites were: Silver Bow Creek at Warm Springs (SS-25) with a mean score of 50.00%, the Clark Fork River at Deer Lodge (CFR-27H) with a mean score of 79.17%. Three tributary sites also did not achieve scores above the impairment threshold for metals: these were the sites on Lost Creek (LC-1), the Little Blackfoot River (LBR-CFR), and Rock Creek (RC-CFR).

- On the basis of the taxonomic composition of the macroinvertebrate fauna and the performance of the metals tolerance index, the influence of metals contamination was a

possible stressor at all headwaters sites, at the mainstem Clark Fork River site at Deer Lodge (CFR-27H), and at tributary sites on Racetrack Creek (RTC-1) and Flint Creek (FC-CFR).

4 PERIPHYTON

4.1 Introduction

This chapter describes results of periphyton monitoring within the CFROU in 2012. A total of fifteen sites were sampled; seven sites in the Clark Fork River or Silver Bow Creek mainstem and eight sites in tributaries. 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.

Periphyton samples were analyzed for non-diatom algae, diatom taxonomy, and community structure. A suite of metrics were applied to these diatom data to assess the degree of impairment from metals, nutrients, and sedimentation. These metrics included a stressor-specific tool developed for the Middle Rockies Ecoregion (Teply 2010a; Woods et al. 2002) and adopted by MDEQ as a periphyton standard operating procedure for determining the probability of sediment impairment (MDEQ 2011). In addition, a variety of diatom metrics developed for Montana mountain streams were used (Bahls et al. 1992; Bahls 1993; Teply and Bahls 2005) which are based on autecological preferences or requirements of freshwater diatoms (Lowe 1974; Van Dam et al. 1994; Bahls 2006).

Potential water quality or habitat stressors at each site, identified by the taxonomic and functional composition of the benthic flora, are described in a series of site-specific narratives.

4.2 Methods

4.2.1 Sampling

In September 2012, benthic macroinvertebrates and periphyton were sampled at six sites in the Clark Fork River, one site in Silver Bow Creek, and at eight sites in tributary streams. Tributary sites were located in Mill-Willow Creek (two sites), Warm Springs Creek, Lost Creek, Racetrack Creek, the Little Blackfoot River, Flint Creek, and Rock Creek. Atkins collected periphyton samples from September 11-13, 2012. One composited periphyton sample was collected at each of the fifteen sites (Table 4-1). Samples were collected using a Hess sampling device following standard methods and preserved with alcohol in the field. Periphyton samples were collected following the MDEQ PERI-1 method for flowing streams where a defined reach has not been established (MDEQ 2012a). Periphyton samples were preserved in the field with Lugols IKI solution and kept on ice prior to refrigeration in the laboratory.

Table 4-1. Periphyton sampling sites in the Clark Fork River Operable Unit, September 2012.

Site description	Site number	USGS site number	Latitude	Longitude
SBC at Warm Springs	SS-25	12323750	46.18123	-112.77917
Clark Fork near Galen	CFR-03A	12323800	46.20877	-112.76740
Clark Fork at Deer Lodge	CFR-27H	12324200	46.39796	-112.74283
Clark Fork above Little Blackfoot River	CFR-42G	12324400	46.51111	-112.78977
Clark Fork at Gold Creek	CFR-53C	12324680	46.59004	-112.92864
Clark Fork near Drummond	CFR-84F	12331800	46.71204	-113.33137
Clark Fork at Turah	CFR-116A	12334550	46.82646	-113.81424
Mill-Willow Creek at Frontage Road	MCWC-MWB	none	46.12649	-112.79876
Mill-Willow Bypass near mouth	MWB-SBC	none	46.17839	-112.78270
Warm Springs Creek near mouth	WSC-SBC	12323770	46.18041	-112.78592
Lost Creek near mouth	LC-CFR	12323850	46.22665	-112.76017
Racetrack Creek near mouth	RC-CFR	none	46.28406	-112.74484
Little Blackfoot River near mouth	LBR-CFR	12324590	46.51964	-112.79312
Flint Creek near mouth	FC-CFR	12331500	46.62891	-113.15151
Rock Creek near mouth	RC-CFR	12334510	46.72153	-113.68169

4.2.2 Laboratory Analysis

4.2.2.1 Non-Diatom Algae

To prepare samples for analysis of soft-bodied (non-diatom) algae, raw periphyton samples were vigorously shaken in the original sample container to homogenize the sample. The contents were then emptied into a porcelain evaporating dish. A small, random subsample of the liquid fraction with suspended algal material (approximately 3-5 drops) was dispensed onto a standard glass microscope slide using a disposable plastic dropper. Visible (i.e., macroscopic) soft-bodied algae were teased apart and subsampled in proportion to their estimated importance relative to the total volume of algal material in the sample, and this material was added to the liquid fraction on the slide. The assembled subsample was then covered with a 22x30 mm cover slip, and the completed wet mount was analyzed for soft-bodied algae as described below.

Soft-bodied algae were identified to genus using an Olympus BHT compound microscope under 100X, 200X, and/or 400X magnification. The relative abundance of each soft-bodied 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 subsample,
- occasional (o): multiple occurrences, but infrequently observed,
- common (c): multiple occurrences, regularly observed,
- frequent (f): present in nearly every field of view,
- abundant (a): multiple occurrences in every field of view,
- dominant (d): multiple occurrences in every field of view in abundances beyond practical limits of enumeration.

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

4.2.2.2 Diatom Algae

To prepare samples for diatom analysis, organic matter was oxidized and permanent fixed mounts of cleaned diatom material were prepared. Each raw periphyton sample was vigorously shaken in the original sample container to thoroughly homogenize the material, and a subsample of approximately 20 mL was poured into a 250 mL Pyrex beaker. Each beaker was treated with 30-50 mL of concentrated sulfuric acid (H_2SO_4), and a small quantity 30% hydrogen peroxide (H_2O_2) and granulated potassium dichromate ($K_2Cr_2O_7$). Samples were then covered with a Pyrex watch glass and heated to near-boiling for 1-2 hours to completely oxidize all organic matter in the sample. Samples were then allowed to cool, and topped off with deionized water. The diatom material was allowed to settle for at least 8 hours, and the clear supernatant decanted; this process was repeated at least five times to thoroughly flush all traces of oxidants from the diatom material.

Subsample volumes were adjusted to obtain acceptable densities of diatom cells in suspension, and a small amount of each sample was dispersed onto clean 22-mm square glass cover slips. The cover slips were air dried, heated to 150 ºF, and affixed onto standard glass microscope slides with Naphrax mounting medium to create a permanent mount of diatom cells (frustules). To ensure a high quality mount for diatom identification and to make replicates available for archives, at least two slide mounts were made from each sample; one of the replicates was selected from each sample batch for analysis. An Olympus BHT compound microscope with a SPlan oil immersion objective (1000X total magnification) was used for diatom counts and identifications. The XY-axis coordinates were recorded at the top edge of the cover slip to define the starting point for a transect line, and a proportional count of 800 diatom valves (400 frustules) was preformed within a one-field-of-view width along the transect. All diatoms encountered during the proportional count were identified to the lowest taxonomic level practical.

4.2.3 Data Analysis

4.2.3.1 Non-Diatom Algae

Non-diatom algae genera identified at each of the 15 monitoring sites, with the estimated relative abundance and biovolume ranking of each taxon, are presented in Appendix E. Estimated relative abundance and biovolume of diatom algae at each site, with all taxa considered collectively under the division Bacillariophyta, are included for comparison with non-diatom algae. The number of "major" non-diatom genera present at each site (defined as those genera with estimated occurrence in a sample of at least "occasional") are presented in Table 4-2.

4.2.3.2 Diatom Algae

Diatom species identified at each site, with cell counts and the calculated percent relative abundance of each taxon, are presented in Appendix F. A suite of diatom metrics and bioassessment indices were calculated to assess water quality impairment at each site (Appendix F). Diatom metrics are based on diatom autecology and community structure, some of which were developed specifically for Montana streams. Several diatom metrics utilize the concept of "increaser taxa", which recognize that some diatom species are particularly tolerant of specific environmental conditions such as sedimentation, metal contamination, or nutrient enrichment (Teply 2010a; Teply and Bahls 2005). Additional metrics were developed based on known environmental preferences, functional groupings, or other autecological requirements of

diatom species (Van Dam et al. 1994; Bahls 1993). Sediment impairment probabilities were calculated based on discriminate functions developed for MDEQ (Teply 2010a).

4.2.3.3 Bioassessment Indices

4.2.3.3.1 Sediment increaser taxa (Teply 2010a; 2010b)

Diatom taxa counts were evaluated to determine the probability of sediment impairment using a list of sediment increaser taxa for coldwater streams in the Middle Rockies Ecoregion (Teply (2010a; 2010b). Sediment increaser taxa have autecological preferences for sediment impaired habitats. The current impairment probability threshold for sediment impairment in Middle Rockies Ecoregion streams is 51%. Sites with a percent relative abundance of sediment increaser taxa >15.34 exceed the impairment probability threshold and are therefore classified as "sediment impaired". The percent relative abundance values of sediment increaser taxa are included in Appendix H and plotted in Figure 4-1.

4.2.3.3.2 Diatom biocriteria for Montana mountain streams (Teply and Bahls 2005)

Teply and Bahls (2005) proposed lists of diatom increaser taxa indicative of impairment in Montana mountain streams resulting from sediment, nutrients, metals, or non-specific causes. They developed equations to determine impairment probabilities based on the percent relative abundance of diatoms from each list in a given sample. The increaser taxa criteria were based on empirical observations of ecological attributes of diatoms from Montana mountain ecoregions. The diatom increaser taxa identified in Teply and Bahls (2005) were not adopted as SOPs because the likelihood for meeting performance criteria may be low, and the ability of these criteria to differentiate between specific causes of impairment may be low. For the sake of comparison, percent relative abundance values of metal and nutrient increaser taxa for each site are presented in Appendix H and plotted in Figure 4-2 and Figure 4-3.

4.2.3.3.3 Diatom association metrics for Montana mountain streams (Bahls 1993)

Bahls (1993) proposed a set of seven metrics to evaluate biological integrity in mountain streams in Montana. These metrics are based on diatom associations in reference (i.e., relatively unimpaired) and impaired streams under a variety of impairment circumstances. Included are metrics indicative of impairment for sedimentation, nutrient enrichment, and metal contamination.

Bahls (1993) biological integrity bioindex synthesizes more specific bioindices from several sources: three pollution tolerance groups defined by Lange-Bertalot (1979), diatom autecological profiles described by Lowe (1974), and unpublished Montana diatom data described later in Bahls (2006). Diatom species were assigned to numerical categories (i.e., "most-tolerant", "less-tolerant", "sensitive") for tolerance to siltation, nutrient enrichment, mineral salts, elevated temperatures, and metal toxicity. For example, a large number of diatom taxa are motile (i.e., capable of motion), which may be an adaptation to siltation; motility allows individual diatom cells to avoid inundation. The total percent abundance of motile diatom taxa (e.g., *Navicula*, *Nitzschia* and *Surirella* sp.) provides the basis for the siltation index (Bahls 1993).

Biocriteria evaluate the level of environmental stress or impairment, rate biological integrity, and evaluate any impairments to beneficial aquatic life uses. Values for the seven biological integrity metrics and the overall rating for each site are presented in Appendix H and summarized in Table 4-3, based on criteria in Appendix H**.**

4.2.3.3.4 Additional diatom association metrics (Van Dam et al. 1994)

The percent relative abundance of diatoms representing a range of tolerance inorganic nutrients is presented for each site (Figure 4-4). The percent relative abundance of diatoms with specific nitrogen metabolism processes which the degree of organic nitrogen tolerance for those organisms is presented for each site (Figure 4-5). The percent relative abundance of diatoms intolerant of hypoxia and elevated biological oxygen demand is presented for each site (Figure 4-6).

4.2.3.4 Ecological Interpretations

Narrative interpretations are reported to infer the degree and potential causes of water quality impairment for each site. These interpretations are based on the taxonomic composition, autecological preferences, and functional organization of non-diatom and diatom components of the periphyton assemblage at each monitoring site

Varying tolerance to inorganic and organic nutrients have been established among non-diatom and diatom algae; some taxa are sensitive to nutrient enrichment and other taxa are tolerant of, nutrient enrichment (Prescott 1962; Wehr and Sheath 2003; Bahls 2006).

Some soft-bodied algae are sensitive to metals, particularly copper. However, some taxa (e.g., *Cladophora, Mougeotia, Scenedesmus, Stigeoclonium,* and *Ulothrix* sp.) are tolerant of metals (Shaw 1990). Filamentous green algae tends to be more sensitive to copper compared to colonial (i.e., mat-forming) cyanobacteria. Colonial cyanobacteria are tolerant of metals due to gelatinous mucilage (i.e., slime coating).

Diatom assemblages may also indicate metal contamination. Elevated metals cause teratological growth forms (i.e., abnormalities in cell walls) in diatoms (Falasco et al. 2009). Diatom species that increase in abundance in response heavy metals were identified by Teply and Bahls (2005) and Stoermer and Smol (1999).

4.3 Results

4.3.1 Non-Diatom Algae

The number of “major” (i.e., those with a ranking for estimated abundance of “occasional” or greater) non-diatom algae genera identified at each site monitored in 2012 are presented in Table 4-2. All genera of non-diatom algae, identified in the 2012 samples with the estimated abundance and biovolume rank relative to other non-diatom genera and diatom algae, are presented in Appendix H.

Table 4-2. Number of major[a] non-diatom algae genera (by algal division) present at Clark Fork River Operable Unit monitoring sites, 2012.

Algal Division: / Monitoring Site	Chlorophyta Green Algae	Cyanophyta Blue-green Algae[b]	Rhodophyta Red Algae	Xanthophyta Yellow-green Algae	Phaeophyta Brown Algae	Total Major[a] Genera
MCWC-MWB	9	6	1	1	0	17
MWB-SBC	7	7	0	0	0	14
SS-25	5	4	0	0	0	9
WSC-SBC	4	2	1	0	0	7
CFR-03A	3	6	1	0	0	10
LC-7	7	3	2	1	0	13
RTC-1	7	3	1	2	1	14
CFR-27H	6	4	0	0	0	10
CFR-42G	6	3	0	0	0	9
LBR-CFR	10	4	1	2	0	17
CFR-53C	6	5	0	0	0	11
FC-CFR	11	5	1	0	0	17
CFR-84F	5	2	1	1	0	9
RC-CFR	6	3	1	0	0	10
CFR-116A	9	6	1	0	1	17

[a] Defined as being at least "occasional" in estimated abundance; only "rare" genera are not included (see Periphyton methods, Section 4.2).
[b] a.k.a., Cyanobacteria.

At CFROU sites in 2012, the number of major non-diatom algae genera ranged from 7-17 (Table 4-2). The fewest major non-diatom algae genera occurred at WSC-SBC (Warm Springs Creek). The most major non-diatom algae genera occurred at four sites: MCWC-MWB (Mill and Willow Creeks), LBC-CFR (Little Blackfoot River), FC-CFR (Flint Creek), and CFR-116A (Clark Fork at Turah). At the remaining sites there were 9-11 major non-diatom genera present: SS-25 (Silver Bow Creek) and the five Clark Fork sites between Warm Springs and Drummond. Tributary sites generally had more non-diatom taxa (12-17) than Clark Fork River mainstem sites, with the exceptions of RC-CFR (Rock Creek, 10 taxa) and WSC-CFR (Warm Springs Creek, 7 taxa).

Non-diatom genera, five algal divisions, were identified in 2012 (Table 4-2). A total of 42 genera were identified among the 15 monitoring sites (Appendix H). Among all sites, the order of most genera by algal division was: Chlorophyta (green algae), Cyanophyta (blue-green algae), Rhodophyta (red algae), Xanthophyta (yellow-green algae), and Phaeophyta (brown algae). Each division was represented by at least one genus as a “major” taxon, at one or more of the monitoring sites. Some of these algae are of interest as indicators of specific environmental conditions.

Green algae genera (Chlorophyta) outnumbered blue-green algae genera (Cyanophyta or Cyanobacteria) at all but two sites: CFR-03A (Clark Fork near Galen) and MWB-SBC (Mil-Willow Bypass). Other algal divisions (Rhodophyta, Xanthophyta, and Phaeophyta) were either scarce or absent. The number of major genera belonging to Rhodophyta, Xanthophyta, Phaeophyta, or all of those, present at RTC-1 (Racetrack Creek), LC-7 (Lost Creek), and LBR-CFR (Little Blackfoot River) were 4, 3, and 3, at each site respectively. No major genera belonging to Rhodophyta, Xanthophyta, or Phaeophyta were identified at 5 of the 15 sites. High diversity of non-diatom algae may be indicative of clean water whereas low diversity may indicate toxic substances.

4.3.2 Diatom Bioassessment Indices

4.3.2.1 Diatom Increaser Taxa

The percent relative abundance and probability of impairment of diatom increaser taxa for sediment (Figure 4-1), metals (Figure 4-2), and nutrients (Figure 4-3) at the 15 sites monitored in 2012 are presented in Appendix H. As previously noted (see Section 4.2.3.2), the metals and nutrient increaser taxa indices have not been adopted as SOPs by MDEQ.

4.3.2.2 Sediment Increaser Taxa

Sediment increaser taxa were most abundant at site MCWC-MWB (Mill-Willow Creek at Frontage Road) (Figure 4-1). The probability of impairment (72%) for sediment increaser taxa at MCWC-MWB exceeded the impairment threshold (51%). Two other sites had impairment probabilities exceeding the sediment increaser taxa impairment threshold, LBR-CFR (Little Blackfoot River near mouth, 59%) and FC-CFR (Flint Creek near mouth, 62%). No other sites had sediment impairment probabilities which exceeded the threshold; the range of sediment impairment probabilities among the remaining sites was 19-42% (Figure 4-1).

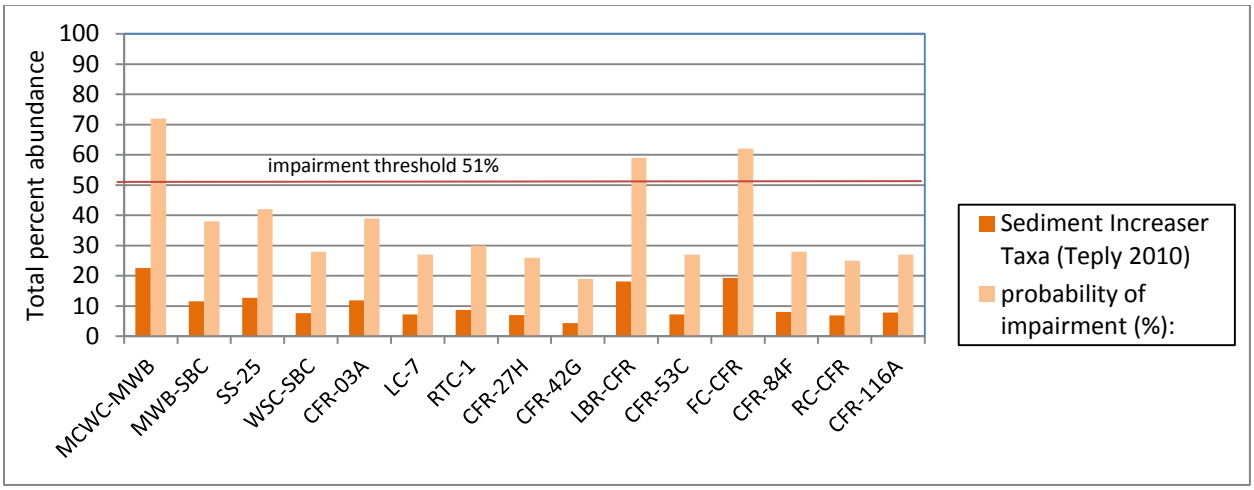

Figure 4-1. Total percent abundance and probability of impairment for diatom sediment increaser taxa bioassessment index (Teply 2010a).

4.3.2.3 Metals increaser taxa

Metals increaser taxa were most abundant at site CFR-84F (Clark Fork near Drummond) followed by site CFR-53C (Clark Fork at Gold Creek) (Figure 4-2). At those sites the probability of heavy metals impairment was >95% (Figure 4-2). The MWB-SBC (Mill-Willow Bypass near mouth) and SS-25 (Silver Bow Creek at mouth) sites also had high (~95%) probability of metals impairment (Figure 4-2). The probability of metals impairment at Clark Fork River mainstem sites CFR-03 (near Galen), CFR-42G (above the Little Blackfoot River), and CFR-116A (at Turah) were in the 70-80% range. The probability of metals impairment at the tributary sites WSC-SBC (Warm Springs Creek), LBR-CFR (Little Blackfoot River) and FC-CFR (Flint Creek) were also in the 70-80% range. The probability of metals impairment at the tributary sites LC-7 (Lost Creek), RTC-1 (Racetrack Creek), and RC-CFR (Rock Creek) were <20%. No impairment threshold has been established for metals increaser taxa in the CFROU. This index is provided to allow for comparisons of the relative magnitude of impairment probabilities between sites.

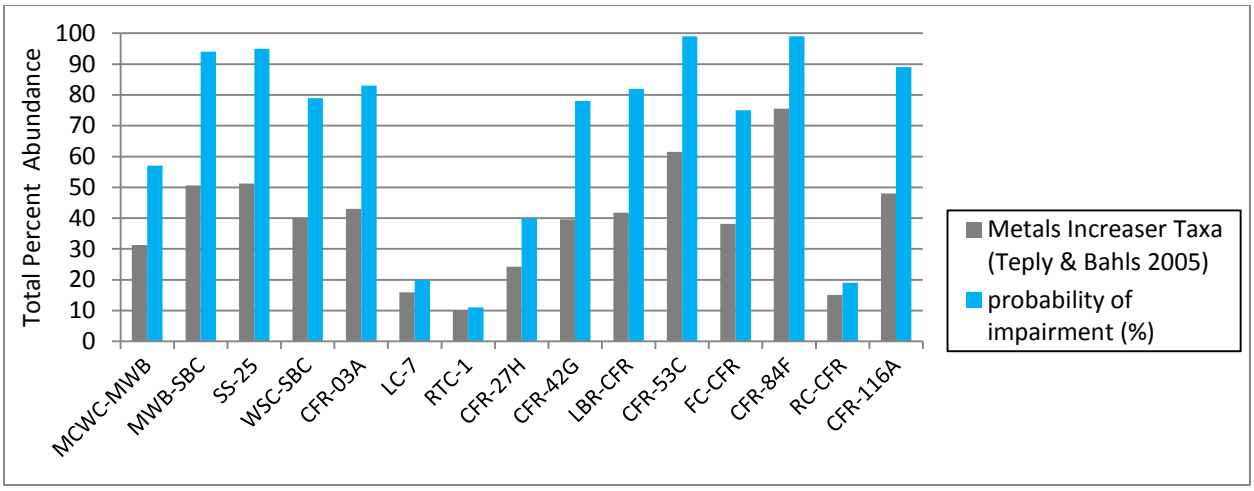

Figure 4-2. Total percent abundance and probability of impairment for diatom metals increaser taxa bioassessment index (Teply and Bahls 2005).

Some Clark Fork River mainstem sites had high (80-95%) probabilities of nutrient impairment based on nutrient increaser taxa relative abundances, specifically: CFR-03A (near Galen), CFR-42G (above the Little Blackfoot River), CFR-53C (at Gold Creek) and CFR-84F (near Drummond) (Figure 4-3). The tributary sites MCWC-MWB (Mill and Willow Creeks), SS-25 (Silver Bow Creek), LBR-CFR (Little Blackfoot River), and FC-CFR (Flint Creek), and the Clark Fork site CFR-116A (at Turah) had probabilities of nutrient impairment of ranging from 56-77% (Figure 4-3). The tributary sites MWB-SBC (Mill-Willow Bypass), WSC-SBC (Warm Springs Creek), LC-7 (Lost Creek), RTC-1 (Racetrack Creek) and RC-CFR (Rock Creek), had relatively low probabilities of impairment (8- 44%) (Figure 4-3). No impairment threshold has been established for nutrient increaser taxa in the CFROU. This index is provided to allow for comparisons of the relative magnitude of impairment probabilities between sites.

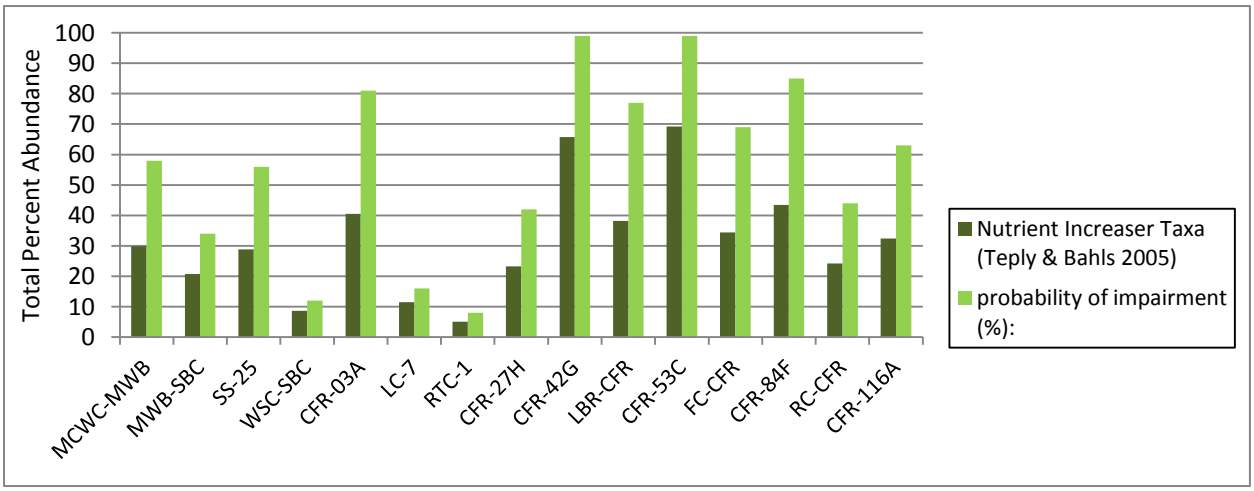

Figure 4-3. Total percent abundance and probability of impairment for diatom nutrient increaser taxa bioassessment index (Teply and Bahls 2005).

4.3.2.4 Diatom Association Metrics for Montana Mountain Streams

Metrics proposed by Bahls (1993) to evaluate biological integrity in Montana mountain streams, based on criteria in Appendix H, were determined for the diatom associations present at each CFROU site monitored in 2012. Results are summarized in Table 4-3, and are presented in Appendix H.

Table 4-3. Diatom association metrics and biological integrity[a] and impairment[b] ratings for Clark Fork River Operable Unit monitoring sites, 2012 (after Bahls 1993).

Diatom Metric: / Site	Diatom Species Richness	Shannon Diversity Index	Dominant Taxon, percent	Disturbance Taxon, percent	Pollution Index	Siltation Index	Abnormal Cells, percent	Biological Integrity[a]
MCWC-MWB	54	3.20	12.13	8.63	2.64	**30.50**	0.00	**Good**
MWB-SBC	47	**2.97**	20.25	4.00	2.66	**36.13**	0.00	**Good**
SS-25	40	**2.75**	**26.63**	1.00	**2.48**	**42.50**	0.00	**Fair**
WSC-SBC	38	**2.65**	**26.00**	20.88	2.77	**44.50**	0.00	**Fair**
CFR-03A	48	**2.98**	16.00	2.50	2.55	**34.88**	0.00	**Good**
LC-7	57	**2.94**	**26.38**	**26.38**	2.54	**22.63**	0.00	**Good**
RTC-1	39	**2.01**	**56.88**	**56.88**	2.82	10.75	0.00	**Fair**
CFR-27H	50	3.09	23.25	23.25	2.54	**21.25**	0.00	**Good**
CFR-42G	50	**2.50**	**29.25**	0.25	**2.44**	**21.13**	0.00	**Good**
LBR-CFR	52	3.22	14.50	2.13	2.51	**40.50**	0.00	**Fair**
CFR-53C	47	**2.36**	**47.13**	0.00	2.70	19.63	0.00	**Good**
FC-CFR	59	3.43	13.00	3.25	2.57	**42.75**	0.00	**Fair**
CFR-84F	37	**2.21**	**34.63**	0.25	2.81	15.50	0.00	**Good**
RC-CFR	42	**2.74**	22.88	4.00	2.83	16.00	0.00	**Good**
CFR-116A	46	**2.96**	15.25	11.63	2.69	**22.88**	0.00	**Good**

[a] Biological integrity rating is based numerical criteria for each diatom metric, see Appendix H.
[b] Impairment ratings coding: no accent = no impairment; bold accent = minor impairment; bold and underscored = moderate impairment.

Of the 15 sites monitored in 2012, 10 (67%) were rated "good" for biological integrity, 5 were rated "fair" for biological integrity (Table 4-3). An elevated siltation index was responsible for the "fair" biological integrity ratings at SS-25 (Silver Bow Creek), WSC-SBC (Warm Springs Creek), LBC-CFR (Little Blackfoot River), and FC-CFR (Flint Creek).

The siltation index was responsible, at least in part, for the minor "good" biological integrity ratings at MCWC-MWB (Mill and Willow Creeks), MWB-SBC (Mill-Willow Bypass), LC-7 (Lost Creek), and for the following Clark Fork River mainstem stations: CFR-03A, CFR-27H, CFR-42G, and CFR-116A. Reduced diversity index values also occurred at those same seven sites, which indicate impairment from environmental stress.

Site RTC-1 (Racetrack Creek) was rated "fair" for biological integrity due to the elevated abundance of disturbance taxon (e.g., diatom *Achnanthidium minutissimum*). This result was likely an indication of environmental stress, possibly caused by variable streamflows, water velocities, and temperatures at the site. Variability in streamflows, water velocities, and temperatures may have limited diatom species diversity by favoring taxon specialized post-disturbance recolonization. A slightly elevated disturbance taxon value at LC-7 (Lost Creek) may have also been due to harsh environmental conditions. The "good" biological integrity rating at RC-CFR (Rock Creek) resulted from the relatively high diversity index value at that site.

4.3.2.5 Additional Diatom Association Metrics

For each sites monitored in 2012, three metrics based on ecological attributes of diatom associations are presented. Diatom trophic state is the total percent relative abundance of diatoms tolerant to inorganic nutrients (i.e., nitrogen and phosphorus) (Figure 4-4). Diatom nitrogen metabolism is the total percent relative abundance of diatoms tolerant to organic nitrogen compounds (Figure 4-5). The total percent relative abundance of oxygen sensitive diatoms requiring high levels of dissolved oxygen saturation, and intolerant of elevated biological oxygen demand, is plotted in Figure 4-6.

The enrichment level inorganic nitrogen and phosphorus (i.e., trophic state) of a water body influences the algal community at a site. The response of many diatom taxa to inorganic nutrient enrichment (i.e., eutrophic conditions) is well known and provides the basis of the diatom trophic state index (Figure 4-4). Nutrient tolerant diatom species do not necessarily require high nutrient levels. Nutrient intolerant diatom species however are at a competitive disadvantage in nutrient enriched conditions. As a result, nutrient intolerant species tend to be reduced, or absent, in relative abundance under nutrient enriched conditions.

Figure 4-4 suggests moderately nutrient enriched (i.e., slightly eutrophic) conditions at all Clark Fork mainstem sites. At those sites, intolerant taxa abundance was low whereas tolerant taxa were abundant. Several of the tributary sites, particularly FC-CFR (Flint Creek), LBR-CFR (Little Blackfoot River), MWB-SBC (Mill-Willow Bypass) and probably MCWC-MWB (Mill-Willow Creeks) may have had somewhat lower nutrient levels, although the relative abundance of intolerant taxa was still low compared to the relative abundance of tolerant taxa. The remaining tributary sites (Rock Creek, Lost Creek, Silver Bow Creek, and Warm Springs Creek) had the greatest relative abundance of intolerant or indifferent nutrient diatom taxa, suggesting relatively low levels of nutrient enrichment at these sites.

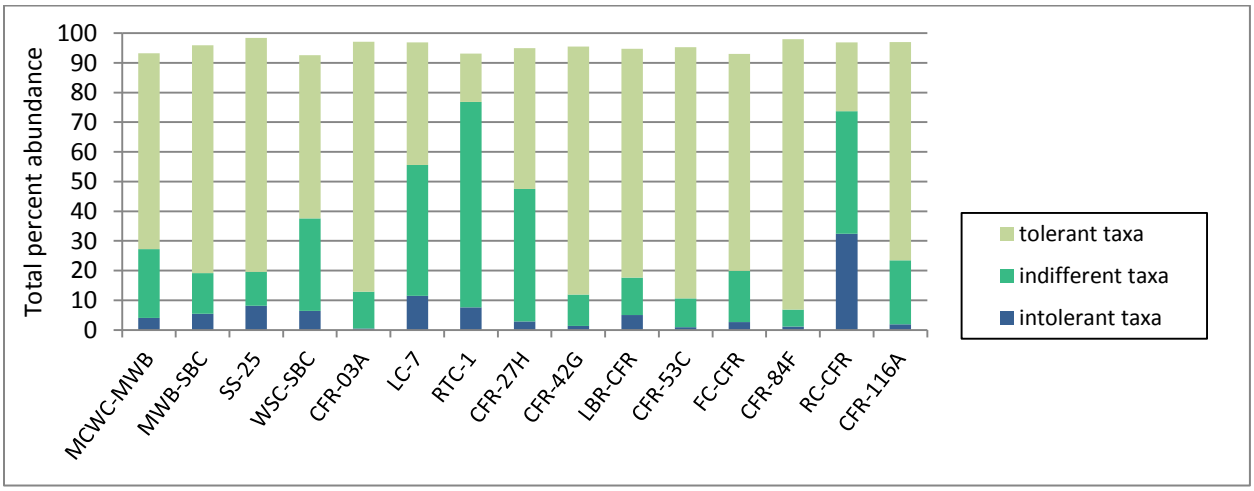

Figure 4-4. Variation in diatom trophic states among Clark Fork River Operable Unit monitoring sites, 2012; percent abundance of taxa tolerant to inorganic nutrients (after Van Dam et. al 1994).

Nitrogen enrichment may influence the composition of the algal community. Diatom taxa exhibit a range of tolerance nitrogen. Most diatoms are “nitrogen-fixers” (i.e., nitrogen-autotrophs, able to convert inorganic nitrogen to organic nitrogen) but in excessive concentrations are unable to utilize organic nitrogen. Some diatoms are metabolic specialists and are able to assimilate organic nitrogen (i.e., nitrogen-heterotrophs).

Nitrogen-autotroph diatoms were dominant at all sites monitored in 2012, with taxa tolerant of organic nitrogen concentrations more abundant than intolerant forms at all but one site (Figure 4-5). Site SS-25 (Silver Bow Creek) had the highest proportion of nitrogen-heterotrophic and one of the lowest values for nitrogen-autotrophic. SS-25 is immediately below the Warm Springs Ponds system and organic nitrogen from the ponds may be influence the diatom assemblage at this site. Relatively high proportions of nitrogen-heterotrophic diatom taxa, nitrogen-autotrophic diatom taxa, were also present at site MWB-SBC (Mill-Willow Bypass), and at site CFR-03A (the Clark Fork River at Galen). The highest proportion of nitrogen-autorophic diatoms were observed at Clark Fork River mainstem sites CFR-42G, CFR-53C, and CFR-84F between Deer Lodge and Rock Creek, and at RC-CFR (Rock Creek). These data suggest that, while tolerance of diatom assemblages to organic nitrogen varied between sites, organic nitrogen enrichment did not appear to strongly influence the diatom assemblages at these sites.

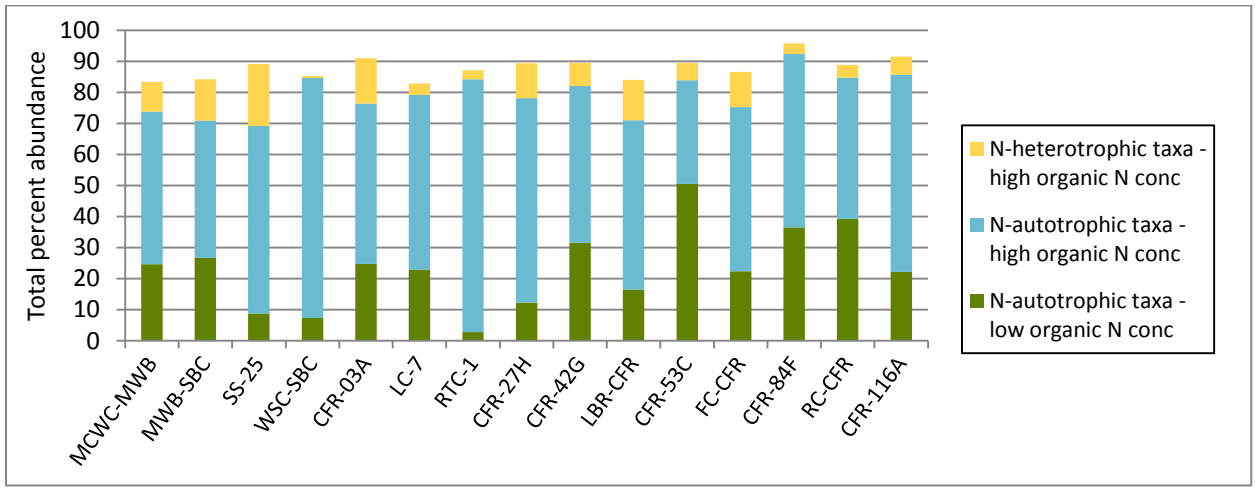

Figure 4-5. Variation in diatom nitrogen metabolism among Clark Fork River Operable Unit monitoring sites, 2012; percent abundance of taxa tolerant of organic nitrogen (after Van Dam et. al 1994).

The percent abundance of diatoms tolerating oligosaprobous (i.e., low rates of dead organic matter metabolism) and β-mesosaprobous (i.e., moderate rate of dead organic matter processing) conditions, and of those requiring >75% dissolved oxygen saturation instream, were compared by site (Figure 4-6). Diatoms intolerant of low (<75%) dissolved oxygen were dominant at all sites. These data suggest that no sites had impairments to diatom assemblages from hypoxia in 2012.

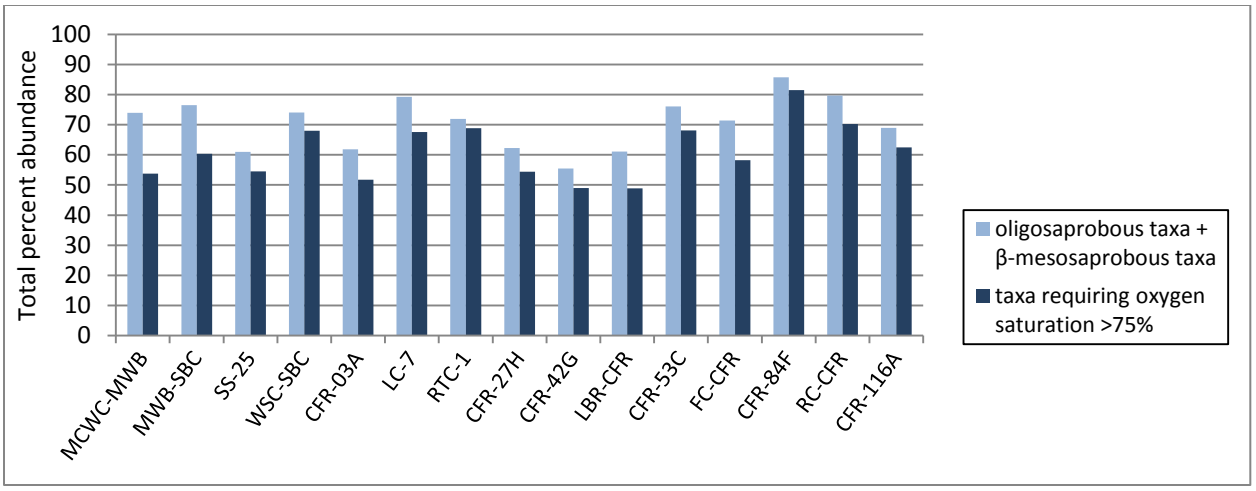

Figure 4-6. Variation in diatom oxygen demand among Clark Fork River Operable Unit monitoring sites, 2012; percent abundance of taxa intolerant to elevated biological oxygen demand (BOD) and hypoxia (after Van Dam et. al 1994).

4.3.3 Ecological Interpretations of Periphyton Assemblages

4.3.3.1 Non-Diatom Algae

From one to nearly a dozen genera of Chlorophyta (green algae) were observed at the monitoring sites in 2012 (Table 4-2). Genera observed at monitoring sites included filamentous forms (*Cladophora, Mougeotia, Oedogonium, Spirogyra, Stigeoclonium,* and *Ulothrix),* colonial forms (*Scenedesmus),* single-celled desmid algae (*Closterium* and *Cosmarium*) and coarse macroscopically-branched forms (*Chara*). These algae are generally indicative of cool, moderately nutrient enriched water. Many of these species are relatively tolerant of nutrients, acidity, metals, or combinations of those conditions. *Mougeotia, Stigeoclonium,* and *Ulothrix* have been observed in streams with elevated zinc concentrations. *Scenedesmus* is known to tolerate elevated copper concentration. *Cladophora* and *Ulothrix* are resistant to copper in paint used on watercraft and ship hulls (Shaw 1990). *Chara* occurs in streams that have high pH and elevated bicarbonate concentrations.

Of the Cyanophyta (blue-green algae), the genus *Nostoc* was a major component at 80% (12 of 15) of the monitoring sites. *Nostoc* has trichomes (i.e., appendages) encased in a tough colonial mucilage that is resistant to scour and desiccation. More importantly, *Nostoc* and several related Cyanophyta genera possess specialized cells called heterocytes that allow for nitrogen-fixation through enzyme reactions. This provides *Nostoc* with a competitive advantage over other non-diatom algae in water with low inorganic nitrogen concentrations. Additionally, several diatom species of the order Rhopalodiales (*Epithemia sorex, Epithemia turgid,* and *Rhopalodia gibba*) are known to harbor single-celled blue-green algae that also fix-nitrogen. These diatom taxa were present at a number of the monitoring sites in 2012, and are the basis for the percent Rhopaloiales metric in Appendix H.

From one to six additional genera of Cyanophyta occurred as major taxa at each of the 15 sites monitored in 2012. These included filamentous blue-green algae: *Phormidium, Chamaesiphon, Heteroleibleinia,* and *Homoeothrix.* All are microscopic benthic forms commonly identified in mountain ecoregion streams. *Phormidium* is a cosmopolitan form which occurs within a relatively broad range of habitats and water quality conditions, and can form extensive

macroscopic growths. *Chamaesiphon* generally prefers low to moderate levels of nutrients and dissolved solids and often is found on submerged substrates in coldwater mountain streams. In relatively unpolluted waters, large abundances of *Chamaesiphon, Heteroleibleinia* and *Homoeothrix* commonly occur as epiphytes (i.e., plants that grow on other plants) on filamentous green algae (e.g., *Cladophora* or *Oedogonium*) and often cover the cell walls of host alga.

The filamentous alga *Audouinella,* a member of the division Rhodophyta (red algae), is a cosmopolitan form that prefers circumneutral (i.e., pH between 6 and 8) to slightly alkaline water that is moderately low in nutrients and dissolved solids. *Audouinella* was a major taxon at 10 of 15 sites. *Audouinella* was the dominant non-diatom taxon at site WSC-CFR (Warm Springs Creek), and was abundant and had the highest estimated biovolume at site RTC-1 (Racetrack Creek). *Chroodactylon,* the only other red alga identified in 2012, is known to prefer cold water with elevated calcium bicarbonate levels. *Chroodactylon* occurred as a major taxon only at site LC-7 (Lost Creek), which originates as a high-elevation mountain stream in limestone geology.

The filamentous genera *Tribonema* and *Vaucheria,* both yellow-green algae (division Xanthophyta), were relatively numerous at site RTC-1 (Racetrack Creek) and LBR-CFR (Little Blackfoot River). Often these taxa occur in cool, nutrient-poor water that is slightly acidic due to elevated levels of dissolved humic susbstances (e.g., tannins) associated with decaying vegetation and bog environments.

The uncommon filamentous brown alga *Heribaudiella* (division Phaeophyta) was found only at site RTC-1 (Racetrack Creek). *Heribaudiella* is known to occur in cool water at higher current velocities, often with moderate levels of nutrients and alkalinity (Wehr and Sheath 2003).

4.3.3.2 Diatom Algae

More than 100 diatom species were identified among all sites in 2012. Several diatoms were of particular interest for because of specific autecological preferences and environmental requirements of those organisms (Appendix H). The percent Rhopalodiales metric suggests low levels of inorganic nitrogen relative to phosphorus in the water column.

The diatom *Achnanthidium minutissimum* is a specialist in re-colonizing stream substrates that have been subjected to physical disturbance such as scour or impacted by dewatering. The percent relative abundance of *A. minutissimum* is the basis for the disturbance index (Bahls 1993).

4.3.3.3 Site-Specific Narratives

The narratives that follow are based on review of results from analyses of data from individual sites, including the taxonomy and community structure of non-diatom and diatom algae and the suite of metrics derived from those data. Biological integrity and the degree of impairment of the aquatic biota are assessed for each monitoring site. The focus of each narrative is on water quality; specifically the influence of metals, nutrients, and sediment on diatom assemblages.

4.3.3.3.1 MCWC-MWB (combined Mill and Willow Creeks)

Non-diatom algae were diverse at MCWC-MWB. Seventeen major genera, representing four algal divisions were present (Table 4-2). Ten of these genera were green algae (Chlorophyta). The presence of green algae, blue-green alga *Nostoc* (order Cyanophyta), yellow-green alga *Vaucheria* (order Xanthophyta), and red alga *Audouinella* (order Rhodophyta) indicated “good” water quality, moderately nutrient rich, and conditions that were likely nitrogen-limited. Diatom

algae had the third highest species richness and Shannon diversity of the 15 sites monitored (Table 4-3). Diatom increaser taxa indicated a high probability of impairment by sediment (Figure 4-1) and moderate probabilities of impairment by metals (Figure 4-2), and nutrients (Figure 4-3). Biological integrity at MCWC-MWB was "good" (Table 4-3), with minor impairment related to sediment, and a low overall level of environmental stress (Appendix H).

4.3.3.3.2 MWB-SBC (Mill-Willow Bypass near mouth)

Non-diatom algae were less-diverse at MWB-SBC (Mill-Willow Creek near mouth) than at the upstream site on Mill-Willow Creek (Table 4-2). The 14 major genera were divided equally between green algae and blue-green algae. Green algae comprised much of the algal biovolume in the sample (Appendix H). Moderate enrichment by inorganic nutrients was indicated, with limited levels of inorganic nitrogen relative to phosphorus suggested by the relative importance of the blue-green algae *Nostoc* and *Tolypothrix*. Diatom species richness and Shannon diversity values were high, but lower than upstream at the upstream, Mill-Willow Creek site. Diatom increaser taxa indicated high probability of impairment by metals (Figure 4-2), and moderate probabilities of impairment by nutrients (Figure 4-3) and sediment (Figure 4-1). Biological integrity at MWB-SBC was "good" (Table 4-3), with minor impairment from sediment and a low level of environmental stress (Appendix H).

4.3.3.3.3 SS-25 (Silver Bow Creek at mouth)

There were nine non-diatom algae genera, about equally divided between green and blue-green algae, in Silver Bow Creek (Table 4-2). Of the 15 sites sampled in 2012, SS-25 was one of only four sites with fewer than 10 major non-diatom algae genera present. Two filamentous green algae genera (*Oedogonium* and *Cladophora*) were responsible for most of the algal biovolume at SS-25. These taxa are indicative elevated of nutrients, particularly nitrogen, and are tolerant are relatively tolerant of metals. Diatom species richness and Shannon diversity were slightly depressed, likely due to environmental stress. Diatom increaser taxa indicated a high probability of impairment by metals (Figure 4-2), and moderate probabilities of impairment by nutrients (Figure 4-3) and sediment (Figure 4-1). Higher percent relative abundance values for diatoms tolerant of elevated inorganic nutrients (Figure 4-4) and organic nitrogen (Figure 4-5) suggest nutrient enrichment in the reach below the Warm Springs Ponds. Biological integrity at SS-25 was "fair" (Table 4-3), with the siltation index suggesting moderate impairment of the biota due to sediment (Appendix H).

4.3.3.3.4 WSC-SBC (Warm Springs Creek near mouth)

Seven major genera of non-diatom algae were identified at Warm Springs Creek (WSC-SBC), the fewest number at any of the 15 sites sampled in 2012. The two most numerous taxa were the red alga *Audouinella* and the green alga *Ulothrix.* Presence of *Audouinella* and *Ulothrix* indicate cool, relatively nutrient-poor water. The near absence of blue-green algae at WSC-SBC suggests adequate levels of inorganic nitrogen relative to phosphorus. Diatom species richness and Shannon diversity were near the lowest observed among all sites in 2012 (Table 4-3), indicating at least a moderate degree of environmental stress. Diatom increaser taxa indicated a low probability of impairment by nutrients (Figure 4-3) and sediment (Figure 4-1), but a moderate probability of metals (Figure 4-2) impairment (Appendix H). Most diatom taxa present at WSC-SBC were relatively intolerant of inorganic nutrients and organic nitrogen, and required a relatively high level of oxygen saturation (Figures 4-4 through 4-6; Appendix H). Biological integrity at WSC-SBC was "fair" (Table 4-3), with moderate impairment of the biota indicated by the siltation index (Appendix H). The siltation index contradicted the sediment increaser taxa results; all other diatom metrics for mountain streams indicated only minor impairment or an unimpaired biota at WSC-SBC (Appendix H).

4.3.3.3.5 CFR-03 (Clark Fork near Galen)

Ten major non-diatom genera were identified at Clark Fork headwaters site CFR-03 (Table 4-1. The cyanobacterium *Nostoc* and diatom algae were responsible for most of the algal biovolume present at CFR-03, with the filamentous green alga *Cladophora* ranked third in relative biovolume (Appendix H). This suggests moderate nutrient enrichment, with somewhat limited levels of nitrogen relative to phosphorus. Diatom increaser taxa indicated a high probability of impairment by metals (Figure 4-2) and nutrients (Figure 4-3) at CFR-03, but a low probability of impairment by sediment (Figure 4-1; Appendix H). Most of the diatom taxa present were tolerant of elevated inorganic nitrogen, but were less tolerant of organic nitrogen, and require moderate levels of oxygen saturation (Figure 4-4 through Figure 4-6). Overall biological integrity was "good" at CFR-03 (Table 4-3), with only minor impairment indicated by slightly depressed Shannon diversity and a slightly elevated siltation index. All other diatom metrics for Montana mountain streams indicated "excellent" biological integrity and an unimpaired biota at CFR-03 (Table 4-3; Appendix H).

4.3.3.3.6 LC-7 (Lost Creek near mouth)

Non-diatom algae at LC-7 were relatively diverse with 13 genera from four algal divisions present (Table 4-2). The macroscopic filamentous green alga *Chara* was responsible for much of the algal biovolume at LC-7. *Nostoc* and several other filamentous green algae species comprised most of the remainder of the diversity in the sample (Appendix H). LC-7 was the only site where *Chara* were present. *Chara* occurrence is consistent with the alkaline nature of Lost Creek, presumably because of limestone geology in the Lost Creek watershed. The relatively high importance of several filamentous green algae genera that require moderate levels of inorganic nitrogen, as well as nitrogen-fixing *Nostoc*, suggest that nitrogen was not the limiting nutrient at LC-7. Of diatom taxa intolerant of or indifferent to elevated inorganic nitrogen and requiring a high level of oxygen saturation, a higher percentage was present at LC-7 than at other upstream sites (Figures 4-4 through 4-6). Diatom increaser taxa indicated a low probability of impairment by metals (Figure 4-2), nutrients (Figure 4-3), or sediment (Figure 4-1) at LC-7 (Appendix H). Overall biological integrity at LC-7 was "good" (Table 4-3), with unimpaired or minor impairment indicated by the various metrics and "excellent" biological integrity (Table 4-3; Appendix H).

4.3.3.3.7 RTC-1 (Racetrack Creek near mouth)

A relatively diverse assemblage of 14 major non-diatom genera from 5 algal divisions was present at RTC-1 (Table 4-2). These genera were largely cosmopolitan taxa with relatively broad ecological tolerances, but in general the assemblage suggests cool, circumneutral, relatively unpolluted water. Of the taxa found at RTC-1, red alga *Audouinella* are associated with cool water with low dissolved solid concentrations, brown alga *Heribaudiella* occurs exclusively on stones in cold, swiftly flowing streams, and yellow-green algae *Vaucheria* and *Tribonema* frequently occur in waters containing dissolved humic compounds. Filamentous green algae were well represented among the major taxa, including the genera *Cladophora, Ulothrix, Oedogonium* and *Spirogyra.* The presence of filamentous green algae suggest nutrient-rich water with moderate levels of inorganic nitrogen at RTC-1. The diatom assemblage was relatively indifferent to inorganic nitrogen, and was relatively tolerant of elevated organic nitrogen. Diatom increaser taxa indicated a low probability of impairment by metals (Figure 4-2), nutrients (Figure 4-3), or sediment (Figure 4-1) at RTC-1. Metal and nutrient increaser taxa had the lowest values of any site sampled in 2012 at RTC-1 (Figure 4-2; Figure 4-3; Appendix H). However, overall biological integrity at RTC-1 was "fair" (Table 4-3), due to the high relative abundance of diatom *Achnanthidium minutissimum,* the basis for the disturbance index. Dominance of *Achnanthidium minutissimum* at RTC-1 suggests that high current velocities and substrate scour likely impact the periphyton assemblage. Values for

pollution index and diatom species richness indicated an unimpaired biota at RTC-1 with excellent biological integrity (Table 4-3; Appendix H).

4.3.3.3.8 CFR-27H (Clark Fork at Deer Lodge)

Ten major non-diatom genera were identified at the Clark Fork River at Deer Lodge site (CFR-27H), slightly less than the mean (12) for the sites sampled in 2012 (Table 4-2). As at the site near Galen, diatoms and the non-diatom genera *Cladophora* and *Nostoc* comprised the top three algae when ranked by estimated biovolume (Appendix H). Moderate nutrient enrichment was suggested at CFR-27H, with adequate levels of inorganic nitrogen relative to phosphorus, as indicated by the presence of *Cladophora* and other filamentous green algae. Diatom increaser taxa indicated a low probability of sediment (Figure 4-1) impairment and moderately low probabilities of impairment by metals (Figure 4-2) and nutrients (Figure 4-3; Appendix H). The diatom assemblage as a whole was relatively indifferent to inorganic nitrogen, had a relatively high tolerance of organic nitrogen, and required moderately high oxygen saturation (Figures 4-4 through 4-6). Overall biological integrity at CFR-27H was "good" (Table 4-3), with minor impairment indicated by the siltation index. All other diatom metrics for Montana mountain streams indicated "excellent" biological integrity and an unimpaired biota at CFR-27H (Table 4-3; Appendix H).

4.3.3.3.9 CFR-42G (Clark Fork above the Little Blackfoot River)

Non-diatom algae were moderately low in diversity at the Clark Fork River site above the Little Blackfoot River (CFR-42G). Nine major genera were identified (Table 4-2). The blue-green alga *Nostoc* and the filamentous green algae *Cladophora* and *Stigeoclonium* were relatively abundant and suggest nutrient-rich water with somewhat limited levels of inorganic nitrogen relative to phosphorus and the possibility of metals impairment. Diatom algae comprised the largest fraction of algal biomass at CFR-42G (Appendix H). Diatom increaser taxa indicated a high probability of impairment by nutrients (Figure 4-3) and moderately high probability of metals (Figure 4-2) impairment, but a low probability of sediment (Figure 4-1) impairment (Appendix H). The diatom assemblage as a whole was very tolerant of elevated inorganic nitrogen but less so of organic nitrogen, and was largely intolerant of low oxygen saturation (Figures 4-4 through 4-6). Overall, biological integrity at CFR-42G was "good", with only minor impairment of the biota indicated by the percent dominant taxon, Shannon diversity, pollution, and siltation indexes (Table 4-3; Appendix H).

4.3.3.3.10 LBR-CFR (Little Blackfoot River near mouth)

Non-diatom algae were diverse at LBR-CFR; 17 major genera representing 4 algal divisions were present (Table 4-2). Blue-green alga (*Nostoc*), filamentous green algae (*Cladophora, Oedogonium, Mougeotia,* and *Spirogyra*), filamentous yellow-green algae (*Vaucheria* and *Tribonema),* filamentous red alga (*Audouinella),* and diatoms comprised most of the algal biomass in the Little Blackfoot River (Appendix H). This assemblage suggests relatively high quality, nutrient-rich water with little indication of impairment by toxic metals. Diatom species richness and Shannon diversity values at LBR-CFR were among the highest for sites sampled in 2012 (Table 4-3). However, diatom increaser taxa indicated moderately high probability of impairment by metals (Figure 4-2), nutrients (Figure 4-3), and sediment (Figure 4-1) at LBR-CFR. The diatom assemblage was largely tolerant of elevated inorganic and organic nitrogen, but intolerant of low dissolved oxygen concentrations (Figures 4-4 through 4-6). Biological integrity at LBR-CFR was "fair", with moderate impairment indicated due to an elevated siltation index value; all other diatom metrics for Montana mountain streams indicated "excellent" biological integrity and no impairment in the Little Blackfoot River (Table 4-3; Appendix H).

4.3.3.3.11 CFR-53C (Clark Fork at Gold Creek)

Eleven major non-diatom genera representing two algal divisions (Chlorophyta and Cyanophyta) were identified at the Clark Fork River site at Gold Creek (CFR-53C) (Table 4-2). As with most of the mainstem sites, the blue-green alga *Nostoc* and the filamentous green alga *Cladophora,* along with the dominant diatom algae, comprised most of the algal biomass. Several metals-tolerant green algae also were among the major taxa at CFR-53C, including colonial *Scenedesmus*, filamentous *Mougeotia* and *Stigeoclonium*, and single-celled desmids *Cosmarium* and *Closterium* (Appendix H). Diatom increaser taxa indicated a high probability of impairment by metals (Figure 4-2) and nutrients (Figure 4-3), and a relatively low probability of sediment impairment (Figure 4-1; Appendix H). The diatom assemblage was largely tolerant of elevated inorganic nitrogen but somewhat less-tolerant of organic nitrogen and low dissolved oxygen concentrations (Figures 4-4 through 4-6). Biological integrity at CFR-53C was rated as "good" with only minor impairment. Impairment was due to a depressed Shannon diversity value and elevated percent abundance of the dominant diatom taxon *Epithemia sorex*. *E. sorex* often harbors endosymbiotic nitrogen-fixing blue-green algae and may indicate an abundance of inorganic phosphorus relative to nitrogen in this reach of the Clark Fork River. All other diatom metrics for Montana mountain streams indicated excellent biological integrity and an unimpaired biota (Table 4-3; Appendix H).

4.3.3.3.12 FC-CFR (Flint Creek near mouth)

A diverse assemblage of 17 major non-diatom genera, representing three algal divisions, was present at FC-CFR (Table 4-2). However, the blue-green alga *Nostoc* and the filamentous green alga *Cladophora* were dominant, and along with the diatom assemblage, were responsible for most of the algal biomass at the Flint Creek site (Appendix H). These taxa and several others, including the green algae *Oedogonium, Scenedesmus* and *Stigeoclonium*, suggest relatively high quality flowing water, rich in available nitrogen and phosphorus, but with the possibility of some impairment by metals. Diatom increaser taxa indicated a moderately high probability of impairment by metals (Figure 4-2) and nutrients (Figure 4-3), and a high probability of sediment impairment (Figure 4-1; Appendix H). The diatom assemblage was largely tolerant of elevated inorganic and organic nitrogen, and required moderately high dissolved oxygen concentrations (Figures 4-4 through 4-6). Biological integrity at FC-CFR was rated "fair" due to an elevated siltation index value. All other diatom metrics for Montana mountain streams indicated "excellent" biological integrity and an unimpaired biota (Table 4-3; Appendix H).

4.3.3.3.13 CFR-84F (Clark Fork near Drummond)

Non-diatom algae at the Clark Fork River site near Drummond (CFR-84F) were moderately low in diversity (9 genera present); the fewest genera present at the six Clark Fork River mainstem sites (Table 4-2). The filamentous green alga *Cladophora* was the most abundant taxon and, had the greatest algal biomass, followed by the blue-green alga *Nostoc* and the filamentous green alga *Stigeoclonium* (Appendix H). These taxa suggest nutrient-rich water with somewhat limited levels of inorganic nitrogen relative to phosphorus and the possibility of metals impairment. CFR-84F had only 37 diatom species present, the fewest of any of the sites sampled in 2012. Diatom increaser taxa indicated a high probability of metals impairment (Figure 4-2), a moderately high probability of impairment by nutrients (4-3), and a relatively low probability of sediment impairment (Figure 4-1; Appendix H). The diatom assemblage was largely tolerant of elevated inorganic nitrogen but somewhat less-tolerant of organic nitrogen and low oxygen saturation levels (Figures 4-4 through 4-6). Biological integrity at CFR-84F was "good" (Table 4-3), with only minor impairment due to a depressed Shannon diversity value and somewhat elevated percent abundance of the diatom *Epithemia sorex.* Elevated percent abundance of the diatom *Epithemia sorex* may indicate an abundance of inorganic phosphorus

relative to nitrogen in this reach of the Clark Fork River. All other diatom metrics for Montana mountain streams indicated "excellent" biological integrity and an unimpaired biota at CFR-84F (Table 4-3; Appendix H).

4.3.3.3.14 RC-CFR (Rock Creek near mouth)

Ten major genera of non-diatom algae representing three algal divisions were identified in periphyton from Rock Creek (Table 4-2). The blue-green alga *Nostoc* and the diatom assemblage as a whole were both dominant in abundance and biovolume at RC-CFR, followed by the filamentous green alga *Ulothrix* and the microscopic green algae *Ankistrodesmus* and *Scenedesmus* (Appendix H). *Ulothrix* is often found in cool, swiftly flowing streams. While not a requirement, all of these genera may occur in streams with elevated inorganic nutrients and moderate levels of metals such as zinc and copper. The red alga *Audouinella* was found to be a major taxon at RC-CFR, which was the case at all tributary sites sampled in 2012 except MCWC-MWB and SS-25. *Audouinella* is indicative of cool, relatively high-quality water that is low in dissolved solids. Diatom Increaser Taxa indicated low probabilities of metals (Figure 4-2) and sediment (Figure 4-1) impairment, and a moderately low probability of nutrient (Figure 4-3) impairment at RC-CFR (Figure 4-1; Appendix H). The diatom assemblage was largely intolerant of, or indifferent to, elevated inorganic nitrogen, and relatively intolerant of organic nitrogen and low dissolved oxygen concentrations (Figures 4-4 through 4-6). Biological integrity at RC-CFR was "good" (Table 4-3), with only minor impairment due to low Shannon diversity. All other diatom metrics for Montana mountain streams indicated "excellent" biological integrity and an unimpaired biota at RC-CFR (Table 4-3; Appendix H).

4.3.3.3.15 CFR-116A (Clark Fork at Turah)

A diverse assemblage of 17 major genera of non-diatom algae representing four algal divisions were identified at site CFR-116A, the lowermost site on the Clark Fork River. This was the largest number for any of the mainstem sites (Table 4-2). The filamentous green alga *Cladophora* and the diatom algae as a whole were ranked as dominant in relative abundance and biovolume, while the green algae *Ulothrix, Scenedesmus, Stigeoclonium* and *Ankistrodesmus,* and 6 genera of blue-green algae, including *Nostoc,* were less-voluminous major taxa (Appendix H). The filamentous red alga *Audouinella* and the relatively rare filamentous brown alga *Heribaudiella* occurred occasionally. The non-diatom algae assemblage at CFR-116A was generally indicative of cool, moderately high quality, nutrient-rich water, likely with only low to moderate levels of toxic metals. Diatom increaser taxa indicated a high probability of metals impairment (Figure 4-2) and a moderately high probability of nutrient (Figure 4-3) impairment, but a low probability of sediment impairment (Figure 4-1; Appendix H). The diatom assemblage was moderately tolerant of elevated inorganic and organic nitrogen, but generally intolerant of low dissolved oxygen concentrations (Figures 4-4 through 1-6). Biological integrity at RC-CFR was rated as "good" (Table 4-3), with only minor impairment due to low Shannon diversity and a slightly elevated siltation index (Table 4-3; Appendix H).

5 UPPER CLARK FORK RIVER CAGED FISH STUDY: THE DISTRIBUTION AND TIMING OF TROUT MORTALITY, 2011-2012[2]

5.1 Introduction

Trout diversity, health, and survival in the Upper Clark Fork River have been well studied (Phillips and 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.

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; 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. 1995b; 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. 1995a). Thus, it is known that 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; 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; 1995b).

Mayfield and McMahon (2010; 2011) documented high mortality rates for adult trout radio-tagged in the Clark Fork River. Greater than 50% of the trout tagged in April expired by fall. Much of the mortality occurred during high spring streamflows and again when water temperatures rose on the descending limb of the hydrograph (Mayfield and McMahon 2010; 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, Montana Fish, Wildlife and Parks [MFWP], personal communication).

[2] Section 5 was prepared by Montana Fish Wildlife and Parks with minor edits and formatting completed by Atkins.

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). These results demonstrate the area of the Clark Fork affected by mine wastes, as well as the spatial and temporal variability within that area.

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. Although metals concentrations (including copper) continue to exceed acute and chronic aquatic toxicity criteria in the Clark Fork River (PBSJ 2010), other conditions have changed. Cleanup work on Silver Bow Creek, 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 dissolved oxygen 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, MFWP 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, Montana), 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.

5.2 Methods

5.2.1 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% larger to accommodate the brown trout used in this study (Figure 5-1). 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.

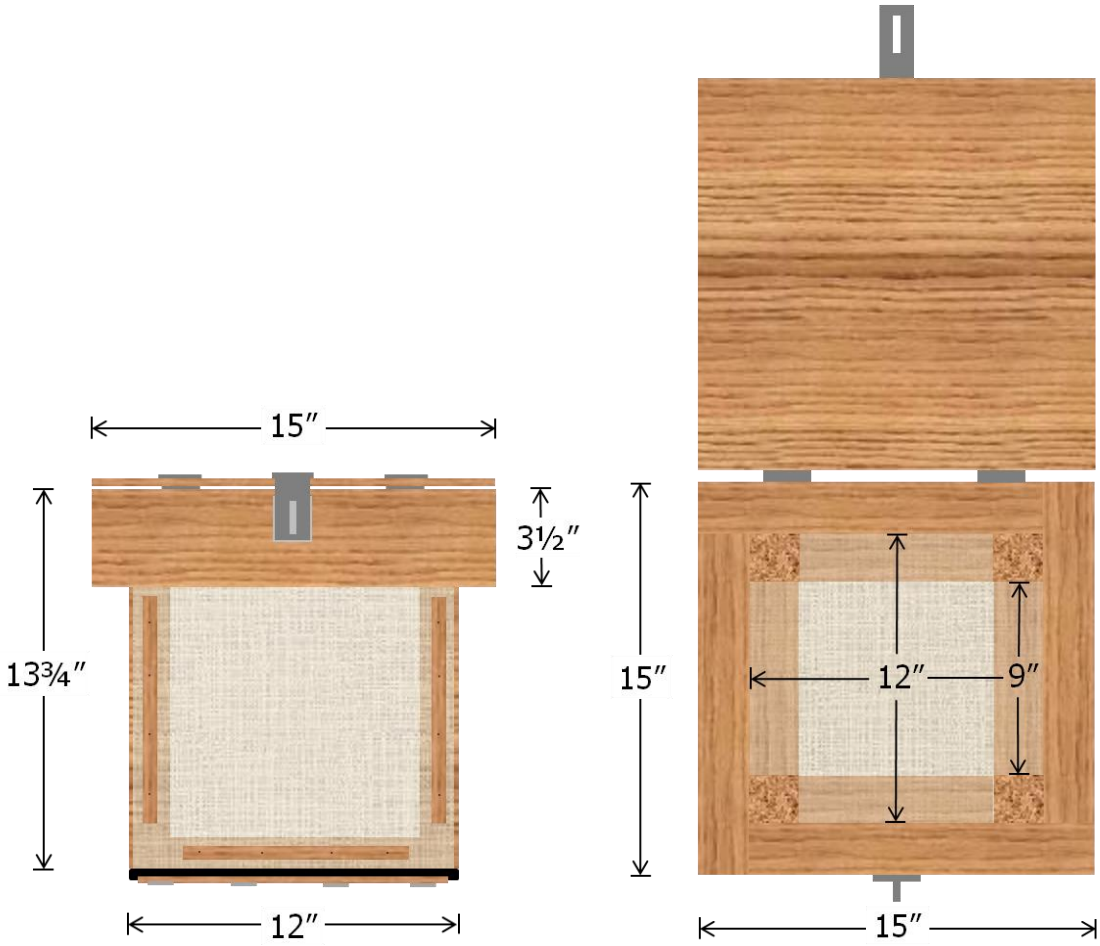

Figure 5-1. Dimensions of the cages constructed for the Clark Fork River fish mortality study.

5.2.2 Study Sites

Cages were deployed at 11 locations in the upper Clark Fork River drainage in late March 2011 and 2012 (Figure 5-2).

Treatment sites (*n* = 7):

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

Control sites (*n* = 3): were located on tributaries:

8) Lower Little Blackfoot River
9) Lower Flint Creek

10) Lower Rock Creek

Handling control site (*n* = 1):

11) Clinton, Montana

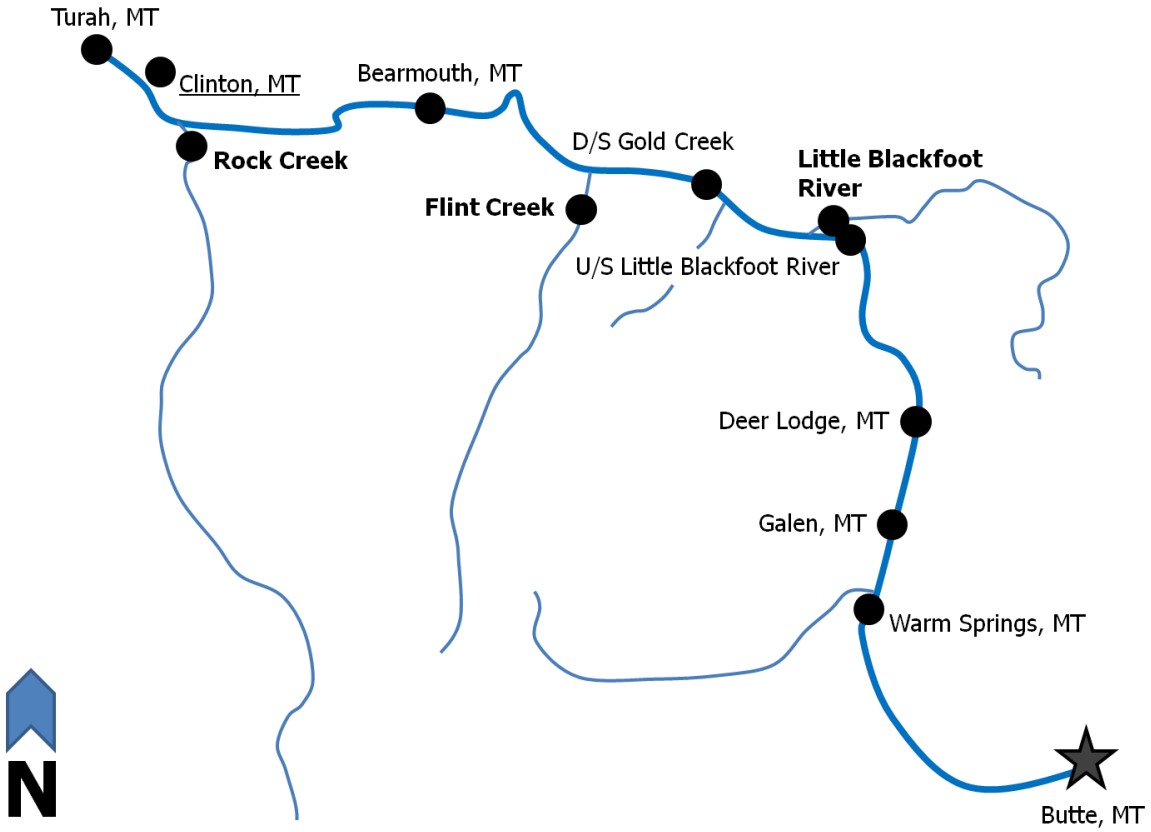

Figure 5-2. Distribution of the eleven study sites in the upper Clark Fork River drainage. Control sites are shown in bold and the handling control is underlined.

All sites except the spring channel near Clinton, Montana (handling control), were located near U.S. Geological Survey (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.

5.2.3 Cage 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 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 5-3). The sash weights provided

additional anchoring during rising water levels, and tether ropes insured the cages were not completely lost should a flood event occur.

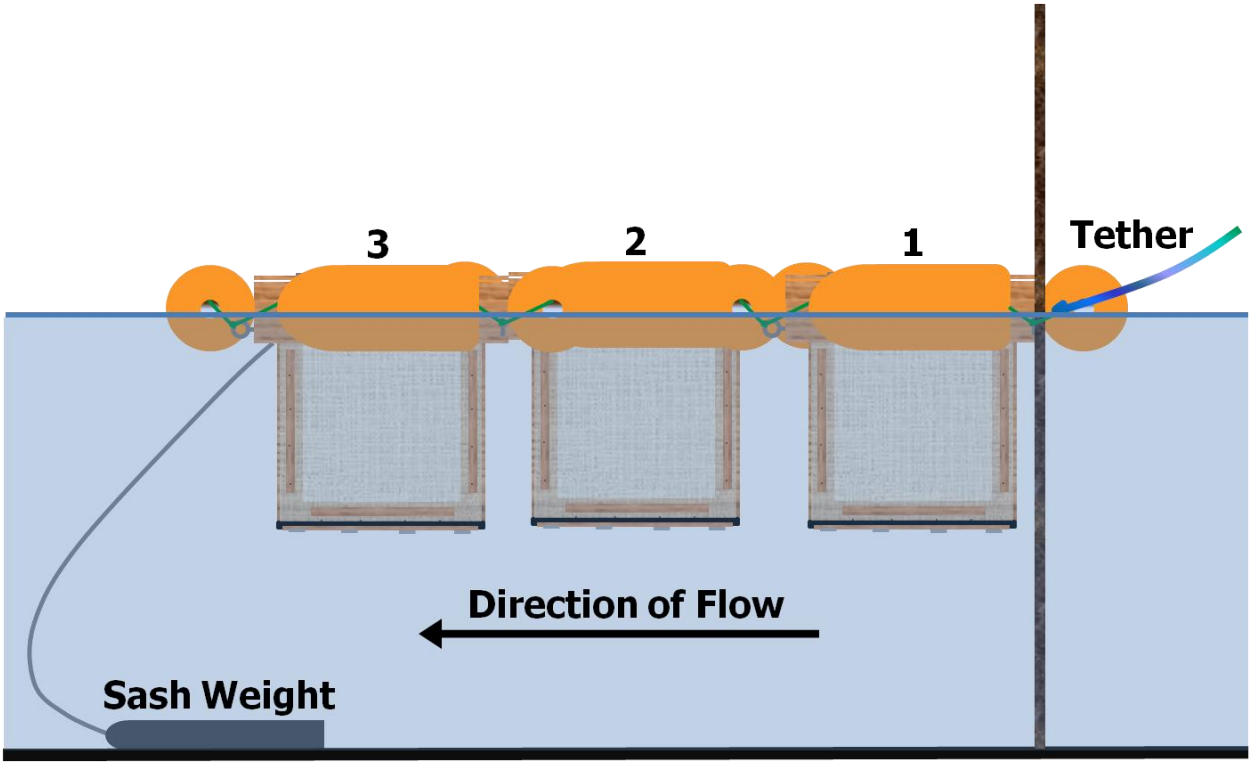

Figure 5-3. Representation of cage deployment (arrangement of cages differed by site, and cages often drifted together) in the Clark Fork River fish mortality study.

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 50-88 mm and were feed-trained on pellet feed upon delivery.

In late March of each year 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 water temperature at each site with the addition of onsite water. In 2011 at the first site stocked the hatchery water was 8.2 °C and water temperatures at the sites varied from 4.8 °C to 8.6 °C, and in 2012 at the first site stocked the hatchery water was 7.2 °C and water temperatures at the sites varied from 3.9 °C to 8.9 °C. Mean length of trout stocked in cages was 67.7 mm (SD = 6.6 mm) in 2011, and mean length of trout stocked in cages was 68.8 mm (SD = 6.2 mm) in 2012.

5.2.4 Mortality Monitoring

Beginning the first week of April each year, trout mortality was monitored twice per week. At each visit the trout in each cage were fed one tablespoon of pellet 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). Cages were repositioned to seams and eddies with reduced velocities as discharge varied at

each site. 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 provide for exchange of water between the cage and the site. At each visit mortalities were removed from the treatment cages (cages 1 and 2) and were replaced with individuals from the replacement cage (cage 3). All mortalities were measured to total length in millimeters and archived in a freezer at the Region 2 FWP headquarters.

Statistical analyses of trout survival at the seven treatment sites consisted of chi-square comparisons between observed and expected survival and mortality in 2011 and 2012 with $\alpha = 0.05$. Yates's correction for continuity was applied to all chi-square tests as the degrees of freedom for each test was one (Yates 1934). Expected mortality for each year was determined by using the mean mortality at the three control sites located in the Little Blackfoot River, Flint Creek, and Rock Creek (2011 mean mortality = 6.3; 2012 mean mortality = 6.0). Expected survival at each site was set to 50 as this was the number of live fish maintained in cages one and two combined. Mortalities during the first week of April each year were not included in the analyses to preclude any mortality due to acclimation. Mortalities after the end of July were not included in the analyses as all mortalities at the Clinton springs handling control occurred during August both years and any mortalities occurring at the treatment sites during this period may have been due to fish being held in cages.

5.2.5 Growth

All specimens placed in cages at the beginning of each field season were measured to the nearest millimeter and a one-way analysis of variance (ANOVA) was used to determine if initial lengths of fish placed in treatment cages differed among sites for each year. Initial lengths differed significantly among sites in 2011 (ANOVA: $F_{10, 539} = 7.19$, $P < 0.001$); thus, all surviving specimens were measured at the completion of each field season and growth was evaluated using change in mean total length by site for each year.

5.2.6 Histology

Cellular change can occur in various organs as a result of stressors and can serve as a biomarker of contaminant exposure (Bernet et al. 1999). 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. In 2012 specimens were collected at all sites in late August at the completion of the study season and individual fish that were near mortality but still alive at the time cages were checked were sacrificed for histology samples. This occurred three times during the 2012 field season, on May 17 downstream of Gold Creek, on July 30 in the Little Blackfoot River, and on August 23 at Warm Springs. In 2012 specimens were also collected March 27 immediately upon obtaining fish for the study from the Big Springs Hatchery for use as a control to establish baseline conditions. Live specimens were placed in Davidson's solution, a combination of glacial acetic acid (100 ml), 95% ethyl alcohol (300ml), 10% 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 hrs, specimens were transferred into alcohol. Specimens were submitted to the Bozeman Fish Health Center at the completion of each field season and 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. Depending on size, fish were processed whole or dissected, then sectioned, mounted to slides, and stained with either hematoxylin and eosin or Giemsa stains. Slides were examined and observed cellular changes were scored on a scale of 1-5: 1 = minimal; 2 = mild; 3 = moderate; 4 = moderately severe; 5 = severe. In

general, histological scores of 1 and 2 are considered normal or cellular changes of no significance; 3 is transitional or intermediary, indicating moderate cellular changes that may or may not be within the normal range depending on species, age, and sex of the fish; scores of 4 and 5 are indicative of pathological lesions.

Increased cellular turnover in kidney and liver tissue results in the proliferation of melanomacrophage aggregates indicative of chronic exposure to contaminants (Agius 1979; Herraez and Zapata 1986; Wolke 1992; Agius and Roberts 2003; Handy 2003; Schwindt et al. 2006; Rosseland et al. 2007). Melanomacrophage aggregates are considered reliable biomarkers of the effects of environmental exposure to pollutants and contaminants (Wolke et al. 1985; Goksoyr et al. 1996; Fournie et al. 2001). Melanomacrophage aggregates in the livers and kidneys of fish sampled were scored for degree of severity. Histology scores ≥ 4 for degree of melanomacrophage aggregation in juvenile brown trout kidneys and scores ≥ 1 in juvenile brown trout livers indicate chronic severe cell necrosis (B. MacConnell, Headwaters Fish Pathology LLC, personal communication).

5.2.7 Tissue Metal Burdens

Tissue metals burdens in fish can be used as a measure of exposure and can be correlated to histopathological effects (Hansen et al. 2004). Upon completion of the study, all mortalities from the replicate cages from May through August each year were submitted to the Montana Department of Health and Human Services Environmental Laboratory in Helena for analysis of tissue metals burdens. Mortalities from each site during each month of each year were combined and submitted as a single sample (N = 55) for analysis. In addition, in both years all fish surviving at the conclusion of the field season at the end of August at each site were also combined and submitted as a single sample (N = 22) for tissue analysis.

Samples were blended to a powder to ensure homogeneity, and then the samples were weighed, dried, and reweighed to determine moisture content. The dried samples were then crushed and dissolved with nitric acid, diluted with deionized water, and analyzed for barium, beryllium, chromium, copper, manganese, nickel, and zinc with inductively coupled plasma optical emission spectrometry (ICP-OES) using the U.S. Environmental Protection Agency (USEPA) Method 200.7 (USEPA 2001). The samples were also analyzed with inductively coupled plasma mass spectrometry (ICP-MS) for contaminants that have a lower detection limit including arsenic, cadmium, lead and selenium using USEPA Method 200.8 (USEPA 1999). All results were reported as µg/g dry weight.

5.2.8 Water Contaminants

In both years water samples were collected three times at each of the eleven sites. Collections roughly coincided with low-elevation runoff (ascending limb of the hydrograph), peak runoff and the descending limb of the hydrograph (Figure 5-4). Grab samples were collected for the caged fish study using the techniques outlined by the MDEQ Field Procedures Manual for Water Quality Assessment Monitoring (MDEQ 2012a). Samples were collected on May 10, June 30, and August 1 in 2011 and on April 20, June 5, and August 9 in 2012. All samples were delivered to Energy Laboratories Inc. in Helena, Montana and were analyzed for dissolved and total recoverable metals including copper, arsenic, lead, cadmium, and zinc, as well as calcium, magnesium, and total ammonia nitrogen (NH_3-N). Atkins collected additional water data under a contract for MDEQ during the quarterly monitoring of the Clark Fork River Operating Unit (CFROU) (Figure 5-4). This data is available for 2011 in a comprehensive report (Atkins 2012b); the Atkins report detailing the 2012 data was not yet available at the time of preparation of this manuscript.

Performance standards have been identified for contaminants in the upper Clark Fork River (USEPA 2004; Atkins 2012a) and are defined as the more stringent of the freshwater aquatic life standards (ALS) published by the MDEQ (2012b). As the chronic aquatic life standard is the most stringent and this study focuses on chronic effects the chronic ALS was used to evaluate contaminant data. Freshwater ALS are a function of total water hardness and are evaluated on the basis of total recoverable metals concentrations (Atkins 2012a; MDEQ 2012b). Chronic freshwater ALS values were obtained from the table of standards for Montana waters or calculated using the hardness relationships described by MDEQ (2012b). The chronic ALS values were calculated as:

$$Chronic = exp.\{mc[ln(hardness)] + bc\}$$

where *mc* and *bc* = values listed by MDEQ (2012b). Chronic ALS compliance ratios were calculated by dividing the measured contaminant values by the calculated chronic ALS values, and were plotted for each site and sampling period. Compliance ratio values <1 indicate contaminant levels below the chronic ALS, while values >1 indicate contaminant levels above the chronic ALS.

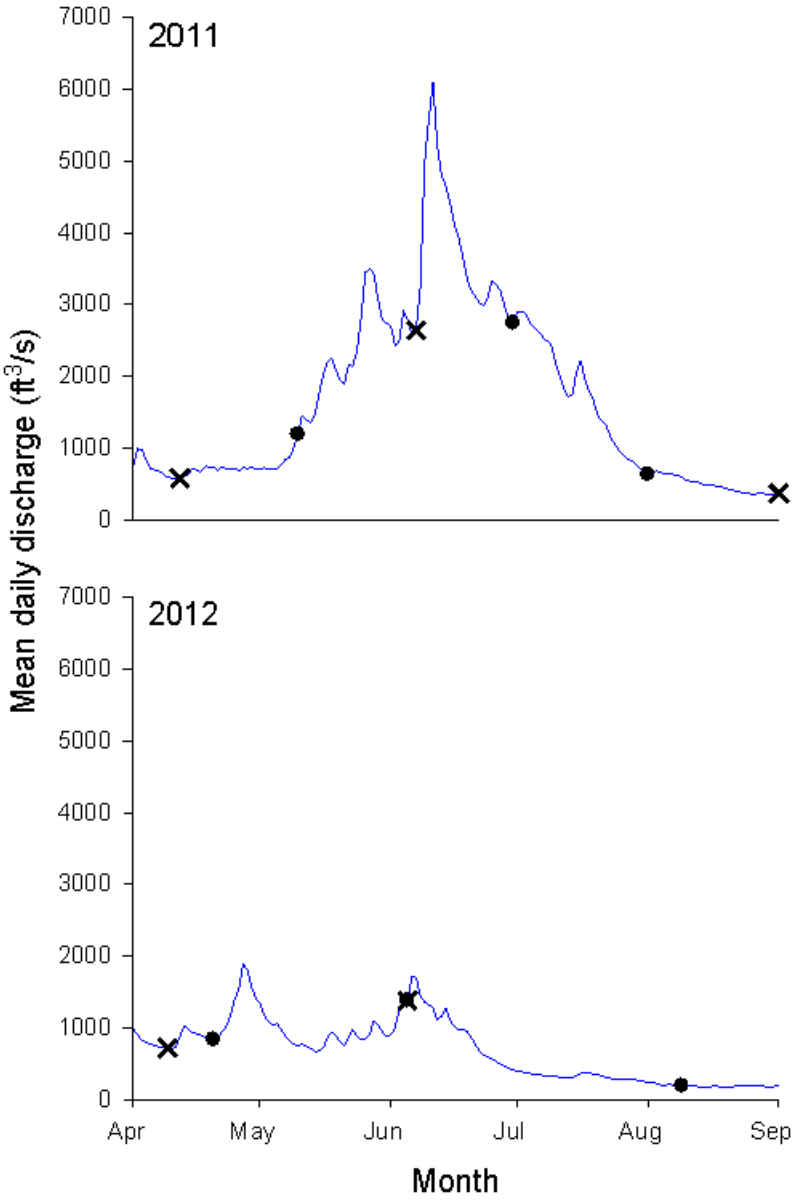

Figure 5-4. Clark Fork River hydrographs for 2011 and 2012 at the Gold Creek gauging station (roughly the midpoint of the study area). Dots represent Montana Fish Wildlife and Parks water collection dates. Crosses represent Atkins water collection dates.

5.2.9 Discharge and Water Temperature

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 2011 and on the Little Blackfoot River in June 2012 were the result of equipment malfunctions. No station exists at the site near Clinton, Montana.

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. Due to logger malfunctions temperature data may contain gaps at some sites; when available, this data was substituted with data from the appropriate USGS station.

5.2.10 Water Quality

Water quality parameters were recorded in the Clark Fork River at four sites in 2011 and at five sites in 2012 with continuously recording multiparameter water quality probes (Hydrolab ® MS5). Cross referencing of data collected with continuously recording multiparameter water quality probes was achieved by sampling intermittently at the seven treatment and four control sites using a handheld multiprobe (YSI ® 556 MPS). Hydrolab and YSI probes were calibrated at regular intervals during each field season. Probes were deployed at Galen, upstream of the Little Blackfoot River, upstream of Gold Creek, and at Bearmouth in 2011; in 2012 probes were once again deployed at these locations with the addition of a probe upstream of Warm Springs Creek. Water quality parameters recorded include temperature, pH, oxidation reduction potential (ORP), specific conductivity, and luminescent dissolved oxygen (LDO) at all sites, with the addition of total ammonia (NH_4 + NH_3) upstream of Warm Springs Creek and at Galen. Toxicity of total ammonia is dependent on other water parameters including water temperature and pH (Emerson et al. 1975; MDEQ 2012b). The increased toxicity is due to the conversion of the generally inert form (NH_4) to the highly toxic form (NH_3) through the process of de-ionization (Barton 1996). Acute freshwater ALS for total ammonia based on hourly average measurements and chronic ALS based on a 30 day average were calculated based on equations published by MDEQ (2012b). The acute ALS values were calculated as:

$$Acute = (0.275/(1 + 107.204 - pH)) + (39.0/(1 + 107.204 - pH))$$

and the chronic ALS were calculated as:

$$Chronic = ((0.0577/(1 + 107.688 - pH)) + (2.487/(1 + 10pH4 - 7.688))) \; x \; MIN(2.85, 1.45 \; x \; 100.028 \; x \; (25 - T))$$

where T = temperature (°C). Thirty day averages for comparison to chronic ALS values were calculated around peaks in total ammonia measurements.

5.3 Results

5.3.1 Mortality, Discharge, and Water Temperature

Table 5-1 contains the results of chi-square comparisons between observed and expected survival and mortality, and Figure 5-5 through Figure 5-15 depict total mortalities between cages one and two combined, maximum daily water temperatures, and mean daily discharges at cage sites in 2011 and 2012. The solid red horizontal line in each panel represents the upper critical temperature threshold for brown trout of 19.0 °C (Elliot 1994). At temperatures above this critical threshold, significant disturbances to normal brown trout behavior may occur, including cessation of feeding and growth and ultimately death (Elliot 1994). The dashed red horizontal line in each panel represents the upper incipient lethal temperature for brown trout of 24.7 °C, above which thermal stress is lethal with mortality a function of exposure time (Elliot 1994).

Generally, in both years the highest mortality occurred after the peak of the hydrograph as water temperatures approached or exceeded 19.0 °C (Figure 5-5 through Figure 5-15). Sites deviating from this trend include Galen (2011 and 2012), Deer Lodge (2012), the Little Blackfoot River (2011), Gold Creek (2012), Flint Creek (2011 and 2012), Rock Creek (2011 and 2012), and Turah (2012) which all exhibited either consistent mortality throughout the study season or

bimodal mortality with some mortality occurring early in the study season on the ascending limb of the hydrograph, and some mortality on the descending limb as water temperatures approached or exceeded 19 °C. Discharge was higher at all sites in 2011 than in 2012, resulting in lower maximum daily water temperatures in 2011 (Figure 5-5 through Figure 5-15). Mean daily discharge, maximum daily water temperatures, and timing of mortalities at each site are outlined below in order from upstream to downstream.

Clark Fork River near Warm Springs

Peak mean daily discharge in the Clark Fork River at the Warm Springs site in 2011 (1,060 ft^3/s) was 271 % higher than in 2012 (286 ft^3/s). Conversely, peak maximum daily water temperature in 2012 (24.8 °C) was 21 % higher than in 2011 (20.5 °C) (Figure 5-5). Maximum daily water temperature in 2011 exceeded 19.0 °C for 9 days and peaked at 20.5 °C on July 29, while maximum daily water temperature in 2012 exceeded 19.0 °C for 39 days and peaked at 24.8 °C on July 21, exceeding the upper incipient lethal temperature for brown trout of 24.7 °C for one day (Figure 5-5). In 2011 all mortalities at the Warm Springs site were on the descending limb of the hydrograph as water temperatures approached or exceeded 19.0 °C. Mortality at Warm Springs in 2012 was higher than in 2011, and was significantly higher than expected (Table 5-1). The majority of mortalities at Warm Springs in 2012 were on the descending limb of the hydrograph as water temperatures exceeded 19.0 °C (Figure 5-5).

Clark Fork River near Galen

Peak mean daily discharge in the Clark Fork River near Galen in 2011 (1,390 ft^3/s) was 151 % higher than in 2012 (554 ft^3/s). Conversely, peak maximum daily water temperature in 2012 (22.9 °C) was 18 % higher than in 2011 (19.4 °C) (Figure 5-6). Maximum daily water temperature in 2011 exceeded 19.0 °C for 2 days and peaked at 19.4 °C on July 25, while maximum daily water temperature in 2012 exceeded 19.0 °C for 28 days and peaked at 22.9 °C on July 21 (Figure 5-6). In 2011 mortality at the Galen site was significantly higher than expected (Table 5-1) and occurred throughout the field season with high mortality during April and early May. Mortality at Galen in 2012 was lower than in 2011 and also occurred throughout the field season. Half of the mortalities in 2012 occurred prior to maximum daily water temperatures exceeding 19.0 °C, while the remaining half occurred on the descending limb of the hydrograph as maximum daily water temperatures exceeded 19.0 °C (Figure 5-6).

Clark Fork River near Deer Lodge

Peak mean daily discharge in the Clark Fork River near Deer Lodge in 2011 (1,960 ft^3/s) was 151 % higher than in 2012 (781 ft^3/s). Conversely, peak maximum daily water temperature in 2012 (24.0 °C) was 18 % higher than in 2011 (21.4 °C) (Figure 5-7). Maximum daily water temperature in 2011 exceeded 19.0 °C for 10 days and peaked at 21.4 °C on July 6, while maximum daily water temperature in 2012 exceeded 19.0 °C for 39 days and peaked at 24.0 °C on July 21 (Figure 5-7). In 2011, mortalities at the Deer Lodge site occurred on the descending limb of the hydrograph as maximum daily water temperatures approached or exceeded 19 °C (Figure 5-7). Mortality at Deer Lodge in 2012 was lower than in 2011 and occurred throughout the field season. The majority of the mortalities in 2012 occurred prior to maximum daily water temperatures exceeding 19.0 °C, while the remaining mortalities occurred on the descending limb of the hydrograph as maximum daily water temperatures exceeded 19.0 °C (Figure 5-7).

Clark Fork River upstream of the Little Blackfoot River

Peak mean daily discharge in the Clark Fork River upstream of the Little Blackfoot River in 2011 (2,560 ft^3/s) was 156 % higher than in 2012 (999 ft^3/s). Conversely, peak maximum daily water temperature in 2012 (24.8 °C) was 22 % higher than in 2011 (20.3 °C) (Figure 5-8). Maximum daily water temperature in 2011 exceeded 19.0 °C for 13 days and peaked at 20.3 °C on July 10. Maximum daily water temperature in 2012 exceeded 19.0 °C for 41 days and peaked at 24.8 °C on July 8 and again on July 21, each time exceeding the upper incipient lethal temperature for brown trout of 24.7 °C for one day (Figure 5-8). In both years the majority of mortalities in the Clark Fork River upstream of the Little Blackfoot River occurred on the descending limb of the hydrograph as maximum daily water temperatures approached or exceeded 19.0 °C, with mortality higher in 2012 (Figure 5-8).

Little Blackfoot River (Control)

Peak mean daily discharge in the Little Blackfoot River in 2011 (2,540 ft^3/s) was 166 % higher than in 2012 (954 ft^3/s). Conversely, peak maximum daily water temperature in 2012 (24.0 °C) was 19 % higher than in 2011 (20.1 °C) (Figure 5-9). Maximum daily water temperature in 2011 exceeded 19.0 °C for 8 days and peaked at 20.1 °C on July 18, while maximum daily water temperature in 2012 exceeded 19.0 °C for 32 days and peaked at 24.0 °C on July 29 (Figure 5-9). In 2011 mortality in the Little Blackfoot River occurred throughout the field season with the majority of mortalities on the ascending limb of the hydrograph. In 2012 mortality was lower than in 2011, with the majority of mortalities occurring on the descending limb of the hydrograph as maximum daily water temperatures approached or exceeded 19.0 °C (Figure 5-9).

Clark Fork River downstream of Gold Creek

Peak mean daily discharge in the Clark Fork River downstream of Gold Creek in 2011 (6,100 ft^3/s) was 223 % higher than in 2012 (1,890 ft^3/s). Conversely, peak maximum daily water temperature in 2012 (23.6 °C) was 18 % higher than in 2011 (20.0 °C) (Figure 5-10). Maximum daily water temperature in 2011 exceeded 19.0 °C for 10 days and peaked at 20.0 °C on July 31, while maximum daily water temperature in 2012 exceeded 19.0 °C for 37 days and peaked at 23.6 °C on July 9 (Figure 5-10). In 2011 no mortality occurred in the Clark Fork River downstream of Gold Creek, and mortality was significantly less than expected (Table 5-1). In 2012, the Clark Fork River downstream of Gold Creek had a bimodal hydrograph, with half of the mortalities occurring on the ascending and descending limbs of the first peak and the remaining mortalities occurring on the descending limb of the second peak, as maximum daily water temperatures approached or exceeded 19.0 °C (Figure 5-10).

Flint Creek (Control)

Peak mean daily discharge in Flint Creek in 2011 (1,390 ft^3/s) was 179 % higher than in 2012 (499 ft^3/s). Conversely, peak maximum daily water temperature in 2012 (23.5 °C) was 27 % higher than in 2011 (18.5 °C) (Figure 5-11). Maximum daily water temperature in 2011 did not exceed 19.0 °C and peaked at 18.5 °C on July 18, while maximum daily water temperature in 2012 exceeded 19.0 °C for 38 days and peaked at 23.5 °C on July 29 (Figure 5-11). In 2011 mortality in Flint Creek occurred throughout the field season with one mortality on the ascending limb, one mortality near the peak, and one mortality on the descending limb of the hydrograph as maximum daily water temperatures approached or exceeded 19.0 °C. In 2012 Flint Creek had a bimodal hydrograph, with the majority of the mortality occurring on the ascending limb of the first peak, one mortality on the ascending limb of the second peak, and the remaining

mortalities on the descending limb of the second peak as maximum daily water temperatures approached or exceeded 19.0 °C (Figure 5-11).

Clark Fork River near Bearmouth

Peak mean daily discharge in the Clark Fork River near Bearmouth in 2011 (7,740 ft^3/s) was 255 % higher than in 2012 (2,180 ft^3/s). Conversely, peak maximum daily water temperature in 2012 (23.7 °C) was 15 % higher than in 2011 (20.6 °C) (Figure 5-12). Maximum daily water temperature in 2011 exceeded 19.0 °C for 5 days and peaked at 20.6 °C on July 31, while maximum daily water temperature in 2012 exceeded 19.0 °C for 39 days and peaked at 23.7 °C on July 29 (Figure 5-12). In 2011, no mortality occurred in the Clark Fork River near Bearmouth, and mortality was significantly less than expected (Table 5-1). In 2012, the Clark Fork River near Bearmouth had a bimodal hydrograph with all mortalities occurring on the descending limb of the second peak as maximum daily water temperatures exceeded 19.0 °C (Figure 5-12).

Rock Creek (Control)

Peak mean daily discharge in Rock Creek in 2011 (5,150 ft^3/s) was 52 % higher than in 2012 (3,380 ft^3/s). Conversely, peak maximum daily water temperature in 2012 (20.9 °C) was 19 % higher than in 2011 (17.5 °C) (Figure 5-13). Maximum daily water temperature in 2011 did not exceed 19.0 °C and peaked at 17.5 °C on July 18, while maximum daily water temperature in 2012 exceeded 19.0 °C for 9 days and peaked at 20.9 °C on July 21 (Figure 5-13). In 2011 in Rock Creek the majority of mortalities were on the ascending limb and the remaining mortalities on the descending limb of the hydrograph. In 2012, Rock Creek had a bimodal hydrograph, with three mortalities occurring on the ascending limb of the first peak, one mortality on the ascending limb of the second peak, and the remaining mortalities on the descending limb of the second peak, as maximum daily water temperatures approached or exceeded 19.0 °C (Figure 5-13).

Spring channel near Clinton (Handling control)

Peak maximum daily water temperature in 2011 at the handling control in the spring channel near Clinton did not exceed 19.0 °C and peaked at 15.9 °C on July 18. Peak maximum daily water temperature in 2012 did not exceed 19.0 °C and peaked at 17.5 °C on July 6. Peak maximum daily water temperature in 2012 was 10 % higher than in 2011. There were no mortalities at the handling control in the spring channel near Clinton during the analysis period in either year (Figure 5-14).

Clark Fork River near Turah

Peak mean daily discharge in the Clark Fork River near Turah in 2011 (12,700 ft^3/s) was 70 % higher than in 2012 (7,490 ft^3/s). Conversely, peak maximum daily water temperature in 2012 (22.1 °C) was 9 % higher than in 2011 (20.3 °C) (Figure 5-15). Maximum daily water temperature in 2011 exceeded 19.0 °C for 6 days and peaked at 20.3 °C on July 31, while maximum daily water temperature in 2012 exceeded 19.0 °C for 30 days and peaked at 22.1 °C on July 18 and again on July 22 (Figure 5-15). In 2011, observed mortality was significantly higher than expected in the Clark Fork River near Turah (Table 5-1), with the majority of mortalities occurring on the descending limb of the hydrograph as maximum daily water temperatures approached or exceeded 19.0 °C (Figure 5-15). In 2012, the Clark Fork River near Turah had a bimodal hydrograph, with two mortalities on the ascending limb and two mortalities on the descending limb of the first peak. One mortality also occurred on the

descending limb of the second peak as maximum daily water temperatures exceeded 19.0 °C (Figure 5-15).

Table 5-1. Chi-squared test results of expected and observed brown trout mortality in Clark Fork River cages, 2011-2012. Yates's correction for continuity has been applied; df = 1 and α = 0.05 for all tests. Red asterisks denote significantly higher than expected mortality; black asterisks denote significantly lower than expected mortality

Site	*p*-value	
	2011	2012
Warm Springs	0.14	0.007*
Galen	<0.001*	0.2
Deer Lodge	0.93	0.86
Upstream of Little Blackfoot River	0.93	0.2
Downstream of Gold Creek	0.02*	0.83
Bearmouth	0.02*	0.87
Turah	<0.001*	0.83

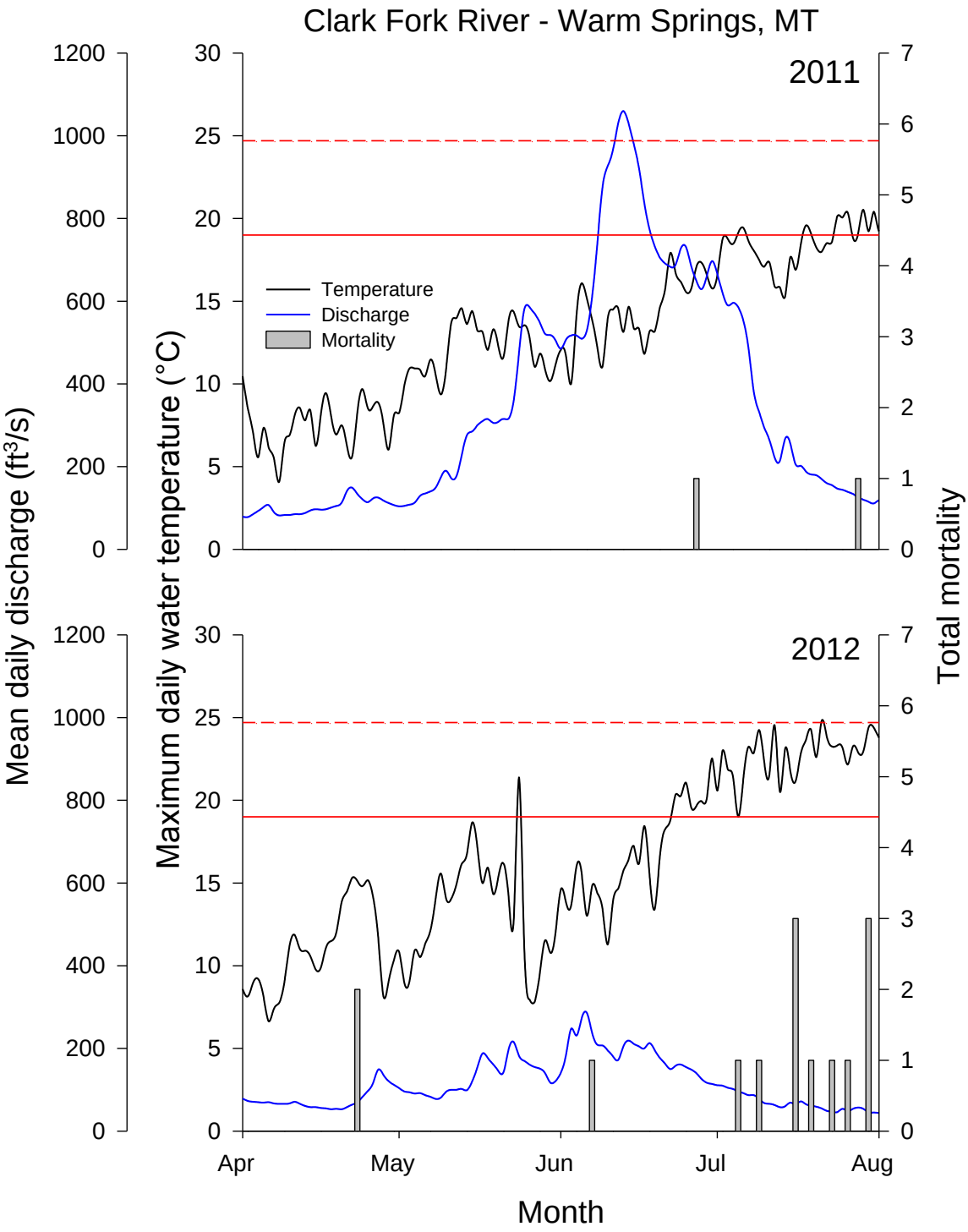

Figure 5-5. Total mortalities between cages one and two combined, maximum daily water temperature, and mean daily discharge for 2011 and 2012 in the Clark Fork River at the Warm Springs site. In each panel the solid red line indicates the upper critical temperature threshold, and the dashed red line represents the upper incipient lethal temperature, for brown trout.

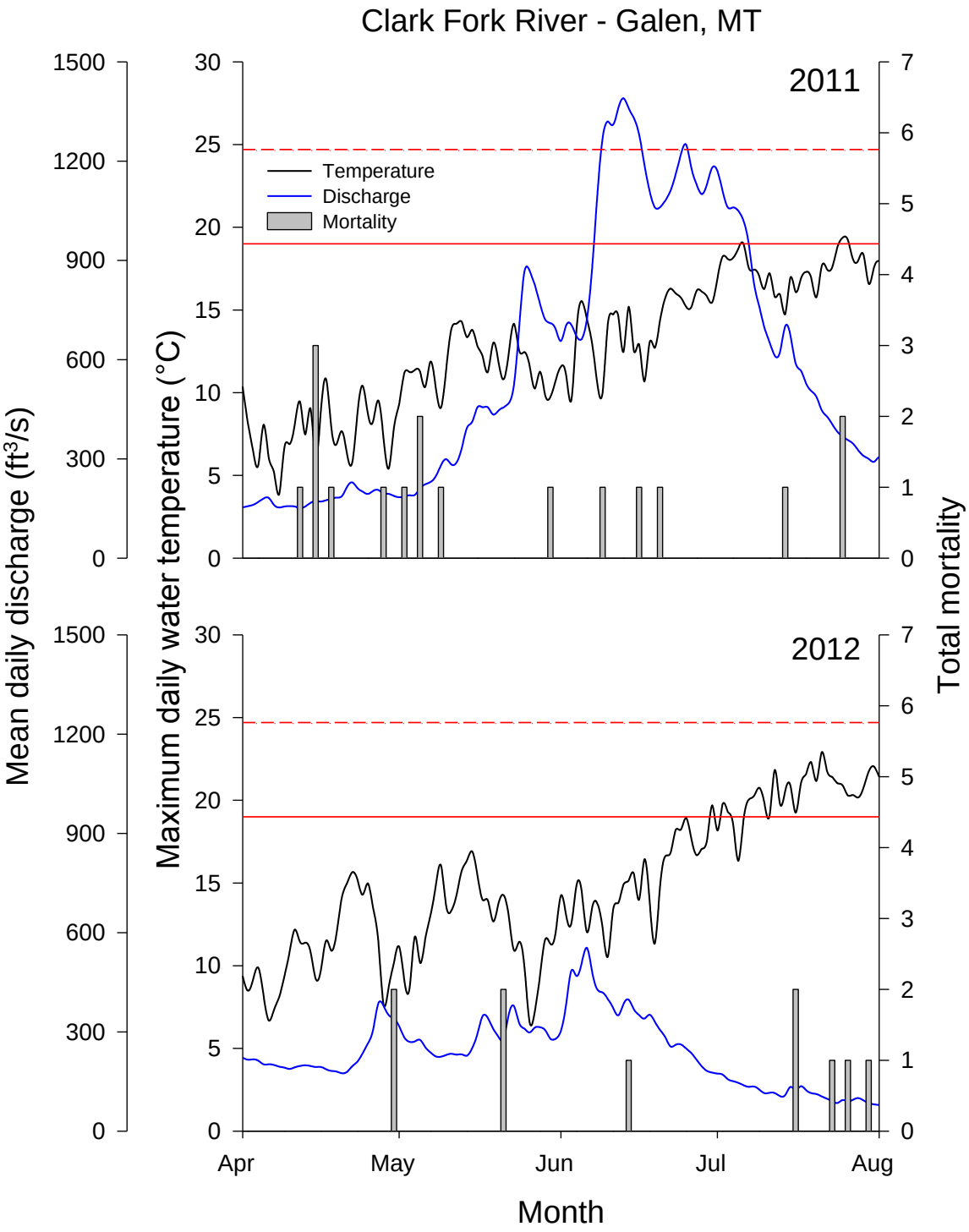

Figure 5-6. Total mortalities between cages one and two combined, maximum daily water temperature, and mean daily discharge for 2011 and 2012 in the Clark Fork River at the Galen site. In each panel the solid red line indicates the upper critical temperature threshold, and the dashed red line represents the upper incipient lethal temperature, for brown trout.

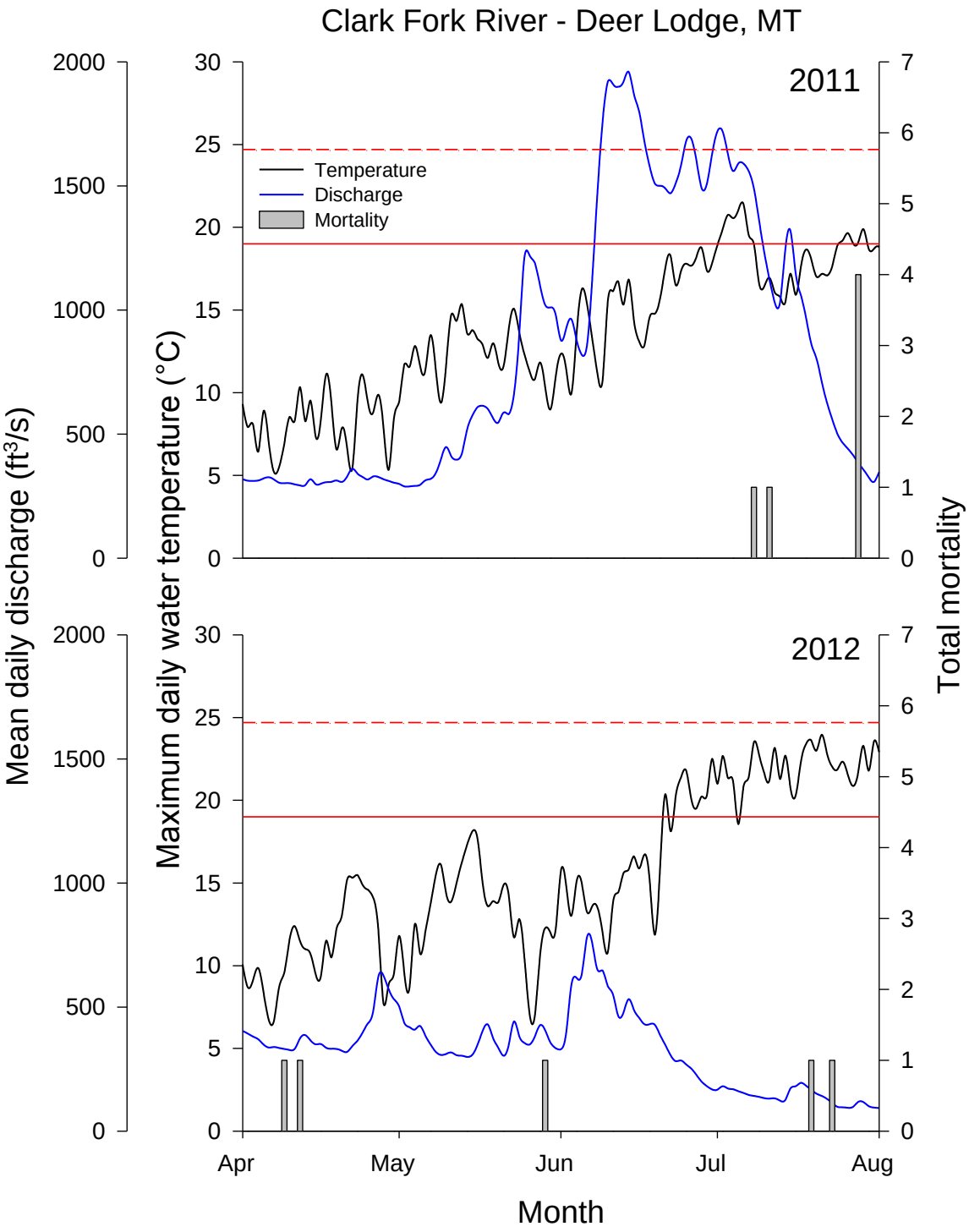

Figure 5-7. Total mortalities between cages one and two combined, maximum daily water temperature, and mean daily discharge for 2011 and 2012 in the Clark Fork River at the Deer Lodge site. In each panel the solid red line indicates the upper critical temperature threshold, and the dashed red line represents the upper incipient lethal temperature, for brown trout.

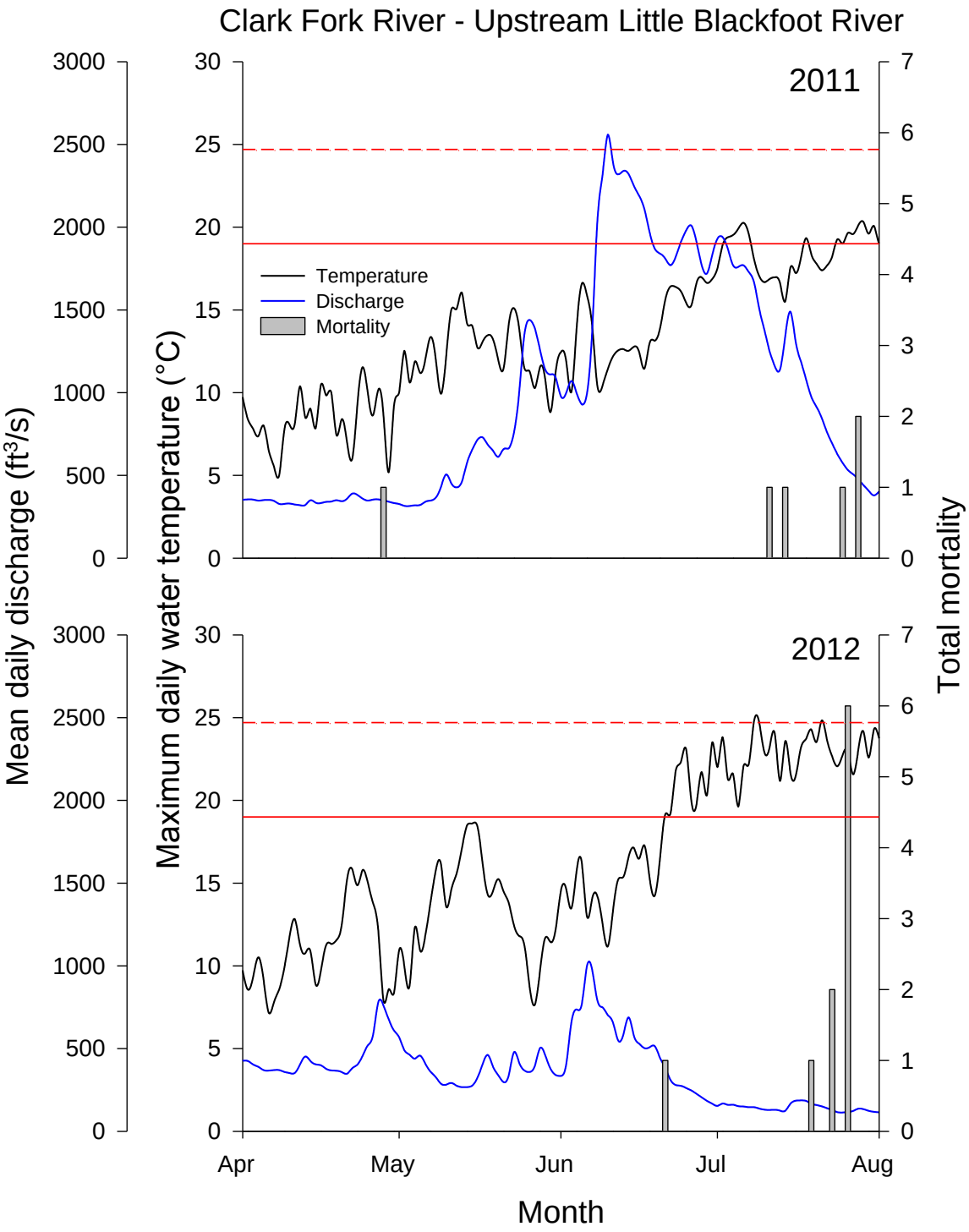

Figure 5-8. **Total mortalities between cages one and two combined, maximum daily water temperature, and mean daily discharge for 2011 and 2012 in the Clark Fork River at the site upstream of the Little Blackfoot River. In each panel the solid red line indicates the upper critical temperature threshold, and the dashed red line represents the upper incipient lethal temperature, for brown trout.**

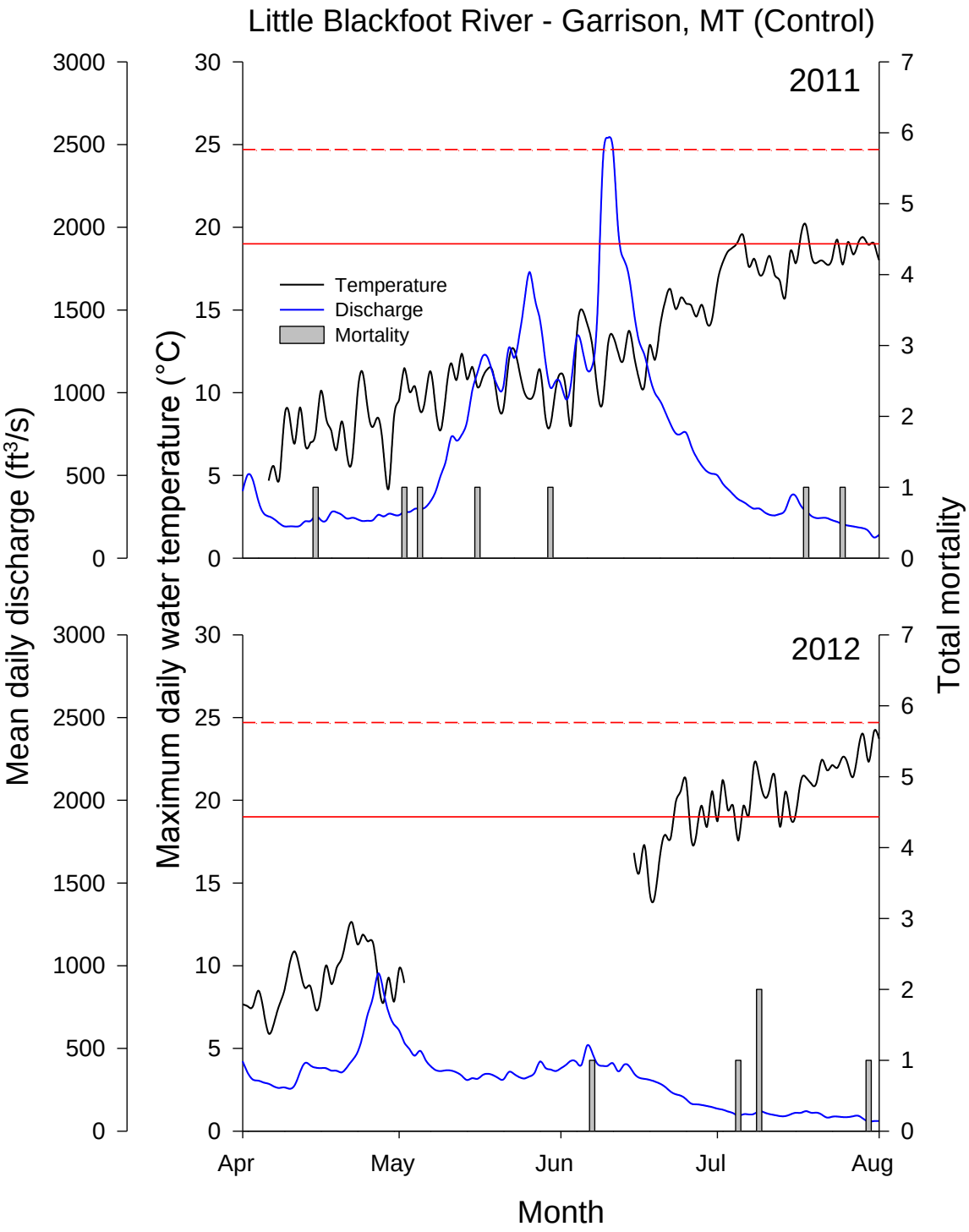

Figure 5-9. Total mortalities between cages one and two combined, maximum daily water temperature, and mean daily discharge for 2011 and 2012 at the control site in the Little Blackfoot River. In each panel the solid red line indicates the upper critical temperature threshold, and the dashed red line represents the upper incipient lethal temperature, for brown trout.

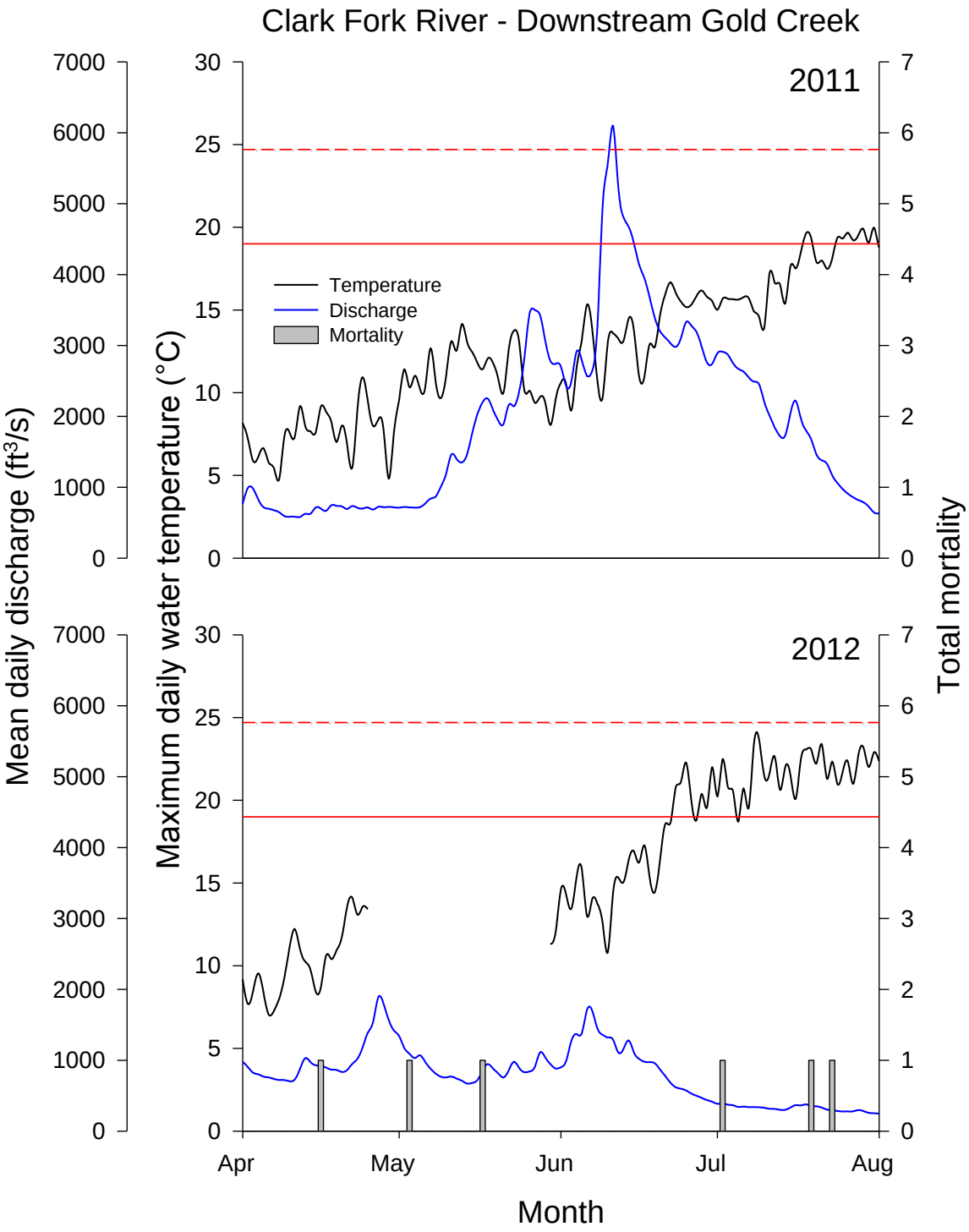

Figure 5-10. Total mortalities between cages one and two combined, maximum daily water temperature, and mean daily discharge for 2011 and 2012 in the Clark Fork River downstream of Gold Creek. In each panel the solid red line indicates the upper critical temperature threshold, and the dashed red line represents the upper incipient lethal temperature, for brown trout.

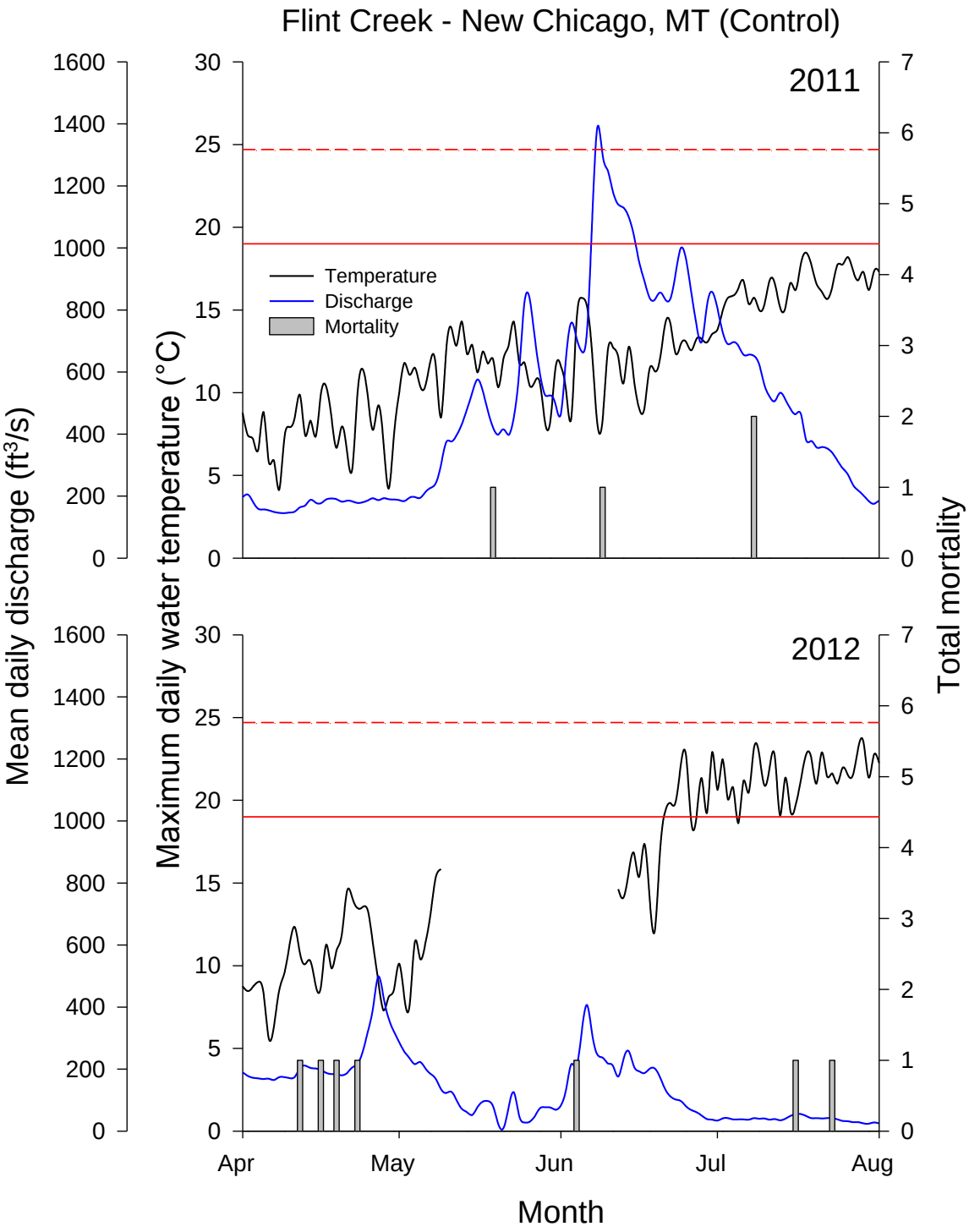

Figure 5-11. Total mortalities between cages one and two combined, maximum daily water temperature, and mean daily discharge for 2011 and 2012 at the control site in Flint Creek. In each panel the solid red line indicates the upper critical temperature threshold, and the dashed red line represents the upper incipient lethal temperature, for brown trout.

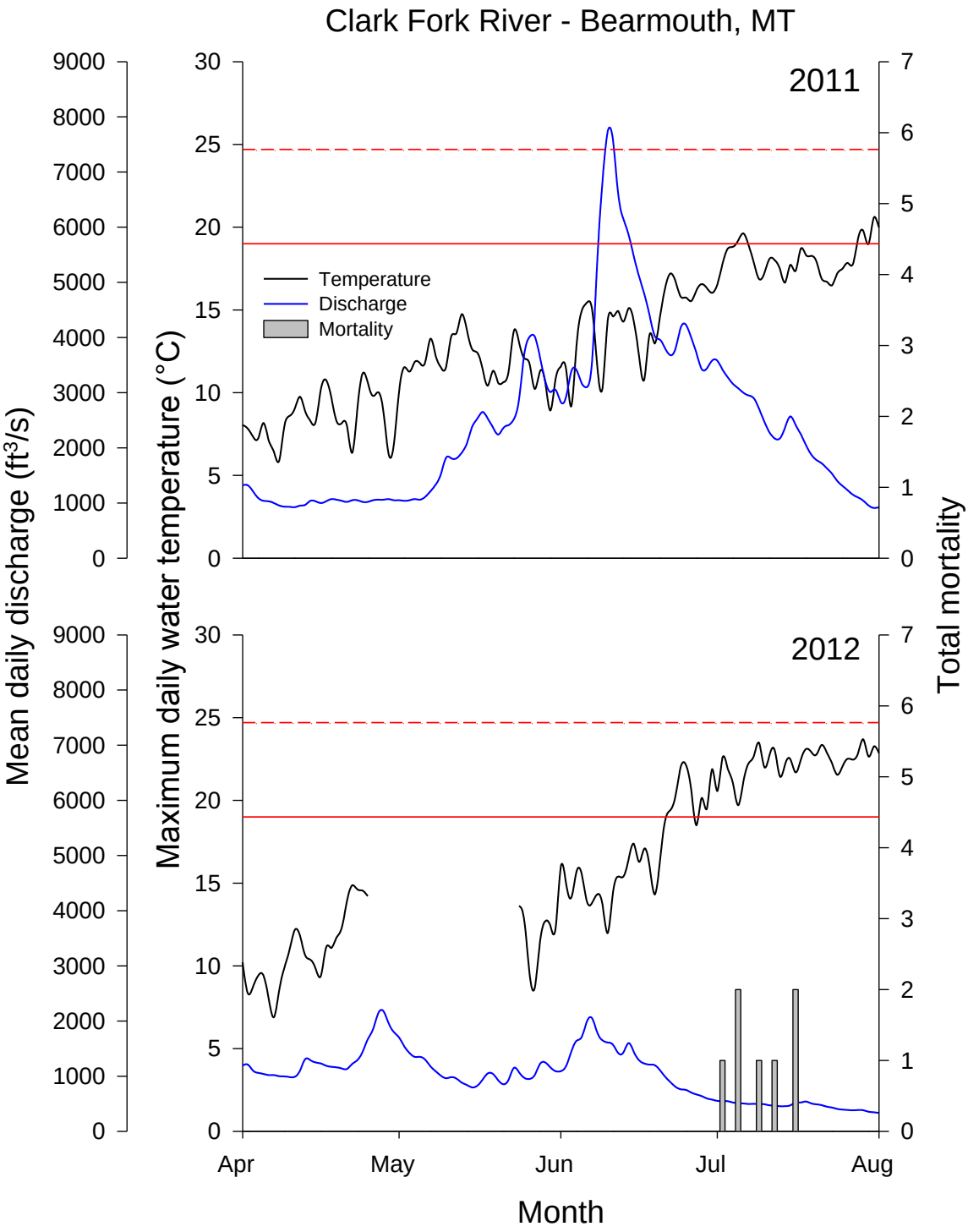

Figure 5-12. Total mortalities between cages one and two combined, maximum daily water temperature, and mean daily discharge for 2011 and 2012 in the Clark Fork River near Bearmouth, Montana. In each panel the solid red line indicates the upper critical temperature threshold, and the dashed red line represents the upper incipient lethal temperature, for brown trout.

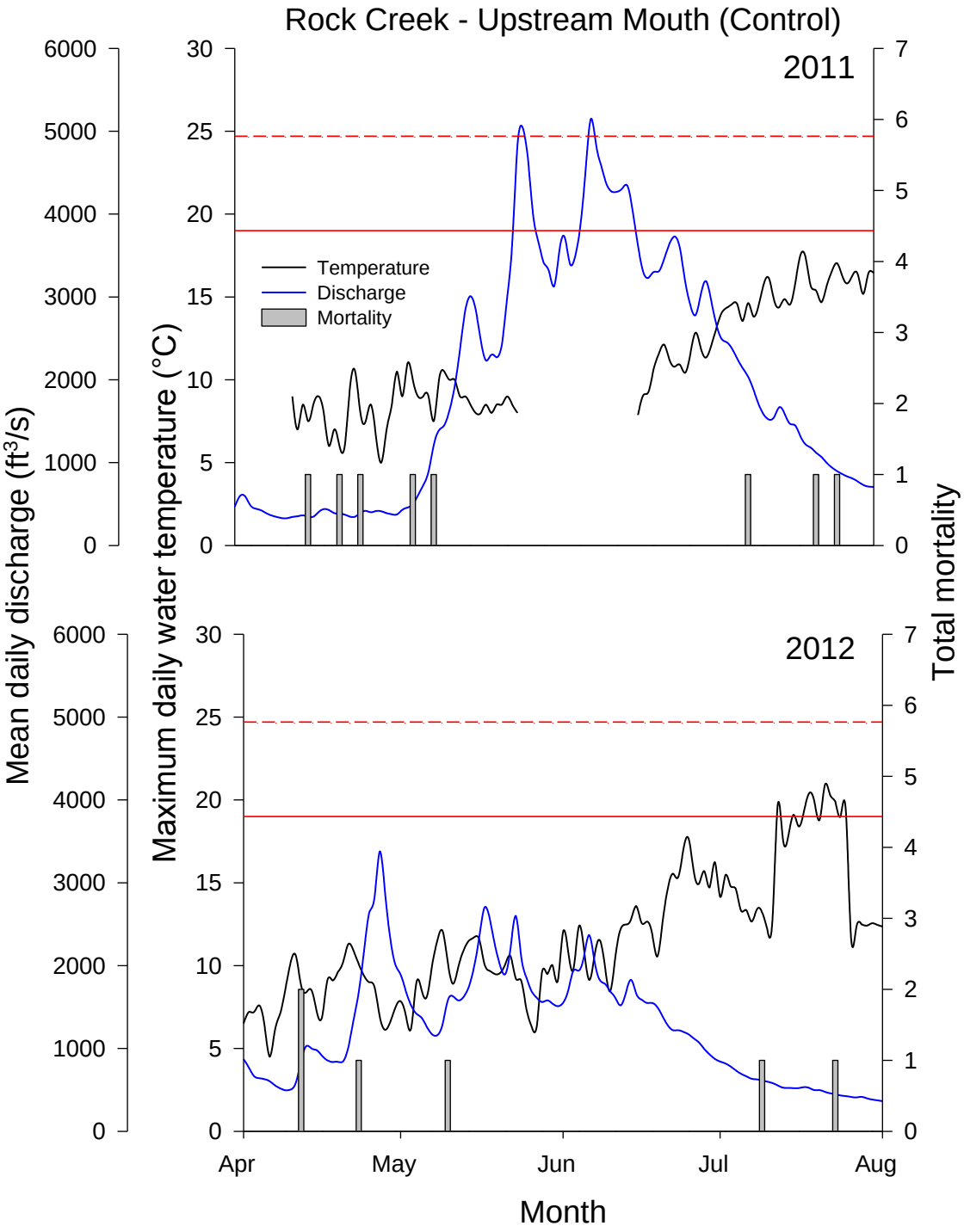

Figure 5-13. Total mortalities between cages one and two combined, maximum daily water temperature, and mean daily discharge for 2011 and 2012 at the control site in Rock Creek. In each panel the solid red line indicates the upper critical temperature threshold, and the dashed red line represents the upper incipient lethal temperature, for brown trout.

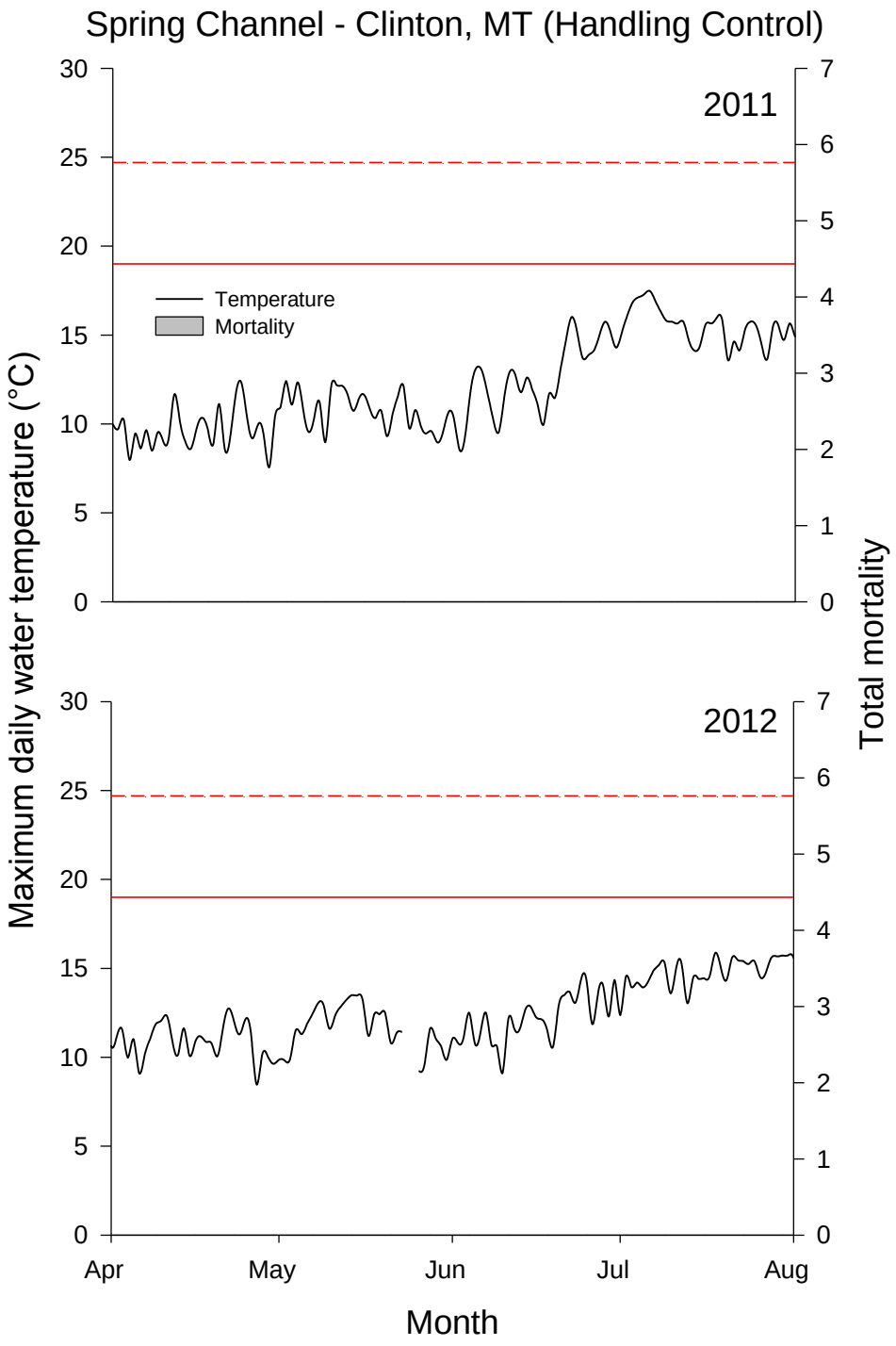

Figure 5-14. Total mortalities between cages one and two combined and maximum daily water temperature for 2011 and 2012 at the control site in the spring channel near Clinton, Montana. In each panel the solid red line indicates the upper critical temperature threshold, and the dashed red line represents the upper incipient lethal temperature, for brown trout.

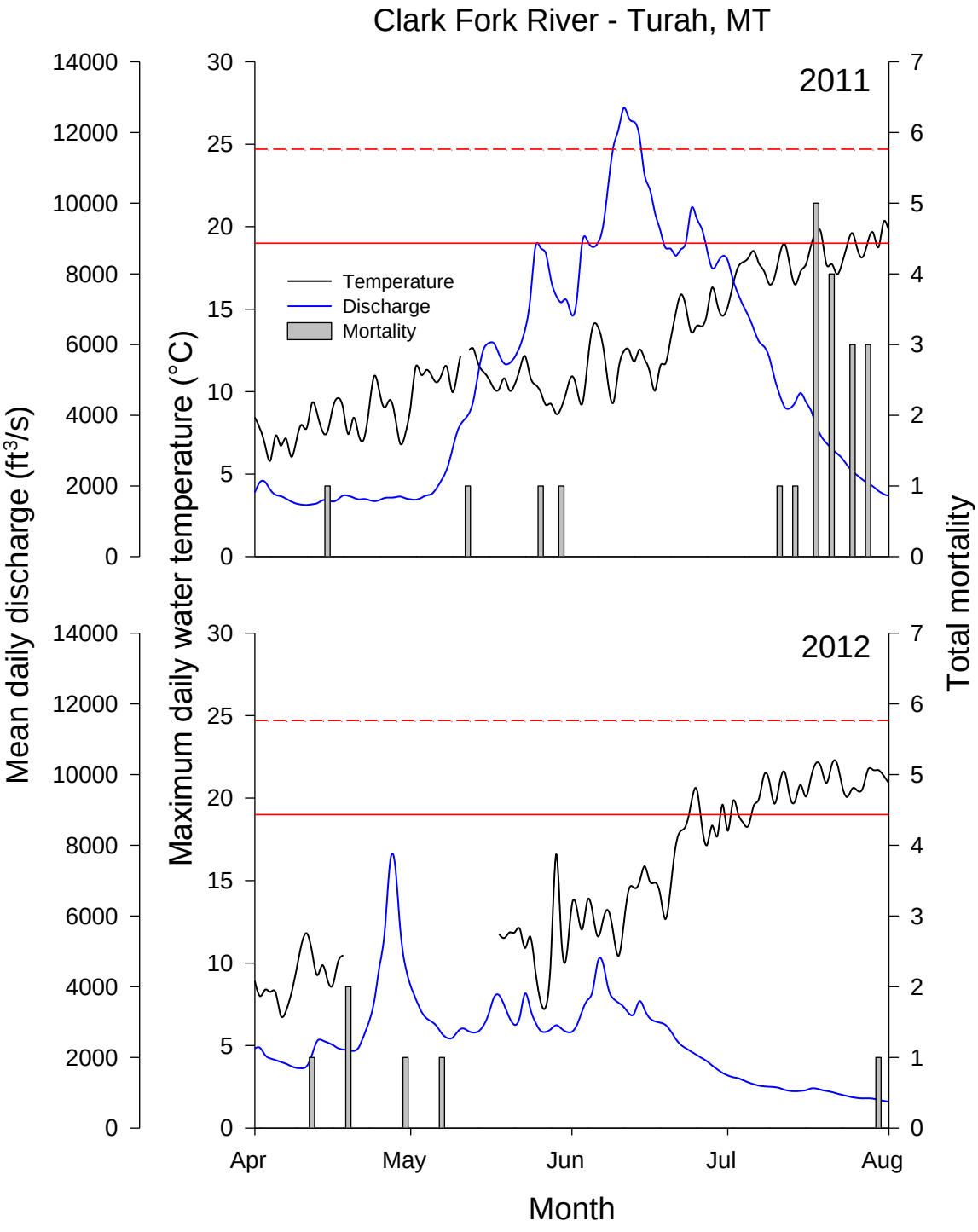

Figure 5-15. Total mortalities between cages one and two combined, maximum daily water temperature, and mean daily discharge for 2011 and 2012 in the Clark Fork River near Turah, Montana. In each panel the solid red line indicates the upper critical temperature threshold, and the dashed red line represents the upper incipient lethal temperature, for brown trout.

5.3.2 Spatial Distribution of Brown Trout Survival

Cumulative survival (%) at each site was calculated by dividing the number of live fish at the end of the analysis period in cages one and two combined by the total number of fish placed in both cages over the entire season. Cumulative survival in 2011 (April 8 to July 31) from the Warm Springs site downstream was as follows; Warm Springs 96 %, Galen 73 %, Deer Lodge 89 %, upstream of the Little Blackfoot River 89 %, within the Little Blackfoot River 88 %, downstream of Gold Creek 100 %, Flint Creek 93 %, Bearmouth 100 %, Rock Creek 86 %, Clinton 100 % and Turah 69 % (Figure 5-16). Cumulative survival in 2012 (April 8 to July 31) from the Warm Springs site downstream was as follows; Warm Springs 78 %, Galen 83 %, Deer Lodge 91 %, upstream of the Little Blackfoot River 83 %, within the Little Blackfoot River 91 %, downstream of Gold Creek 89 %, Flint Creek 88 %, Bearmouth 88 %, Rock Creek 89 %, Clinton 100 % and Turah 89 % (Figure 5-16).

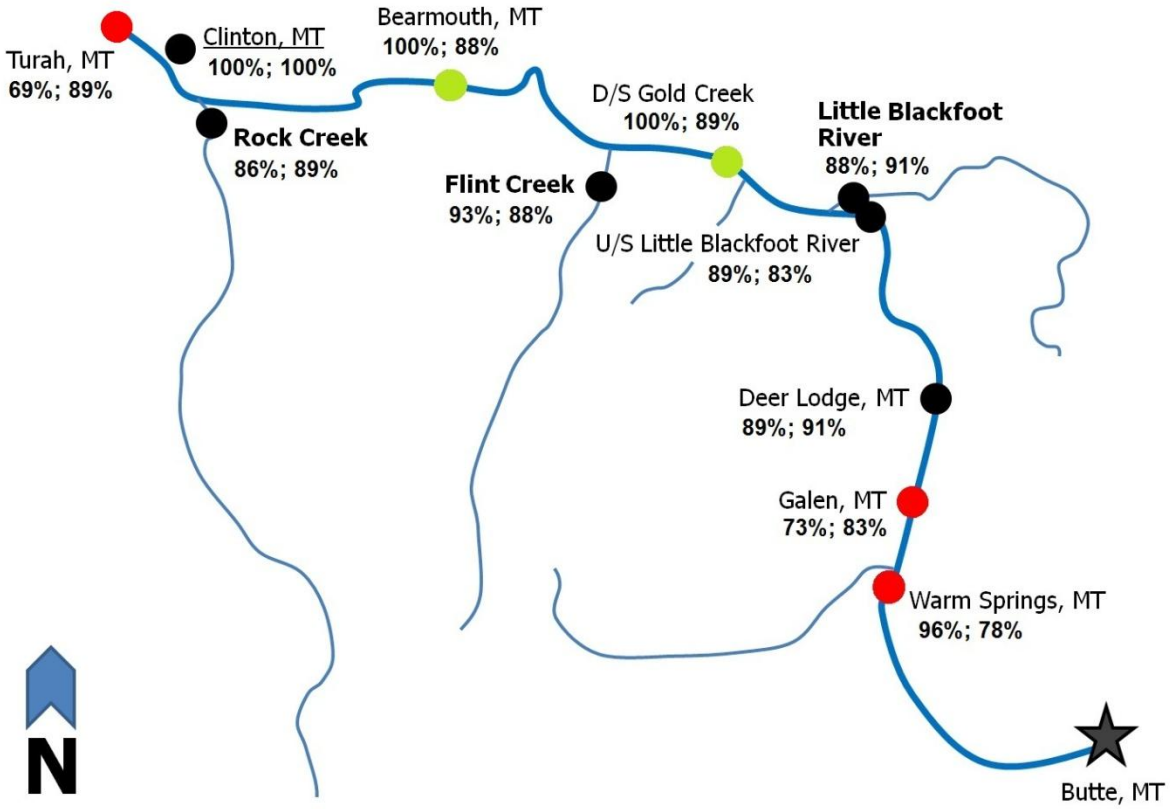

Figure 5-16. Cumulative brown trout survival from April 8th to July 31st across sites for 2011 and 2012 respectively. Control sites are bold and handling control site is underlined. Red dots denote sites with significantly lower than expected survival in at least one year; green dots denote sites with significantly higher than expected survival in at least one year.

Survival in the control tributaries was high, between years averaging 90 % in the Little Blackfoot River, 91 % in Flint Creek, and 88 % in Rock Creek. Survival at the handling control in the spring channel near Clinton was 100 % in both years indicating that mortalities observed at the experimental mainstem sites were not due to conditions inside the cages. Survival in the Clark Fork River near Warm Springs was significantly less than expected in 2012 and survival in the Clark Fork River near Galen was significantly less than expected in 2011. Survival then

increases at downstream mainstem sites and was significantly higher than expected downstream of Gold Creek and near Bearmouth in 2011 (Table 5-1; Figure 5-16). This may indicate a point source of contaminants contributing to mortality that is diluted by input from numerous tributaries entering the Clark Fork River below the two upper sites. In 2011 survival in the Clark Fork River near Turah was less than expected at 69 %; however, survival in 2012 was relatively high at 89 % which is within the range seen in the control tributaries. Why survival was so low at Turah in 2011 but not in 2012 is unknown; however, the low survival seen in 2011 may have been due to environmental conditions or other factors in the immediate area of the cages that were unobserved and out of the control of the researchers. Additional monitoring at this site may identify such conditions.

5.3.3 Growth

Growth varied by site and by year and was overall higher in 2012 (Figure 5-17). In 2011 growth appeared to be related to location on the mainstem and generally followed a decreasing trend from upstream to down, with growth in the tributary and handling control sites slightly higher than at adjacent mainstem sites (Figure 5-17). In 2012, growth was higher than in 2011 at all sites excluding the Clark Fork River near Warm Springs. As in 2011, growth was higher at the handling control at Clinton and in Rock Creek than at adjacent mainstem sites; however, growth at the other two control sites, (Little Blackfoot River and Flint Creek) was lower than at the adjacent mainstem sites (Figure 5-17). In 2012 growth was higher at the sites with the lowest water temperatures (Rock Creek and Clinton) indicating that high temperature in 2012 had an effect on growth at the remaining sites. The high growth rates at Warm Springs and Galen are expected as there is a “tail water” effect of the upstream ponds resulting in increased nutrients and additional food sources including freshwater shrimp and isopods.

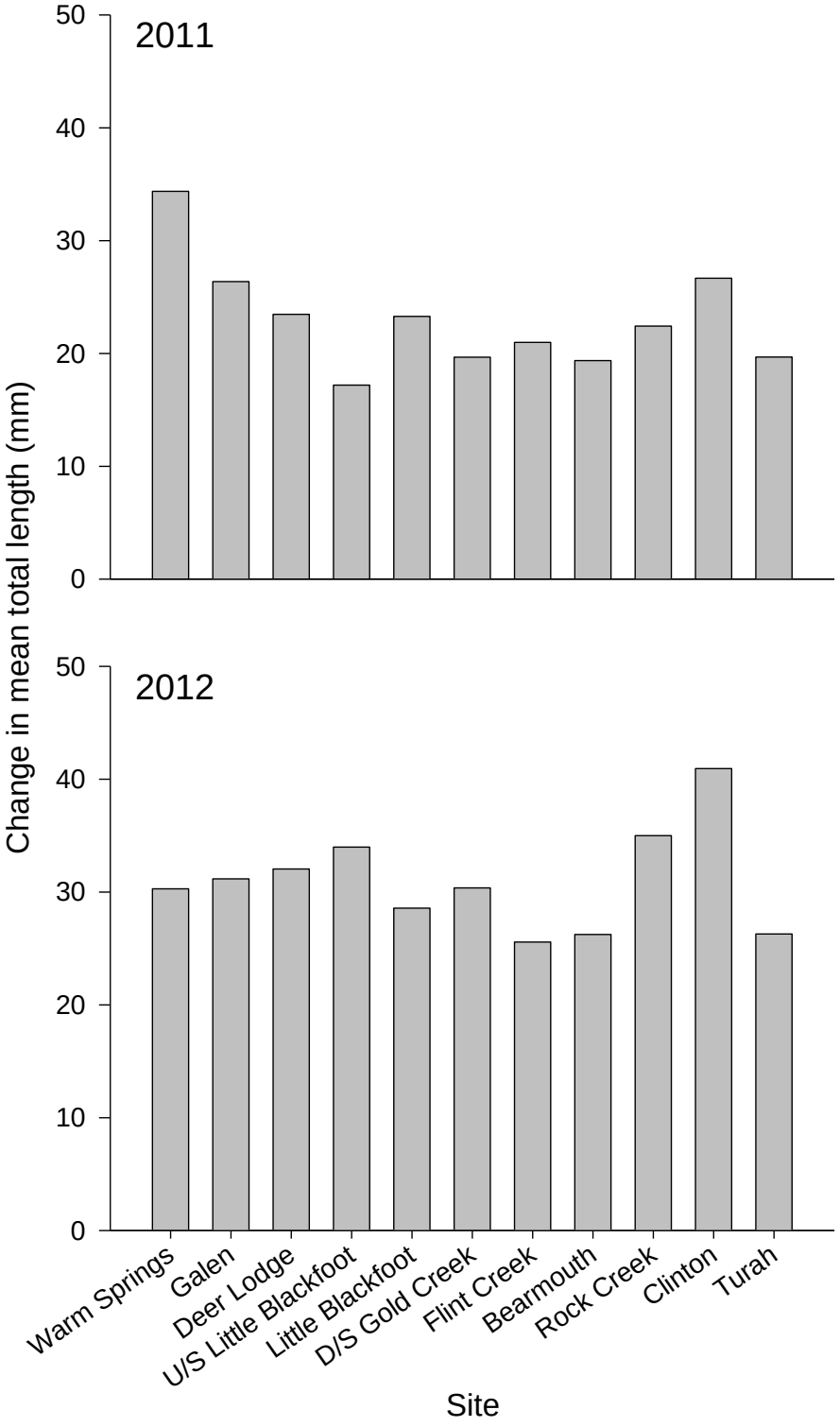

Figure 5-17. Change in mean total length for juvenile brown trout held in Clark Fork River and tributary cages in 2011 and 2012, arranged by site from upstream to downstream.

5.3.4 Histology

The liver is the primary cite of toxic action for fish (Lage et al. 2006). Results from histological analyses show varying degrees of cellular changes within brown trout livers at all sites that only occur with exposure to contaminants. These changes include excessive glycogen vacuolation (histology score ≥ 4) and nuclear vacuolation (histology score ≥ 2) of hepatocytes, as well as pleomorphic nuclei within hepatocytes. Degeneration or necrosis of hepatocytes is indicative of exposure to contaminants which may include heavy metals. The relative effect of contaminant exposure on brown trout at each site for both years was evaluated using histology scores for hepatocytic degeneration and necrosis from fish sampled at the end of each field season as well as a hatchery control collected in late March 2012 when fish for the study were obtained (Table 5-2).

Table 5-2. Scores representing degree of hepatocytic necrosis of histology samples collected at the end of each season by site and year. Scores are on a scale of 1-5: 1 = minimal; 2 = mild; 3 = moderate; 4 = moderately severe; 5 = severe.

Site	2011	2012
Hatchery	NA	2
Warm Springs	2	4
Galen	2	3-4
Deer Lodge	3	4
U/S Little Blackfoot	NA	3-4
Little Blackfoot	NA	4
D/S Gold Creek	3	3-4
Flint Creek	NA	4
Bearmouth	3	4
Rock Creek	2-3	3-4
Clinton Spring	3-4	2-4
Turah	NA	2-4

Histology scores for degree of melanomacrophage aggregation in kidneys and livers from samples collected at the end of each field season by site are presented in Table 5-3. Histology scores for melanomacrophage aggregations indicate contaminant exposure was chronic across the study area in both years. In 2011 the highest score for melanomacrophage aggregation in kidneys was at Warm Springs, with scores varying from 4-5. However all remaining sites excluding Turah had scores of 4 for kidney melanomacrophage aggregation indicating exposure to contaminants was chronic. In 2011 the highest scores for melanomacrophage aggregations in livers were seen downstream of Gold Creek, with scores varying from 2-3; all remaining sites with an available score had scores of 2.

Overall scores for degree of melanomacrophage aggregation in both kidneys and livers were higher in 2012. Fish from the hatchery control had a score of 3 for melanomacrophage aggregation in kidney tissue indicating moderate cellular changes that may or may not be within the normal range. However, the score for melanomacrophage aggregations in kidneys of hatchery fish were lower than any of the treatment or control sites, with scores at all sites ≥ 4. Scores for melanomacrophage aggregation in livers of hatchery fish varied from 2-3 indicating that fish from the hatchery were potentially subjected to chronic exposure to contaminants prior to placement in cages; similar values were seen at all treatment and control sites with the lowest score (1-2) seen at Rock Creek.

Table 5-3. Scores representing degree of melanomacrophage aggregation in kidneys and livers of histology samples collected at the end of each season by site and year. Scores are on a scale of 1-5: 1 = minimal; 2 = mild; 3 = moderate; 4 = moderately severe; 5 = severe.

Site	2011		2012	
	Kidney	Liver	Kidney	Liver
Hatchery	NA	NA	3	2-3
Warm Springs	4-5	2	4-5	NA
Galen	4	2	3-4	NA
Deer Lodge	4	2	3-5	NA
U/S Little Blackfoot	4	2	3-5	2
Little Blackfoot	4	2	4-5	2-3
D/S Gold Creek	3-4	2-3	3-4	2-3
Flint Creek	4	2	4	3
Bearmouth	4	2	4-5	2-3
Rock Creek	3-4	NA	4-5	1-2
Clinton Spring	4	NA	4	2-3
Turah	3	NA	4	2-3

Although fish were exposed to contaminants to some degree at all sites, histological analysis showed gill tissue to be very healthy across all sites and both years indicating that exposure to contaminants was either via ingestion or was non-toxic to gill epithelium. Severity of cellular changes in gills, livers, and kidneys of fish collected at the end of the 2011 field season was similar across all sites, both treatment and control, with the exception of fish collected at Turah which appeared healthier with less severe cellular changes than the other sites. Overall, fish collected at the end of the 2012 field season showed similar cellular changes and severity scores among sites. In addition to cellular changes related to exposure to contaminants, fish from the study area were found to have evidence of infection with parasites including *Myxobolus cerebralis*, as well as bacterial infections, and steatitis, an inflammation of the adipose tissue that is usually associated with a dietary deficiency in trout (Smith 1979; Herman and Kircheis 1985). Results of histological analysis for the hatchery controls collected in March 2012, fish remaining at the end of each field season at each site, and fish collected prior to the end of each field season are discussed below.

Hatchery Control

Histological analysis of brown trout from the hatchery control indicated that fish were overall in good health prior to the study. Prior to being placed in cages fish had normal gills, good glycogen vacuolation indicating stored energy, mild hepatocytic necrosis indicating normal cells or cellular changes of no consequence (Table 5-2), and mild to moderate numbers of melanomacrophages in the kidneys and liver (Table 5-3). Fish from the hatchery also exhibited moderate steatitis, indicating a possible dietary deficiency. These same cellular changes were observed in fish from the treatment and control sites with increased severity, especially in the kidneys.

Clark Fork River near Warm Springs

Fish collected from cages at Warm Springs at the completion of the field season in 2011 had mild to moderate (histology scores = 2-3) swelling of gill epithelium, indicating cellular changes ranging from normal or changes of no consequence to those that may or may not be within the normal range. Degeneration and necrosis of hepatocytes was mild (Table 5-2) indicating normal tissue or tissue with cellular changes of no consequence. Scores for melanomacrophage aggregation in kidney tissue varied from moderately severe to severe, and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants. Fish from Warm Springs had moderately severe glycogen vacuolation within hepatocytes (histology score = 4) indicating exposure to contaminants. In addition to cellular changes associated with exposure to contaminants, one fish collected at the end of the 2011 field season at Warm Springs showed evidence indicative of a bacterial skin lesion.

In 2012 fish collected from cages at Warm Springs at the completion of the field season had mostly normal gill tissue. Degeneration and necrosis of hepatocytes was moderately severe indicating pathological lesions associated with contaminant exposure (Table 5-2). Scores for melanomacrophage aggregations in kidney tissue varied from moderately severe to severe indicating that exposure to contaminants was chronic (Table 5-3).

Clark Fork River near Galen

Fish collected from cages at Galen at the completion of the field season in 2011 had mostly normal gill tissue. Degeneration and necrosis of hepatocytes was mild (Table 5-2) indicating normal tissue or tissue with cellular changes of no consequence. Scores for melanomacrophage aggregation in kidney tissue were moderately severe and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants. In addition to cellular changes associated with exposure to contaminants, all fish collected at the end of the 2011 field season at Galen had steatitis indicating a potential dietary deficiency.

In 2012 six fish collected from cages at Galen at the completion of the field season had mostly normal gill tissue, while four fish showed signs of gill inflammation. Degeneration and necrosis of hepatocytes was moderate to moderately severe indicating pathological lesions associated with contaminant exposure (Table 5-2). Fish from Galen in 2012 also exhibited nuclear vacuolation within hepatocytes which indicates exposure to contaminants. Scores for melanomacrophage aggregations in kidney tissue varied from moderate to moderately severe indicating that exposure to contaminants was chronic (Table 5-3).

Clark Fork river near Deer Lodge

Fish collected from cages at Deer Lodge at the completion of the field season in 2011 had mostly normal gill tissue. Degeneration and necrosis of hepatocytes was moderate (Table 5-2) indicating cellular changes that may or may not be within the normal range. Pleomorphic nuclei within hepatocytes were observed indicating exposure to contaminants. Scores for melanomacrophage aggregation in kidney tissue were moderately severe, and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants. The parasite *Myxobolus cerebralis* was observed in two fish at Deer Lodge in 2011.

In 2012 fish collected from cages at Deer Lodge at the completion of the field season had mostly normal gill tissue. Degeneration and necrosis of hepatocytes was moderately severe indicating pathological lesions associated with contaminant exposure (Table 5-2). Pleomorphic nuclei within hepatocytes were observed indicating exposure to contaminants. Scores for melanomacrophage aggregations in kidney tissue varied from moderate to severe indicating that exposure to contaminants was chronic (Table 5-3). In addition to cellular changes associated with exposure to contaminants, two fish collected at the end of the 2012 field near Deer Lodge had eosinophilic granular cells in cranial nerves which are commonly seen in brown trout exposed to *M. cerebralis* (Hedrick et al. 1999).

Clark Fork River upstream of the Little Blackfoot River

Fish collected from the cages upstream of the Little Blackfoot River at the completion of the field season in 2011 had moderate (histology score = 3) cellular changes to gill tissue that may or may not be within the normal range. Scores for melanomacrophage aggregation in kidney tissue were moderately severe and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants. In addition to cellular changes associated with exposure to contaminants, one fish collected at the end of the 2011 field season upstream of the Little Blackfoot River showed evidence of an eye fluke as well as an oral cavity wound. Many of the fish from the cages upstream of the Little Blackfoot River in 2011 had eosinophilic granular cells in cranial nerves which are commonly seen in brown trout exposed to *M. cerebralis*.

In 2012 fish collected from the cages upstream of the Little Blackfoot River at the completion of the field season had mostly normal gill tissue with mild to moderate (histology score = 2-3) cellular changes that varied from normal or changes of no consequence to those that may or may not be within the normal range. Degeneration and necrosis of hepatocytes was moderate to moderately severe indicating pathological lesions associated with contaminant exposure (Table 5-2). Pleomorphic nuclei and nuclear vacuolation within hepatocytes were observed indicating exposure to contaminants. Scores for melanomacrophage aggregation in kidney tissue varied from moderate to severe and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants. In addition to cellular changes associated with exposure to contaminants, one fish collected at the end of the 2012 field season upstream of the Little Blackfoot River was infected with parasitic *Trichodina* spp. Presence of *Trichodina* spp. may indicate habitats experiencing eutrophication or poor water quality (Schmidt et al. 2003; Ogut and Palm 2005).

Little Blackfoot River (Control)

Fish collected from the Little Blackfoot River at the completion of the field season in 2011 had moderate (histology score = 3) cellular changes to gill tissue that may or may not be within the normal range. Fish from the Little Blackfoot River had moderately severe glycogen vacuolation within hepatocytes (histology score = 4) indicating exposure to contaminants. Scores for melanomacrophage aggregation in kidney tissue were moderately severe and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants. In addition to cellular changes associated with exposure to contaminants, fish collected at the end of the 2011 field season from the Little Blackfoot River had steatitis indicating a dietary deficiency.

In 2012 fish collected from the Little Blackfoot River at the completion of the field season had mostly normal gill tissue. Degeneration and necrosis of hepatocytes was moderately severe indicating pathological lesions associated with contaminant exposure (Table 5-2), and

pleomorphic nuclei within hepatocytes were observed indicating exposure to contaminants. Scores for melanomacrophage aggregation in kidney tissue were moderately severe to severe and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants.

Clark Fork River downstream of Gold Creek

Fish collected from the cages downstream of Gold Creek at the completion of the field season in 2011 had moderate (histology score = 3) swelling of gill tissue. Degeneration and necrosis of hepatocytes was moderate (Table 5-2) indicating cellular changes that may or may not be within the normal range. Scores for melanomacrophage aggregation in kidney tissue were moderate to moderately severe and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants.

In 2012 fish collected from the cages downstream of Gold Creek at the completion of the field season had mostly normal gill tissue. Degeneration and necrosis of hepatocytes was moderate to moderately severe indicating pathological lesions associated with contaminant exposure (Table 5-2). Excessive nuclear vacuolation (histology score = 3) and pleomorphic nuclei within hepatocytes were observed indicating contaminant exposure. Scores for melanomacrophage aggregation in kidney tissue were moderate to moderately severe and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants.

Flint Creek (Control)

Fish collected from Flint Creek at the completion of the field season in 2011 had moderate to moderately severe (histology score = 3-4) swelling of gill tissue. Moderately severe glycogen vacuolation (histology score = 4) of hepatocytes was observed indicating contaminant exposure. Scores for melanomacrophage aggregation in kidney tissue were moderately severe and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants. In addition to cellular changes associated with exposure to contaminants, one fish collected at the end of the 2011 field season in Flint Creek was infected with parasitic *Trichodina* spp., the presence of which could indicate habitat experiencing eutrophication or poor water quality.

In 2012 fish collected from Flint Creek at the completion of the field season had mostly normal gill tissue. Degeneration and necrosis of hepatocytes was moderately severe indicating pathological lesions associated with contaminant exposure (Table 5-2), and pleomorphic nuclei within hepatocytes were observed indicating contaminant exposure. Scores for melanomacrophage aggregation in kidney tissue were moderately severe and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants.

Clark Fork River near Bearmouth

Fish collected near Bearmouth at the completion of the field season in 2011 had moderate to moderately severe (histology score = 3-4) swelling of gill tissue. Degeneration and necrosis of hepatocytes was moderate (Table 5-2) indicating cellular changes that may or may not be within the normal range; however excessive glycogen vacuolation (histology score = 3-4) and nuclear vacuolation (histology score = 2) within hepatocytes indicates exposure to contaminants. Scores for melanomacrophage aggregation in kidney tissue were moderately severe and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants. In addition to cellular changes associated with exposure to

contaminants, one fish collected at the end of the 2011 field season near Bearmouth was infected with parasitic *Trichodina* spp., the presence of which could indicate habitat experiencing eutrophication or poor water quality.

In 2012 fish collected near Bearmouth at the completion of the field season had mostly normal gill tissue. Degeneration and necrosis of hepatocytes was moderately severe indicating pathological lesions associated with contaminant exposure (Table 5-2), and pleomorphic nuclei were observed within hepatocytes indicating exposure to contaminants. Scores for melanomacrophage aggregation in kidney tissue were moderately severe to severe and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants.

Rock Creek (Control)

Fish collected from Rock Creek at the completion of the field season in 2011 had moderate to moderately severe (histology score = 3-4) swelling of gill tissue. Degeneration and necrosis of hepatocytes was moderate to moderately severe indicating pathological lesions associated with contaminant exposure (Table 5-2), and moderate to moderately severe glycogen vacuolation (histology score = 3-4) and pleomorphic nuclei within hepatocytes were observed indicating contaminant exposure. Scores for melanomacrophage aggregation in kidney tissue were moderate to moderately severe (Table 5-3) indicating chronic exposure to contaminants. In addition to cellular changes associated with exposure to contaminants, one fish collected at the end of the 2011 field season from Rock Creek had a severe bacterial infection of the heart. Many of the fish from Rock Creek in 2011 also had eosinophilic granular cells in cranial nerves, a condition commonly seen in brown trout exposed to *M. cerebralis*.

In 2012 fish collected from Rock Creek at the completion of the field season had mostly normal gill tissue. Degeneration and necrosis of hepatocytes was mild to moderately severe indicating pathological lesions associated with contaminant exposure (Table 5-2). Mild to moderately severe nuclear vacuolation (histology score = 2-4) and pleomorphic nuclei within hepatocytes were also observed indicating contaminant exposure. Scores for melanomacrophage aggregation in kidney tissue were moderately severe and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants.

Spring channel near Clinton (Handling control)

Fish collected from the handling control near Clinton at the completion of the field season in 2011 had mostly normal gill tissue. Degeneration and necrosis of hepatocytes was moderate to moderately severe indicating pathological lesions associated with contaminant exposure (Table 5-2), and moderately severe (histology score = 4) glycogen vacuolation within hepatocytes was observed indicating exposure to contaminants. Scores for melanomacrophage aggregation in kidney tissue were moderately severe (Table 5-3), indicating chronic exposure to contaminants. In 2011, one fish from the handling control had eosinophilic granular cells in cranial nerves, a condition commonly seen in brown trout exposed to *M. cerebralis*.

In 2012 fish collected from the handling control near Clinton at the completion of the field season had mostly normal gill tissue. Degeneration and necrosis of hepatocytes was mild to moderately severe indicating pathological lesions associated with contaminant exposure (Table 5-2), and pleomorphic nuclei within hepatocytes were observed indicating exposure to contaminants. Scores for melanomacrophage aggregation in kidney tissue were moderately severe and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants.

Clark Fork River near Turah

Fish collected near Turah at the completion of the field season in 2011 had mostly normal gill tissue. Moderately severe (histology score = 4) glycogen vacuolation within hepatocytes was observed indicating exposure to contaminants. Scores for melanomacrophage aggregation in kidney tissue were moderate and were below the threshold indicating chronic exposure to contaminants.

In 2012 fish collected near Turah at the completion of the field season had mostly normal gill tissue. Degeneration and necrosis of hepatocytes was mild to moderately severe indicating pathological lesions associated with contaminant exposure (Table 5-2). Excessive nuclear vacuolation (histology score = 2) and pleomorphic nuclei within hepatocytes were observed indicating exposure to contaminants. Scores for melanomacrophage aggregation in kidney tissue were moderately severe and melanomacrophage aggregations were observed in livers (Table 5-3), indicating chronic exposure to contaminants.

Mid-Season Histology Samples

In addition to samples collected at the conclusion of each field season, histology samples were collected at various points during the summer. On August 4, 2011 following an increase in mortalities in mid- to late-July, samples were collected for histology from all sites excluding the Little Blackfoot River. In 2012 specimens were collected when an individual fish that was near mortality but still alive at the time cages were checked was found. This occurred three times during the 2012 field season, on May 17 downstream of Gold Creek, on July 30 in the Little Blackfoot River, and on August 23 at Warm Springs. Fish collected prior to the end of each field season showed more severe cellular changes than fish collected at the end of the season. Results for histological analysis of fish collected prior to the end of each field season are summarized below.

Overall, fish collected in early August 2011 showed the same cellular changes as fish collected at the end of the 2011 field season, only the changes were more severe. Moderately severe (histology score = 4) swelling of gill tissue was present in 63 % of histology samples submitted in early August compared to 18 % of those collected at the end of the field season. When observed, degeneration and necrosis of hepatocytes was moderately severe (histology score = 4) indicating pathological lesions in 83 % of histology samples submitted in early August compared to 33 % of those collected at the end of the field season. Overall, fish from Galen had the most severe lesions while those at Warm Springs had the least severe lesions among samples collected in early August.

In addition to cellular changes associated with exposure to contaminants, the moribund fish collected near Galen in May of 2012 had fungal meningitis of the spine, a very uncommon and serious condition. Histological analysis of the fish collected in July 2012 from the Little Blackfoot River revealed proliferation and fusion of gill lamellae and moderate (histology score = 3) degeneration of hepatocytes with no sign of bacterial or parasitic infection, indicating that the fish was moribund due to exposure to contaminants. The moribund fish collected at Warm Springs in August 2012 had normal gills and moderately severe (histology score = 4) cellular changes within the liver indicative of toxicant exposure. In addition to cellular changes associated with exposure to contaminants, this fish also showed evidence of a cranial deformity.

5.3.5 Tissue Metals Burdens

Tissue metals burdens from fish held at cage sites were compared to reported values from previous studies assessing growth or mortality effects using whole body burdens in salmonids.

Of the ten metals detected, studies reporting effects on salmonids from whole body burdens of arsenic, cadmium, copper, lead, selenium, and zinc were found (Table 5-4). Beryllium was the only metal not detected in any of the tissue samples analyzed; the remaining metals were detected in samples from one or more sites.

Copper and zinc consistently exceeded these thresholds, therefore tissue metals burdens for copper and zinc were depicted through each field season graphically (Figure 5-18 through 5-39) while the remaining metals detected were summarized as mean values weighted by sample size (Tables 5-5 and 5-6). Arsenic was the only metal besides copper and zinc to exceed the identified threshold at any site. Arsenic exceeded the threshold only 3 times throughout the study; in Flint Creek in May (13.70 µg/g, N=1) and June (9.57 µg/g, N=1) of 2011, and once in the Clark Fork River downstream of Gold Creek in May 2012 (8.45 µg/g, N=2); however, when weighted by sample size, average arsenic tissue burdens did not exceed the identified threshold at any site (Tables 5-5 and 5-6).

Generally, tissues metals burdens were lower at control sites than at mainstem sites; however, Flint Creek was an exception to this as some of the highest metals burdens of any site occurred there (Figure 5-18 through 5-39; Table 5-5 and 5-6). Copper and zinc burdens typically peaked mid-season at most sites; however some sites had burdens that were highest at the beginning of the season and decreased through time (e.g., copper at Galen in 2011, zinc and copper at Rock Creek in 2012) (Figures 5-18 through 5-39).

Table 5-4. Summary of studies relating whole body metals burdens to growth or mortality effects in salmonids. All values reported were the minimum concentrations causing an effect.

Species	Metal	Metal concentration (µg/g dry weight)	Reference
Rainbow trout	Arsenic	6.8	McGeachy and Dixon 1990
Rainbow trout	Cadmium	4.64	Hollis et al. 2001
Rainbow trout	Copper	8.57	Marr et al. 1996
Eastern brook trout	Lead	20.1	Holcombe et al. 1976
Rainbow trout	Selenium	4	Hilton and Hodson 1983
Rainbow trout	Zinc	105.09	Gundogdu and Erdem 2008

Table 5-5. Average tissue metals burdens weighted by sample size for mortalities and fish remaining alive at the end of the field season in 2011. All measurements are µg/g, dry weight; ND indicates all samples below detectable limit.

Site	Ar	Ba	Cd	Cr	Mn	Ni	lead	Se
Warm Springs	1.22	4.11	0.27	ND	10.98	ND	0.7	1.75
Galen	2	7.95	0.4	ND	23.02	5.12	2.54	1.77
Deer Lodge	2.52	11.47	0.3	ND	24.98	ND	3.89	1.53
U/S Little Blackfoot	1.78	2.81	0.34	ND	22.66	7.69	0.75	1.35
Little Blackfoot	1.71	3.3	ND	ND	16.05	ND	0.92	1.71
Gold Creek	1.76	2.17	ND	ND	15.32	ND	0.44	1.65
Flint Creek	2.6	10.72	ND	2.04	49.21	4.21	1.5	1.54
Bearmouth	2.04	4.17	0.25	ND	29.16	ND	0.96	1.56
Rock Creek	2.52	14.19	ND	ND	9.92	ND	0.45	1.44
Clinton Spring	1.5	2.05	ND	ND	7.41	ND	0.33	1.55
Turah	2.01	10.01	0.26	ND	36.6	ND	1.33	1.47

Table 5-6. Average tissue metals burdens weighted by sample size for mortalities and fish remaining alive at the end of the field season in 2012. All measurements are µg/g, dry weight; ND indicates all samples below detectable limit.

Site	Ar	Ba	Cd	Cr	Mn	Ni	lead	Se
Warm Springs	1.51	7.76	ND	ND	21.08	5.07	0.41	1.15
Galen	1.94	2.51	0.36	ND	23.15	49.4	0.94	1.13
Deer Lodge	1.97	3.58	ND	ND	36.68	41.4	1.03	1.11
U/S Little Blackfoot	1.36	6.68	0.27	ND	11.76	ND	1.12	0.85
Little Blackfoot	1.37	6.53	ND	4.3	15.75	ND	0.33	0.83
Gold Creek	1.55	16.7	0.67	4.04	11.35	2.71	3.53	1.04
Flint Creek	2.05	5.28	ND	ND	40.56	ND	1.27	1.15
Bearmouth	1.34	7.42	0.26	ND	17.1	ND	0.31	1.14
Rock Creek	1.05	3.41	0.4	ND	3.47	4.22	0.27	1.08
Clinton Spring	0.95	1.65	ND	ND	10.57	ND	0.29	1.11
Turah	1.31	3.78	0.72	ND	17.06	2.59	0.47	1.16

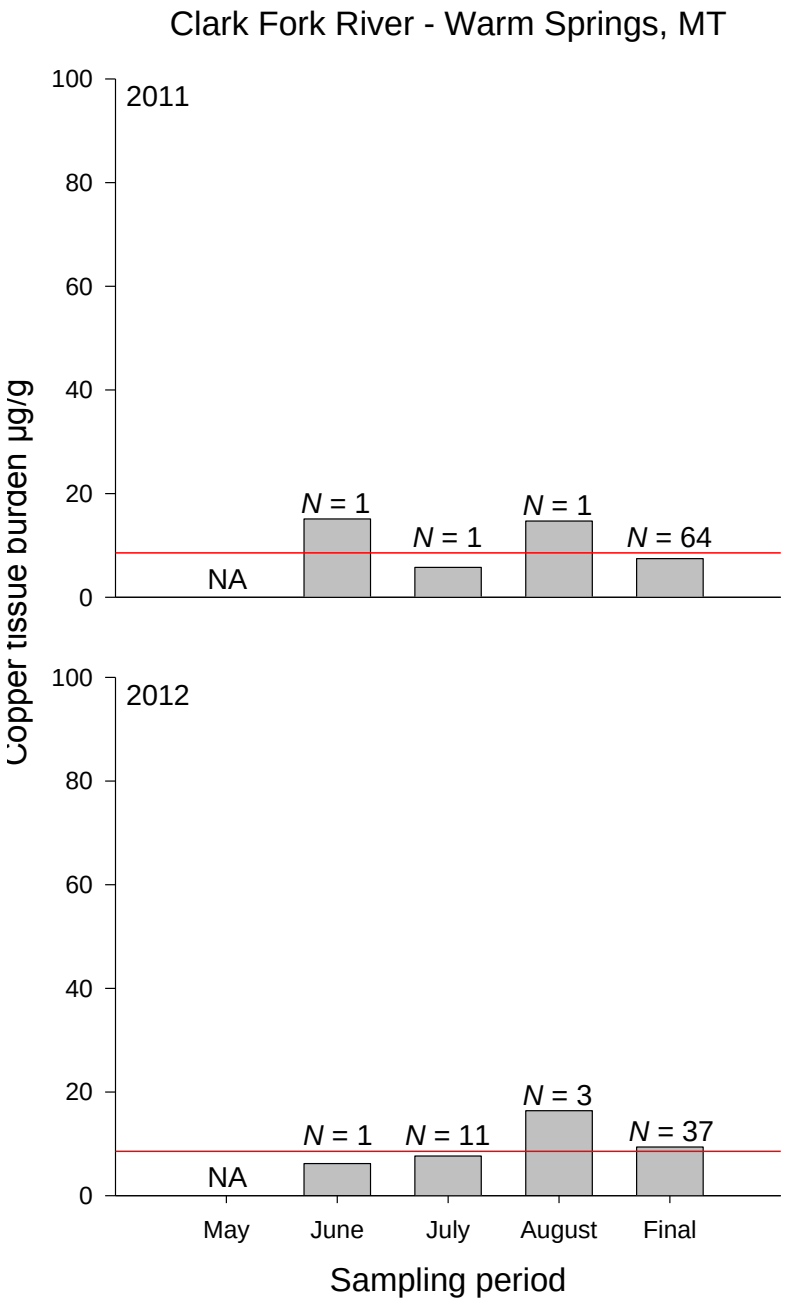

Figure 5-18. Copper tissue burdens in the Clark Fork River near Warm Springs, Montana. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

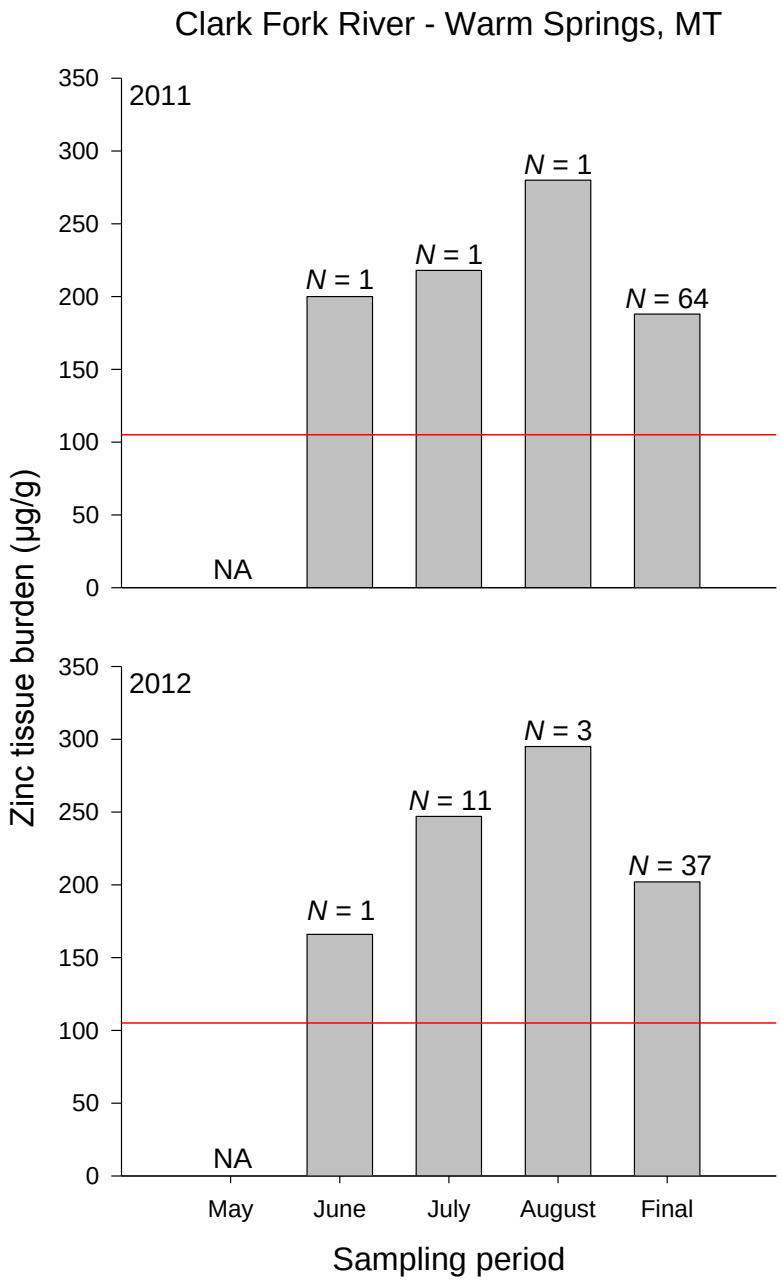

Figure 5-19. Zinc tissue burdens in the Clark Fork River near Warm Springs, Montana. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

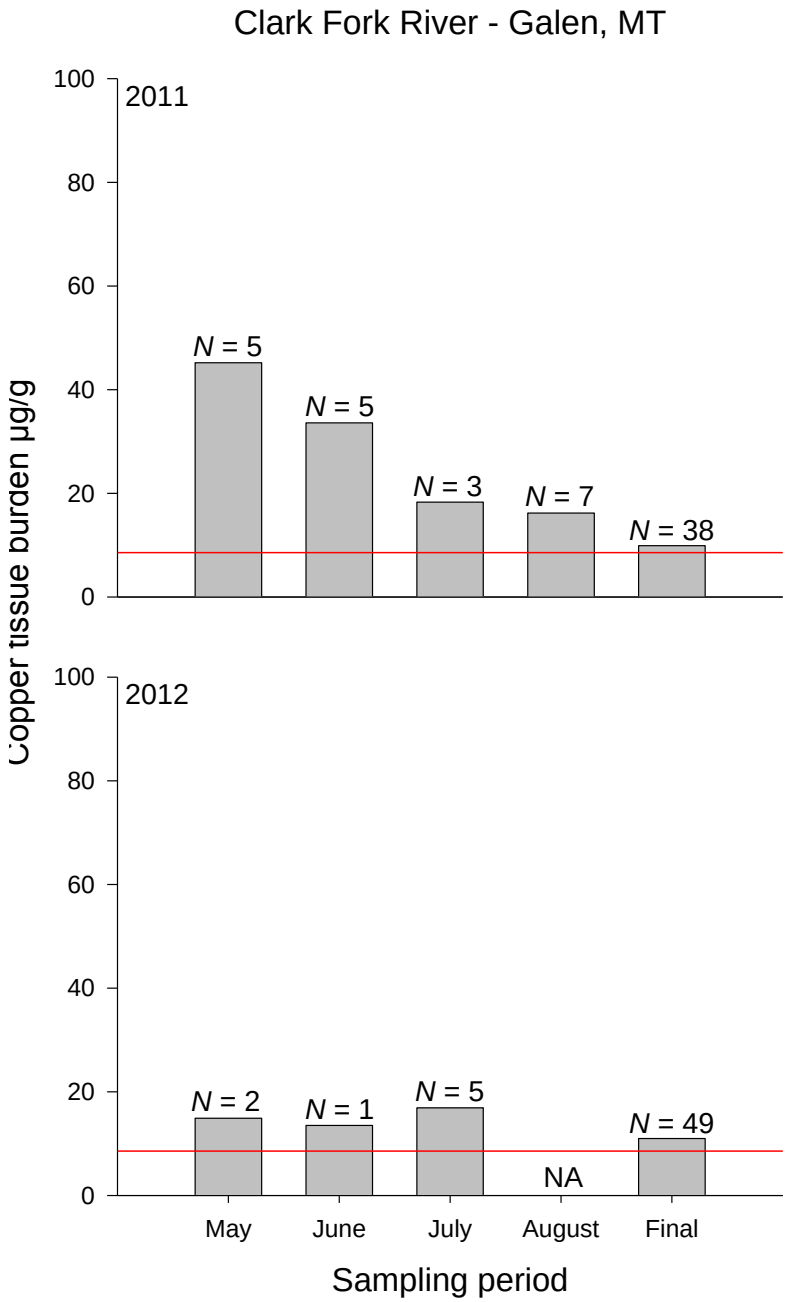

Figure 5-20. Copper tissue burdens in the Clark Fork River near Galen, Montana. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

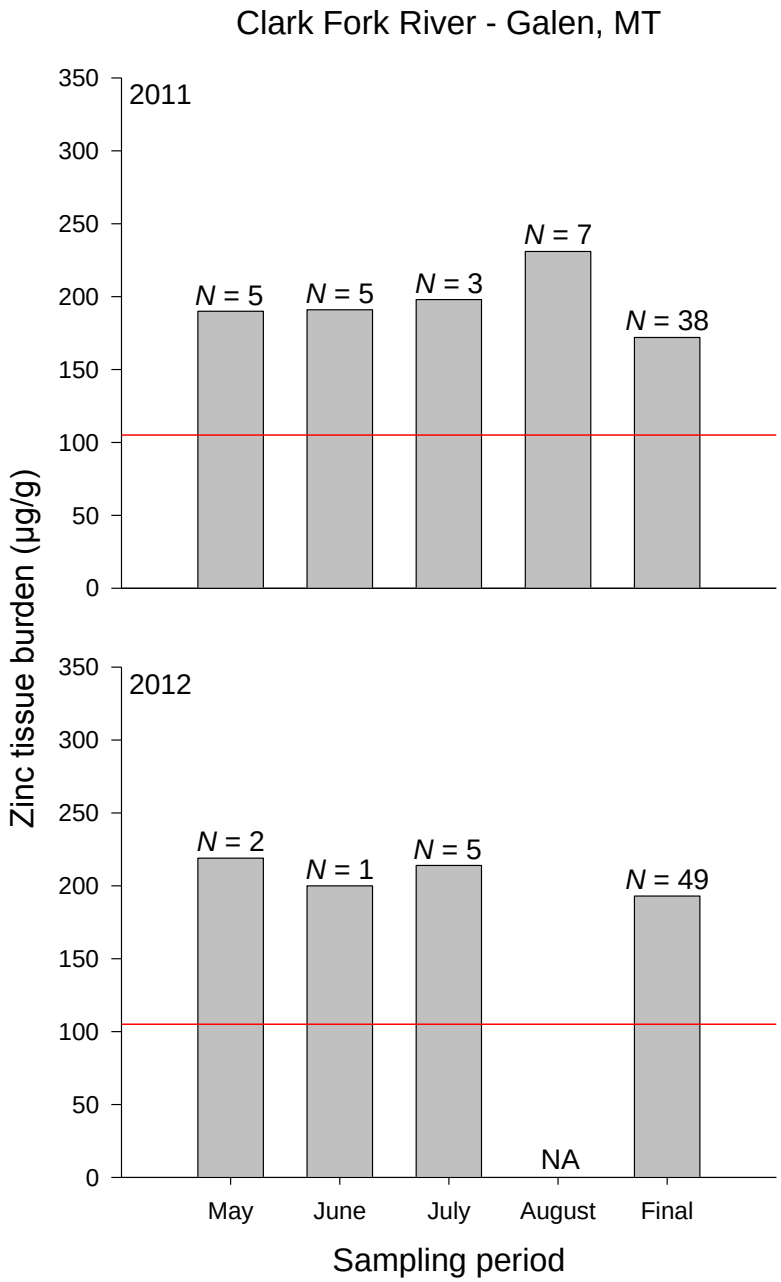

Figure 5-21. Zinc tissue burdens in the Clark Fork River near Galen, Montana. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

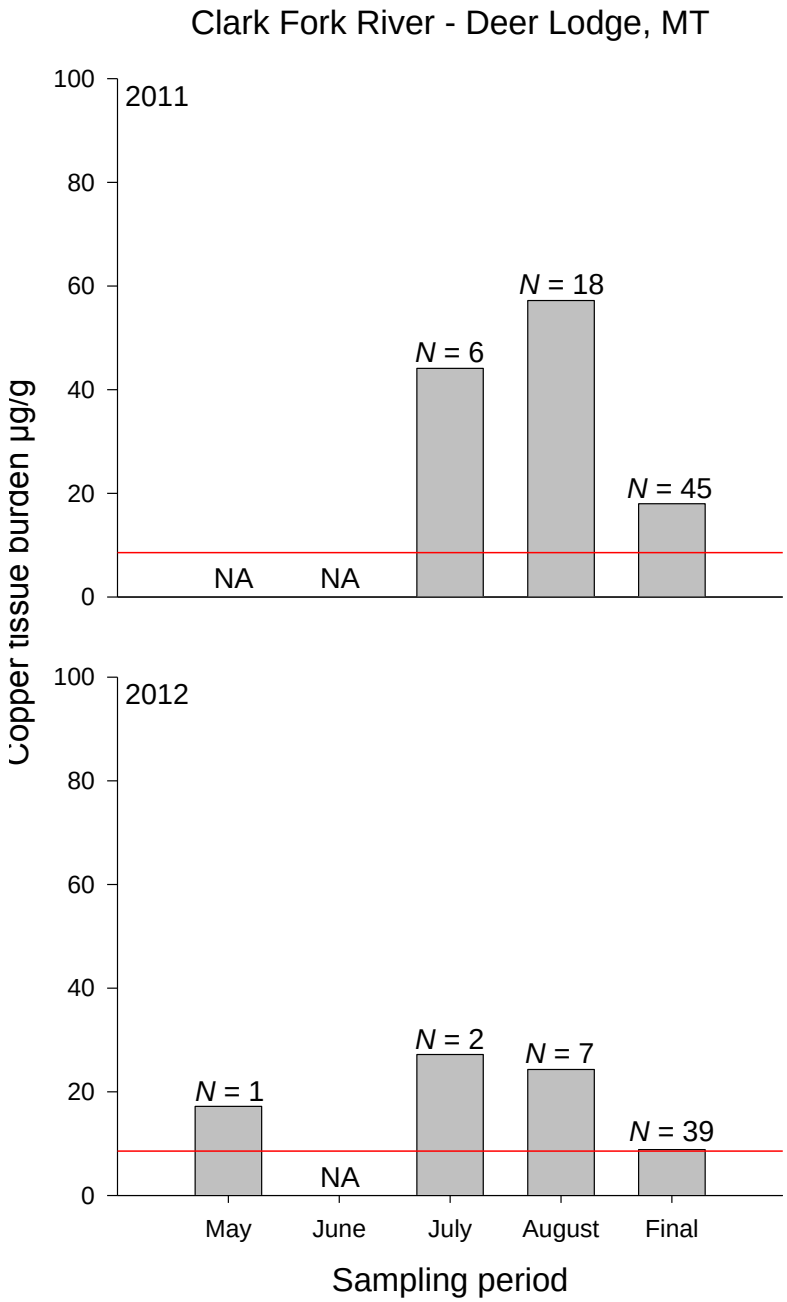

Figure 5-22. Copper tissue burdens in the Clark Fork River near Deer Lodge, Montana. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

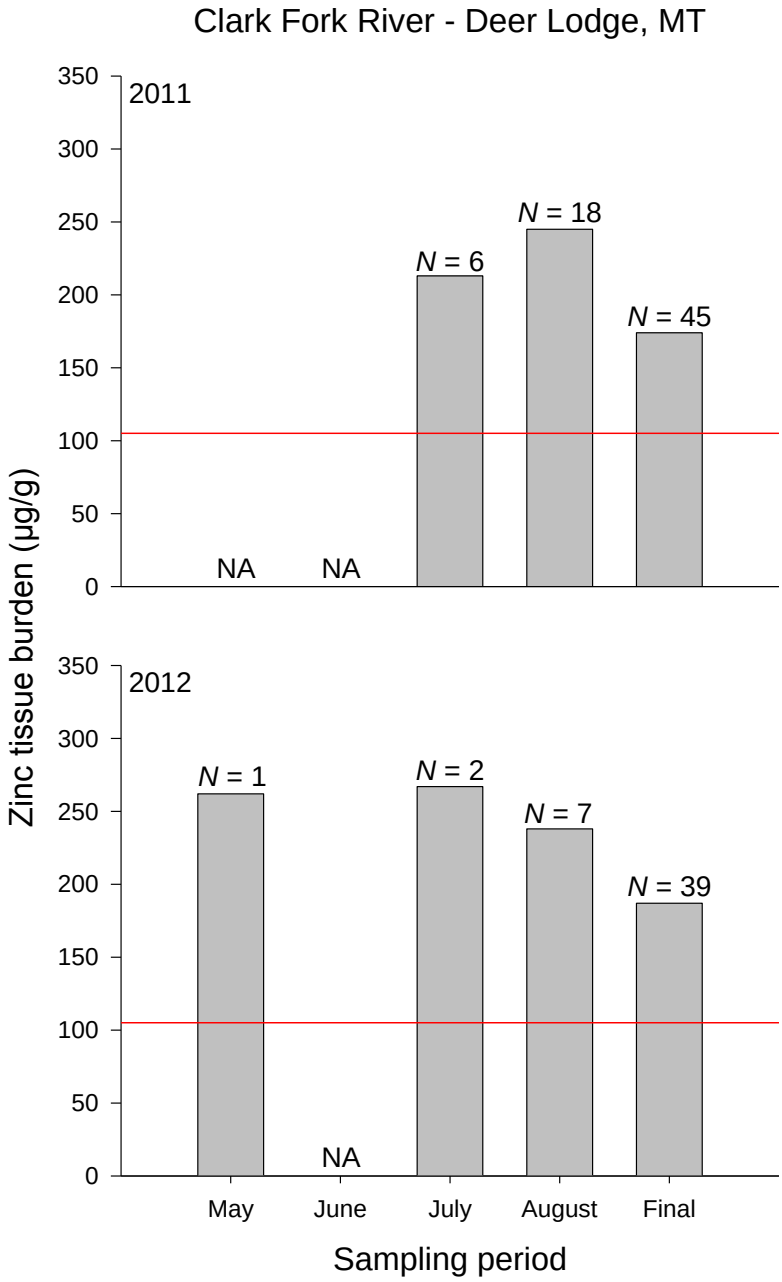

Figure 5-23. Zinc tissue burdens in the Clark Fork River near Deer Lodge, Montana. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

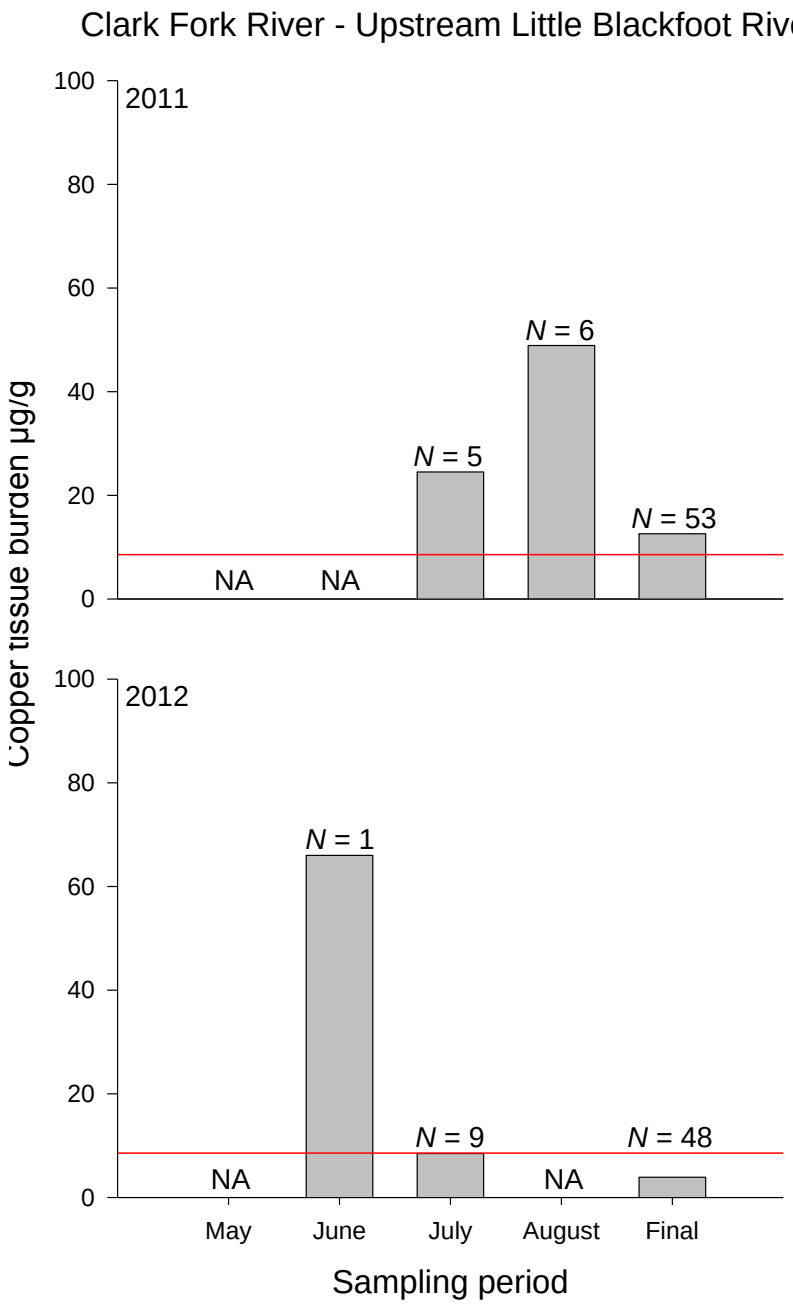

Figure 5-24. Copper tissue burdens in the Clark Fork River upstream of the Little Blackfoot River. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

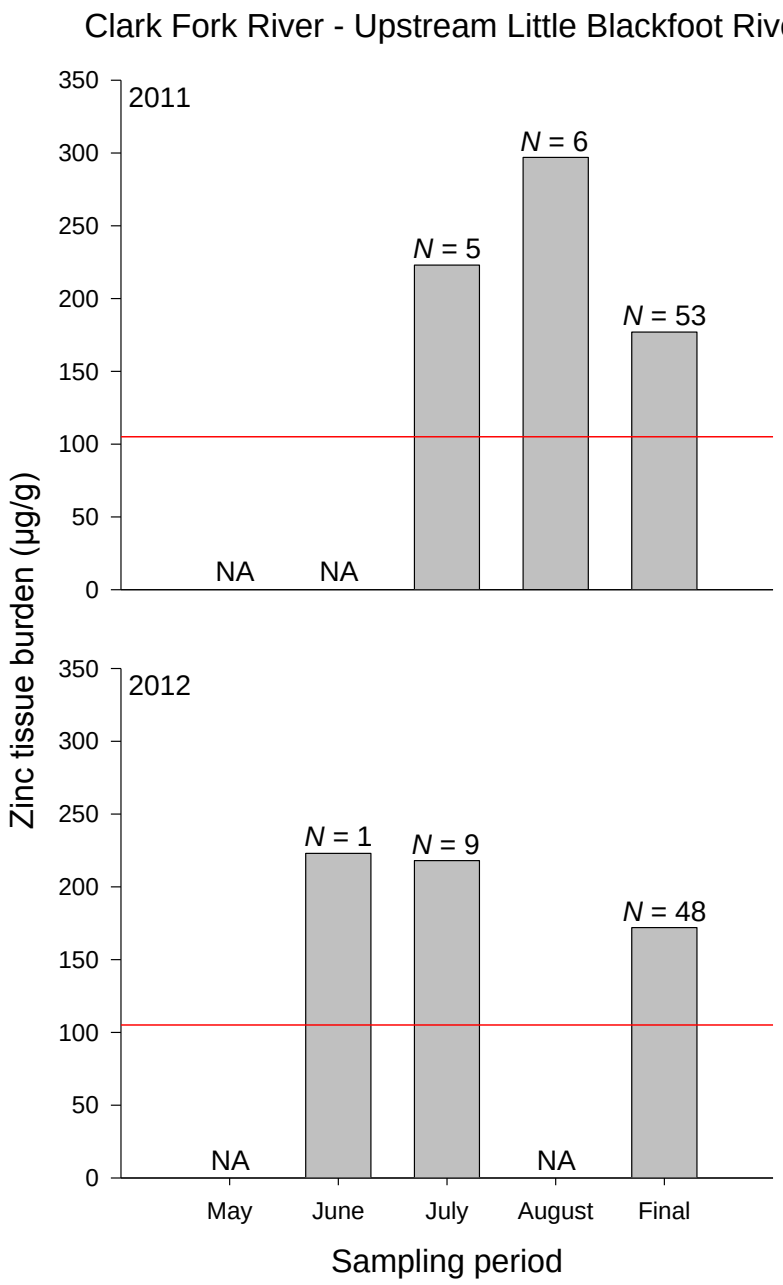

Figure 5-25. Zinc tissue burdens in the Clark Fork River upstream of the Little Blackfoot River. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

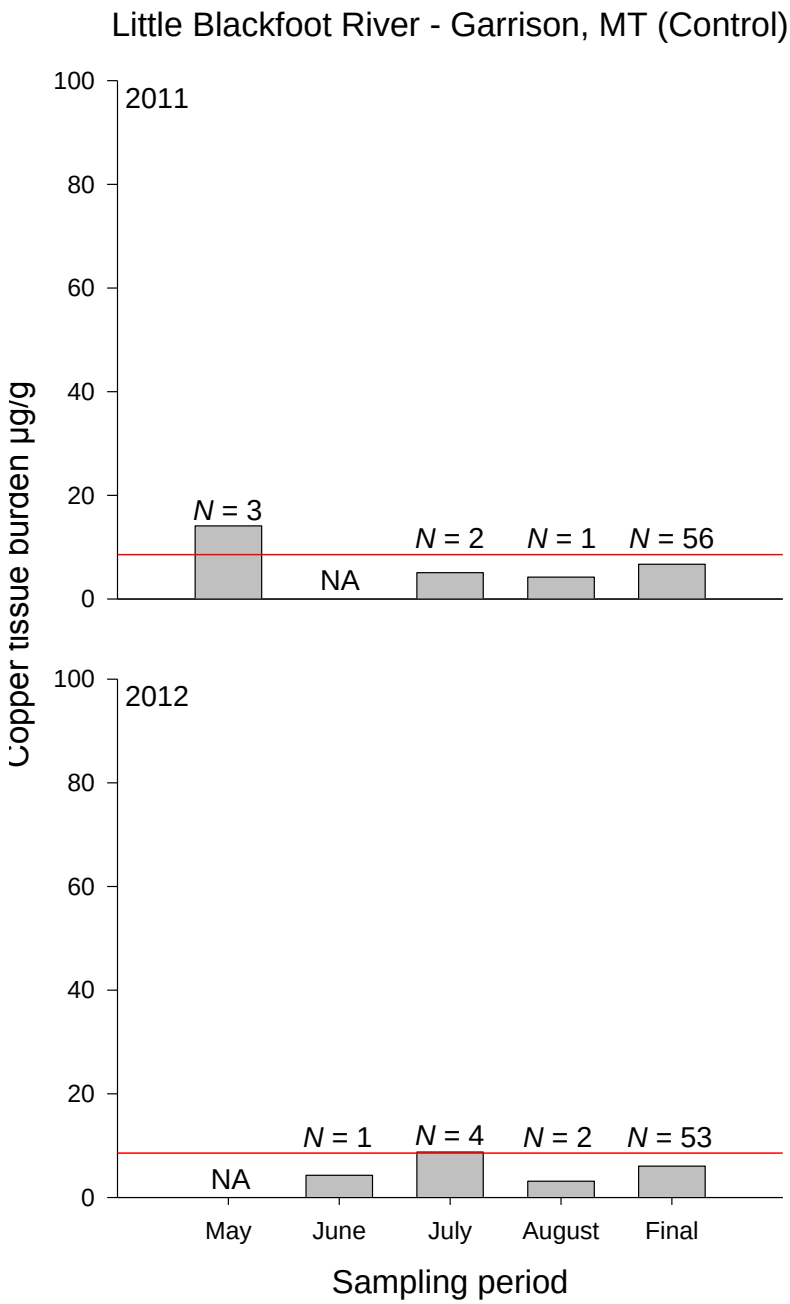

Figure 5-26. Copper tissue burdens in the Little Blackfoot River near Garrison, Montana. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

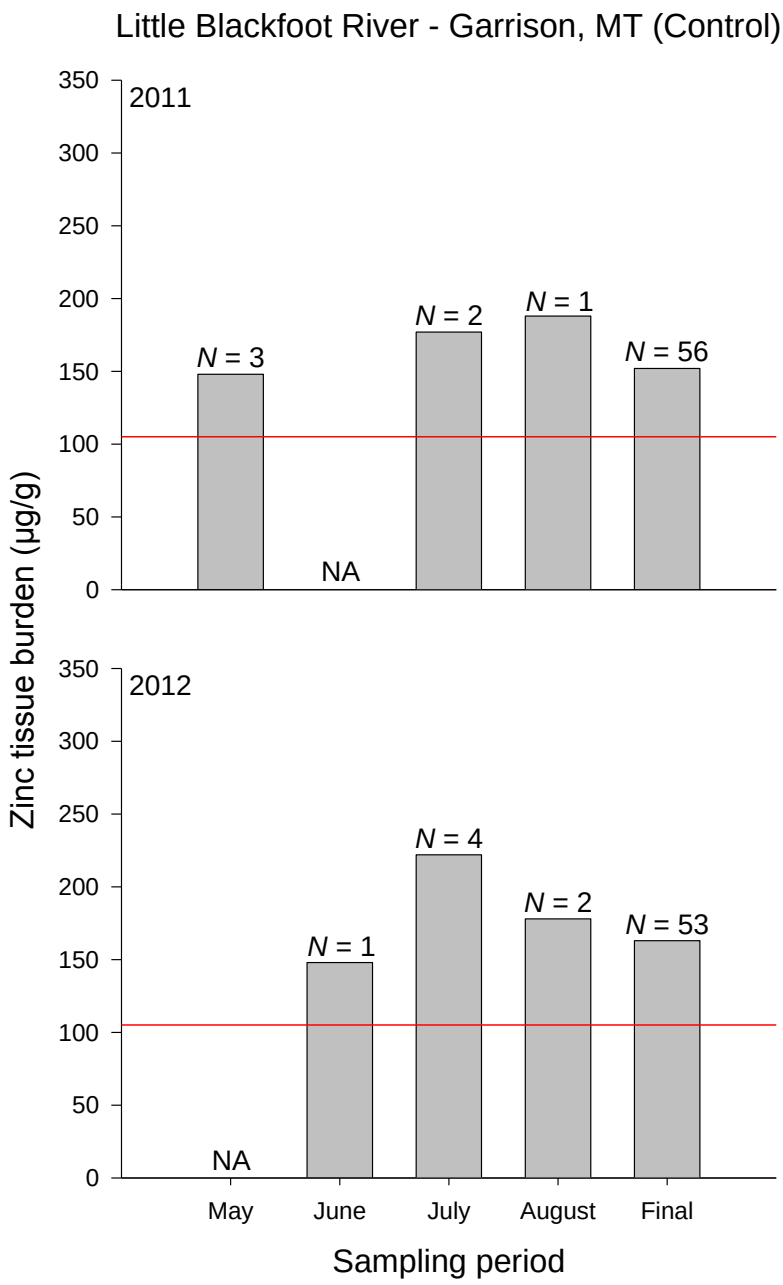

Figure 5-27. Zinc tissue burdens in the Little Blackfoot River near Garrison, Montana. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

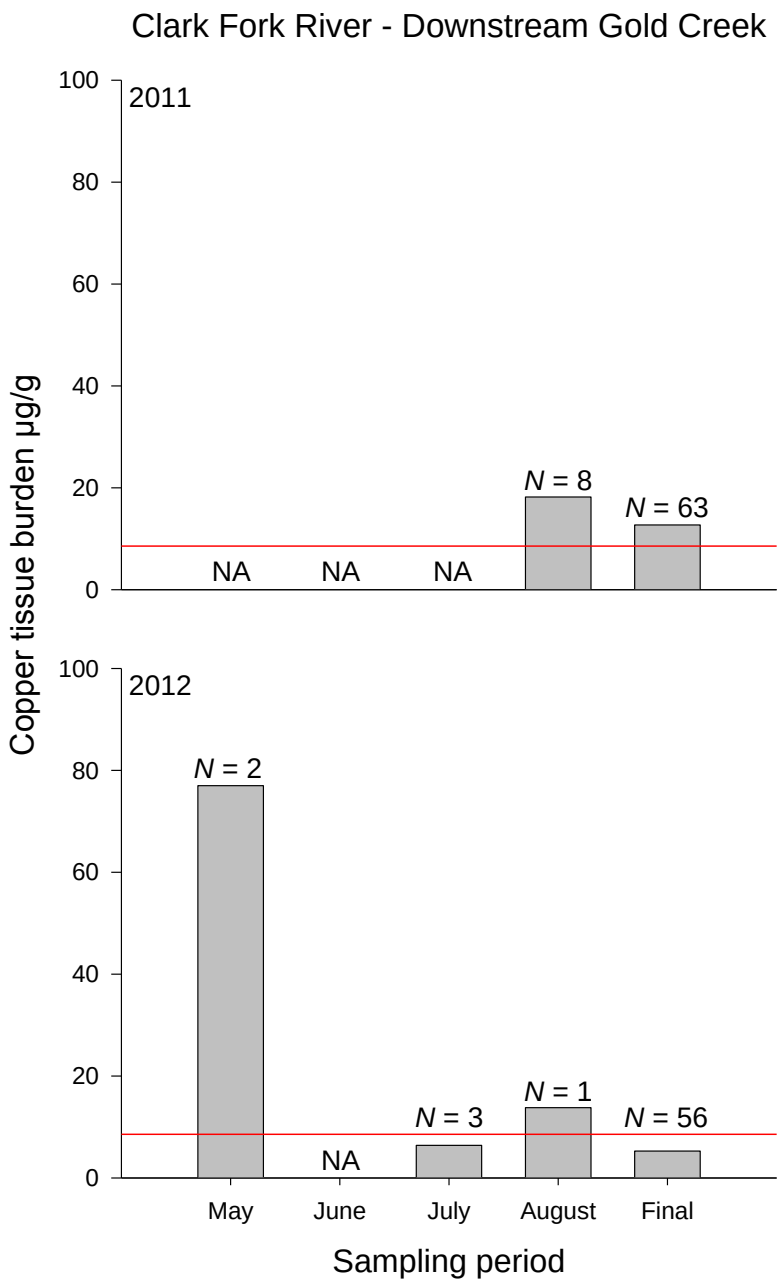

Figure 5-28. Copper tissue burdens in the Clark Fork River downstream of Gold Creek. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

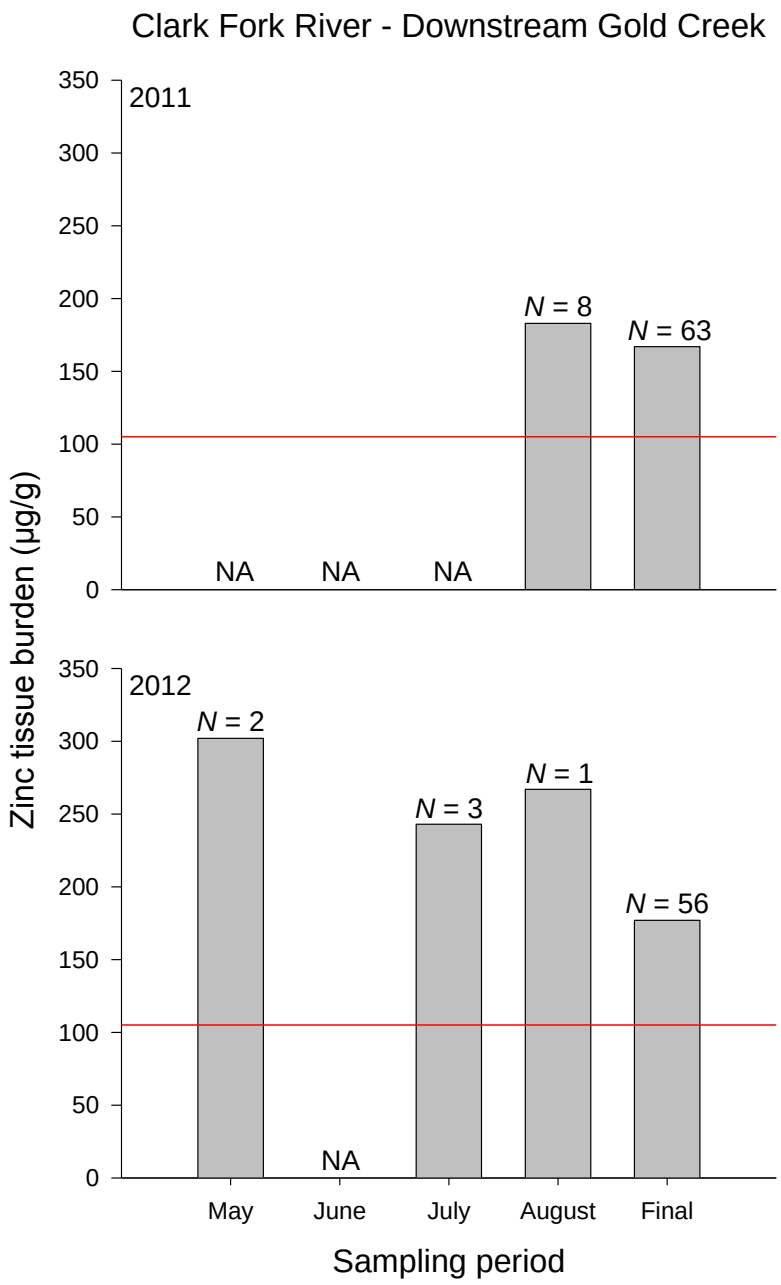

Figure 5-29. Zinc tissue burdens in the Clark Fork River downstream of Gold Creek. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

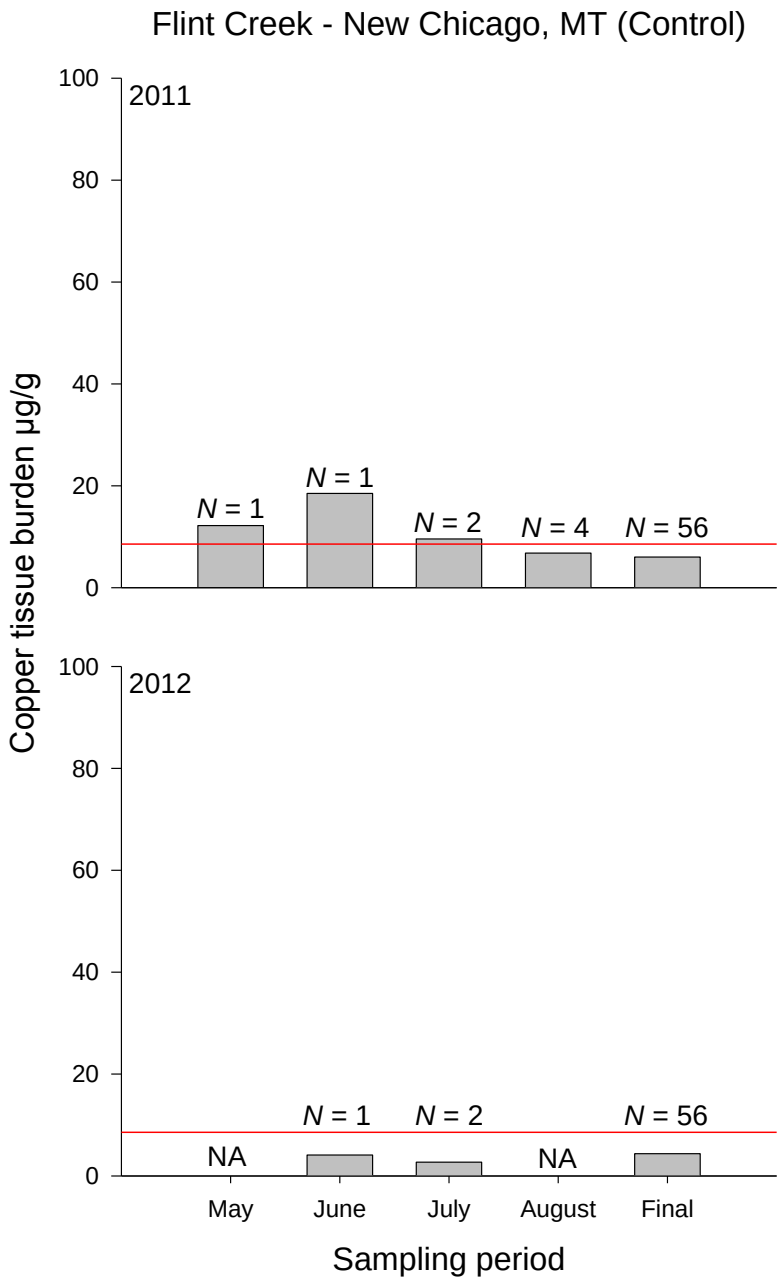

Figure 5-30. Copper tissue burdens in Flint Creek. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

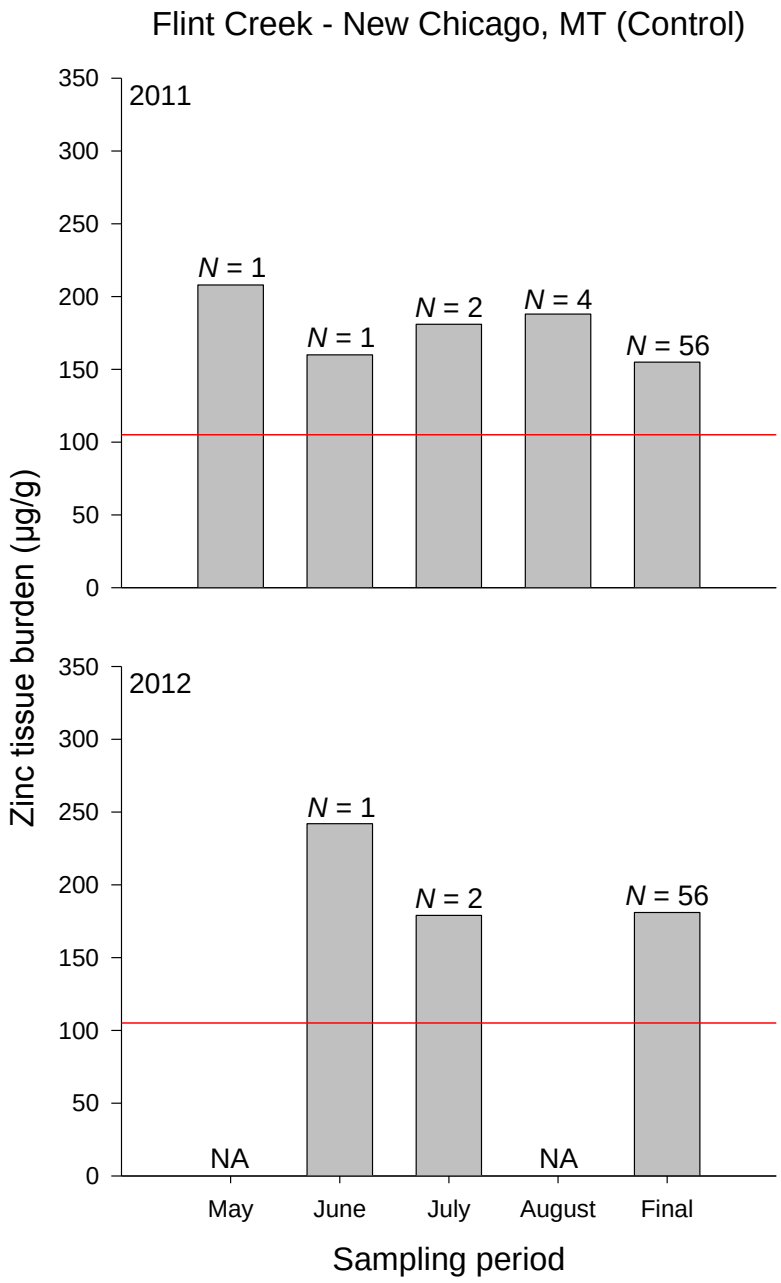

Figure 5-31. Zinc tissue burdens in Flint Creek. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

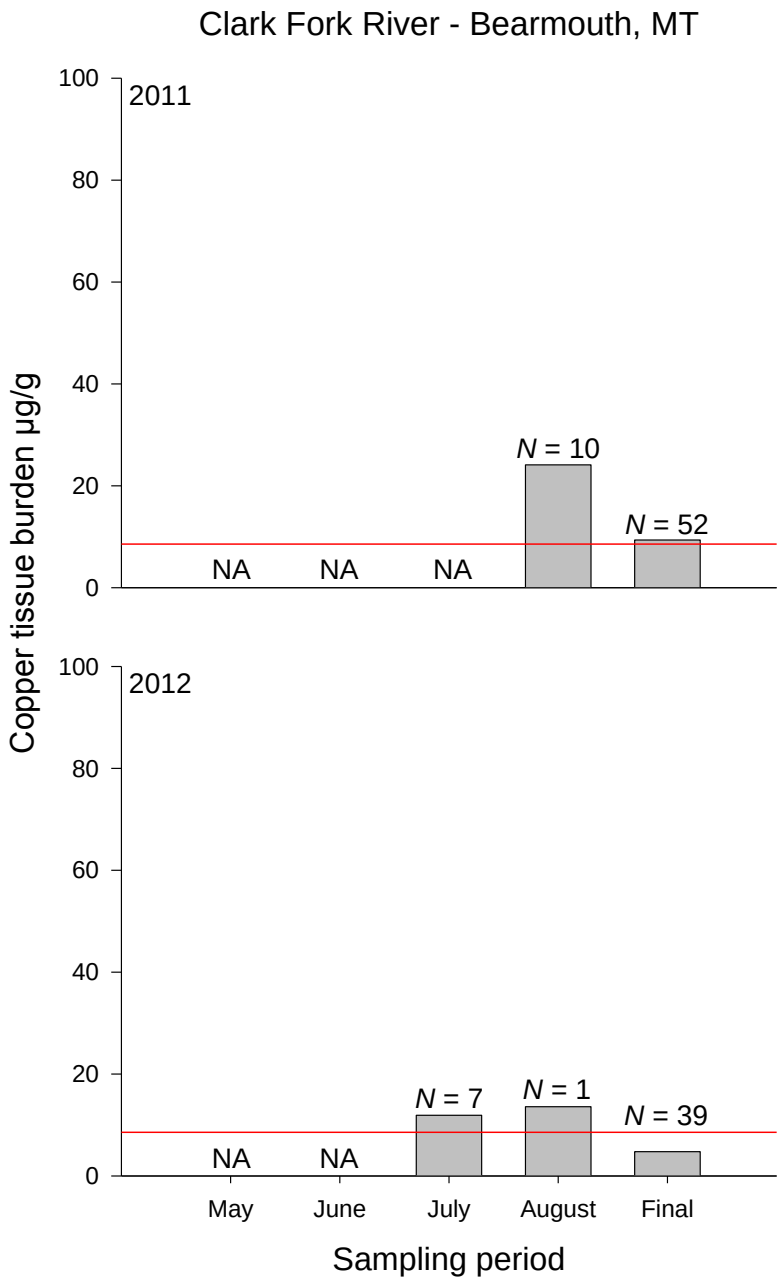

Figure 5-32. Copper tissue burdens in the Clark Fork River near Bearmouth, Montana. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

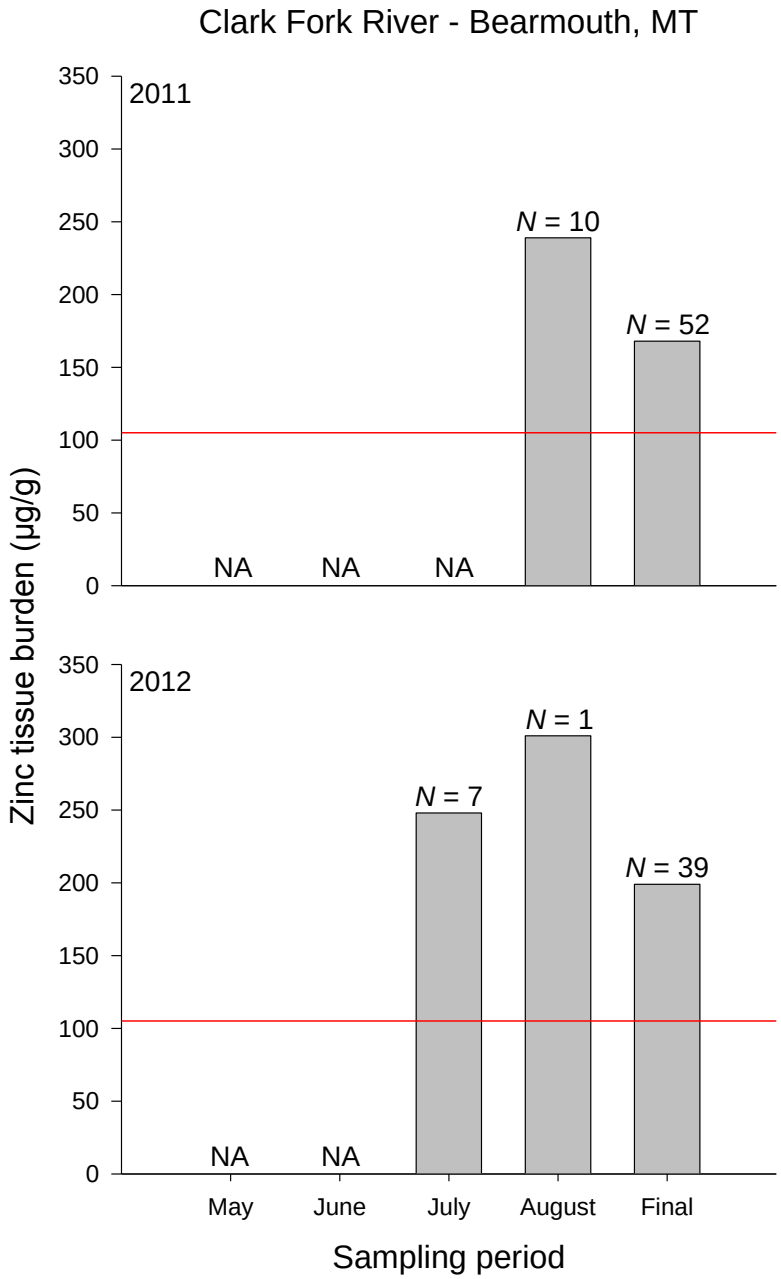

Figure 5-33. Zinc tissue burdens in the Clark Fork River near Bearmouth, Montana. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

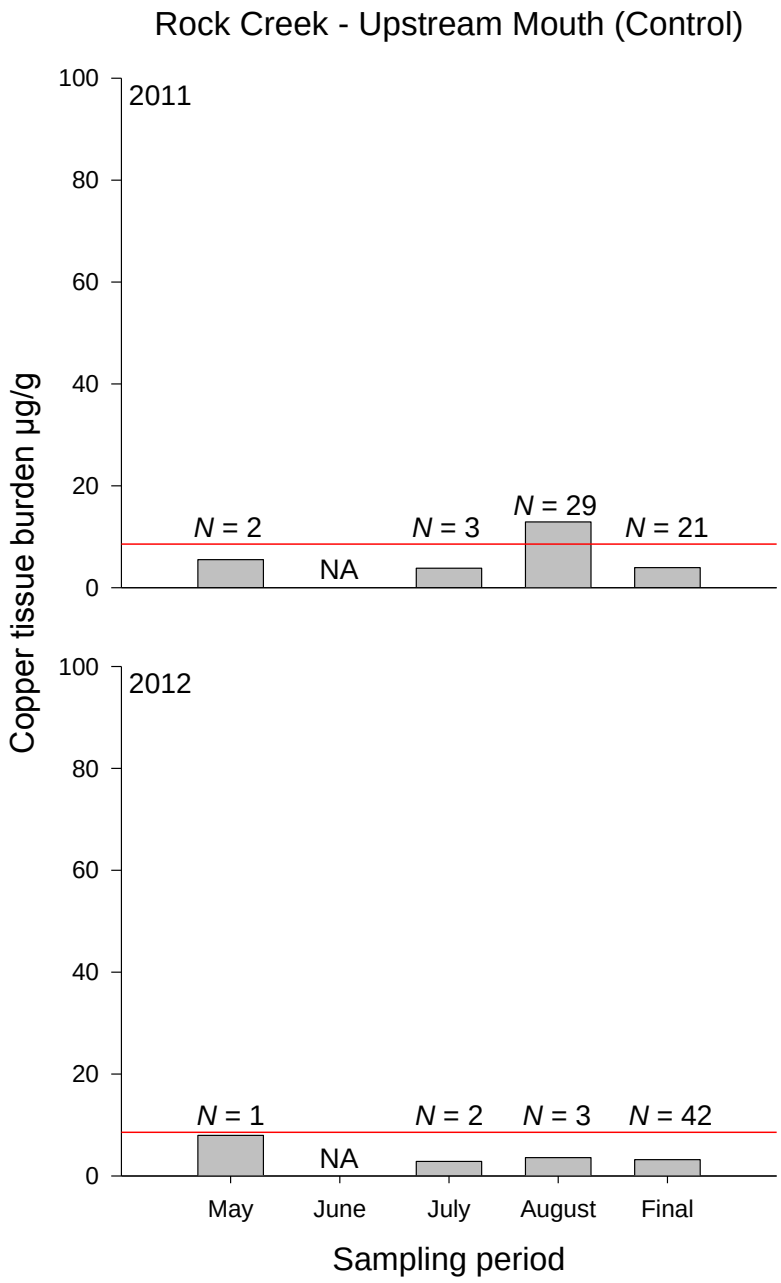

Figure 5-34. Copper tissue burdens in Rock Creek. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

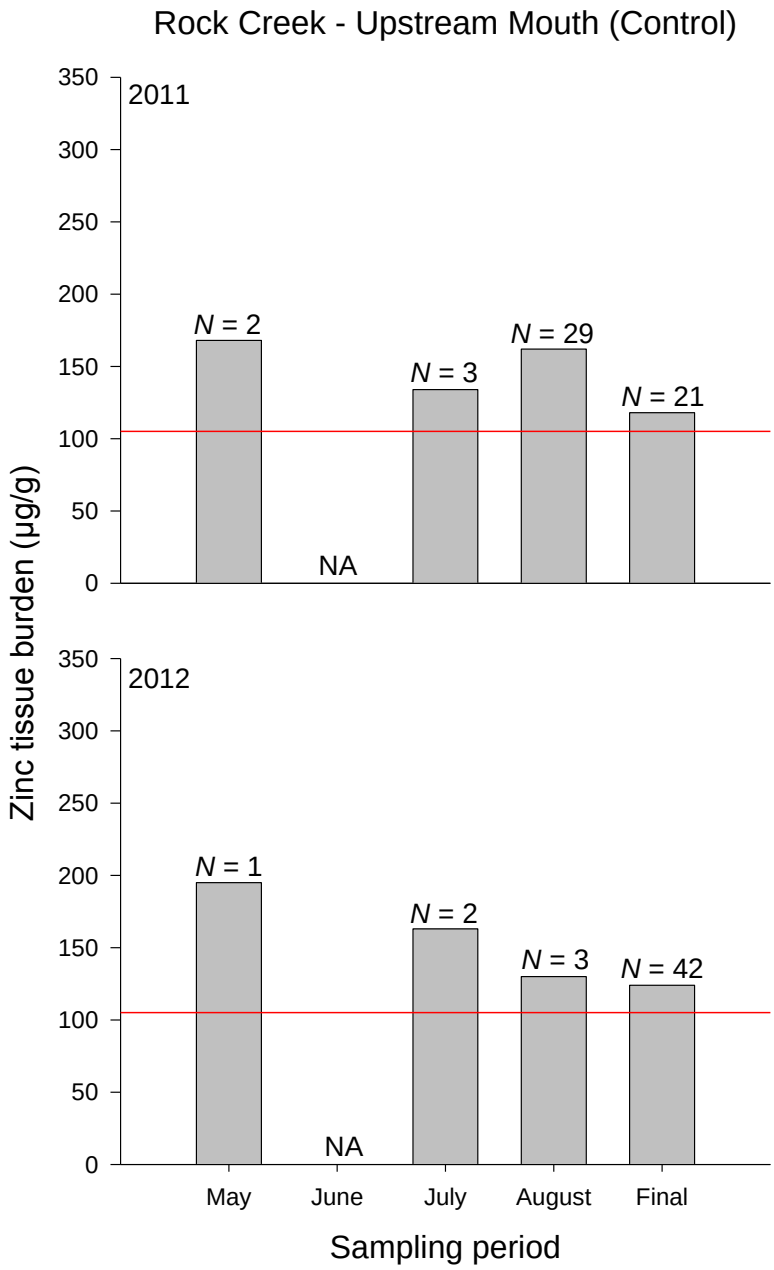

Figure 5-35. Zinc tissue burdens in Rock Creek. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

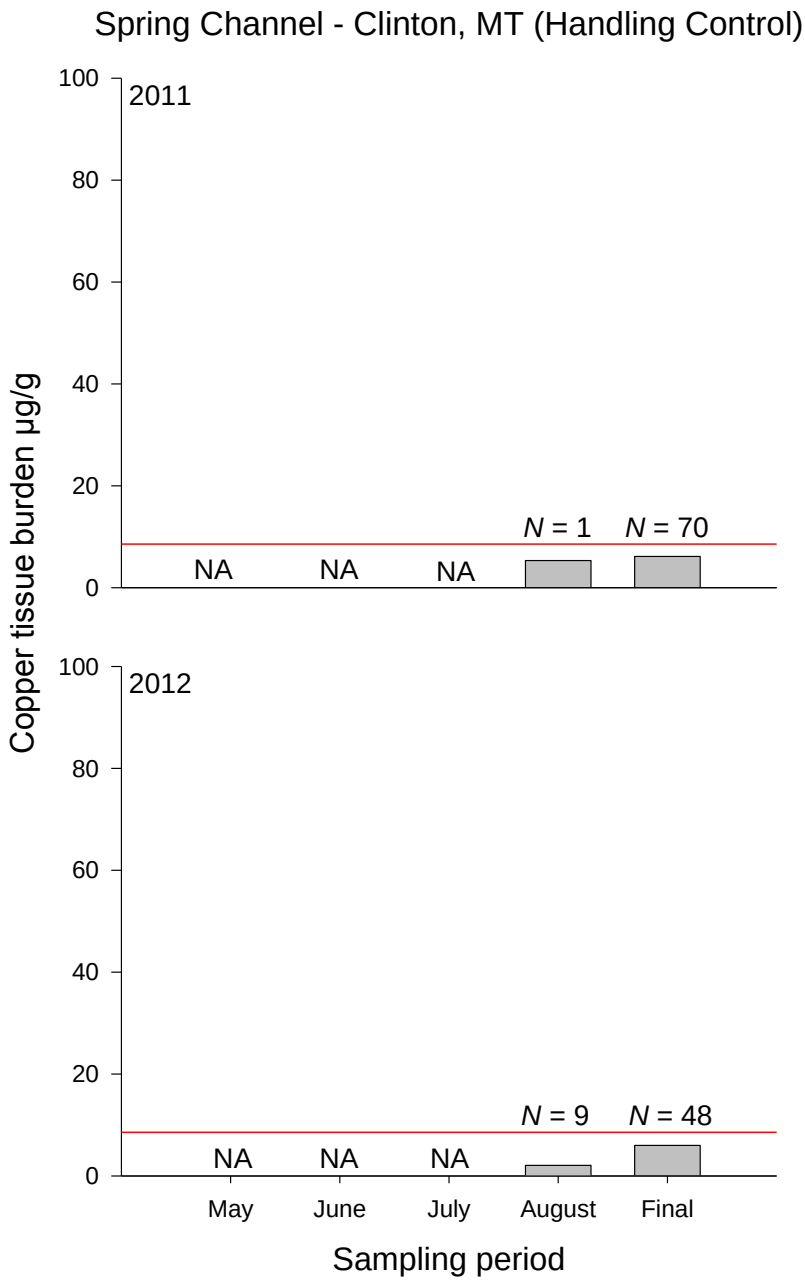

Figure 5-36. Copper tissue burdens in the spring channel near Clinton, Montana. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

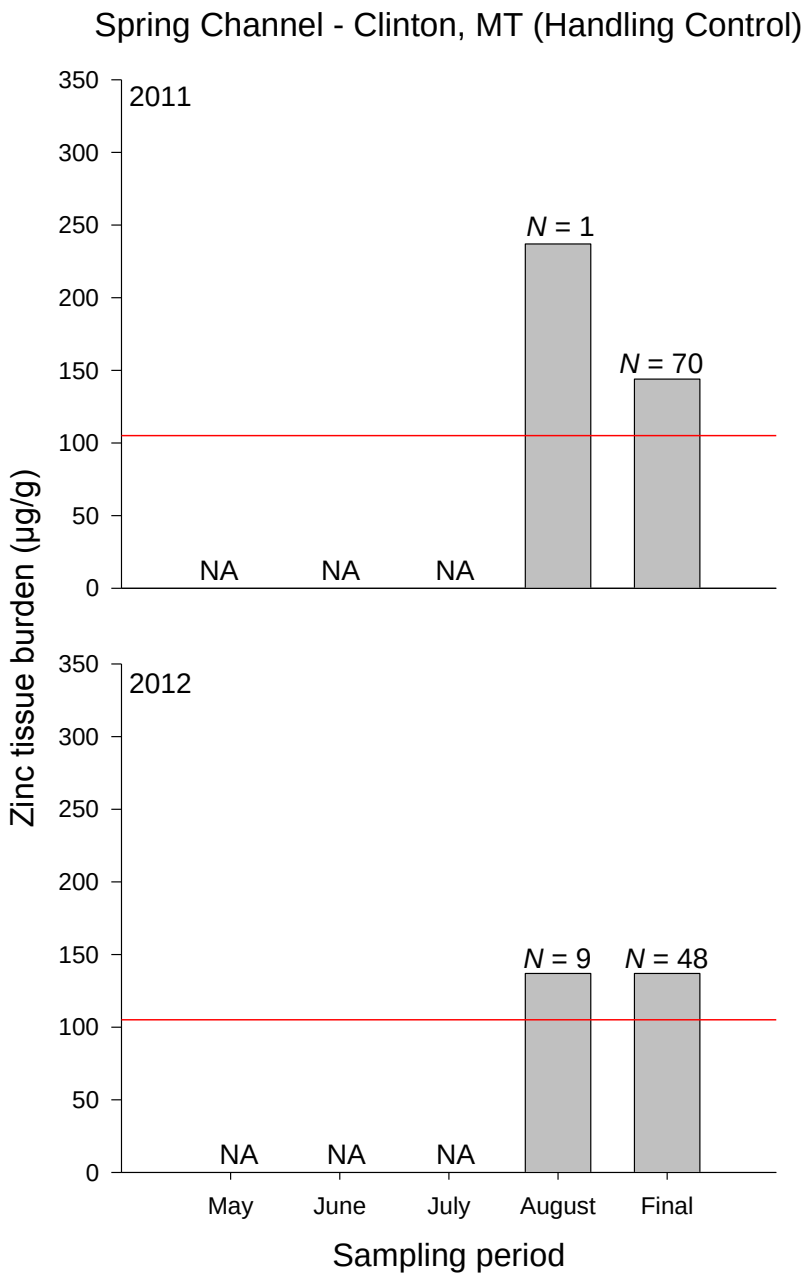

Figure 5-37. Zinc tissue burdens in spring channel near Clinton, Montana. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

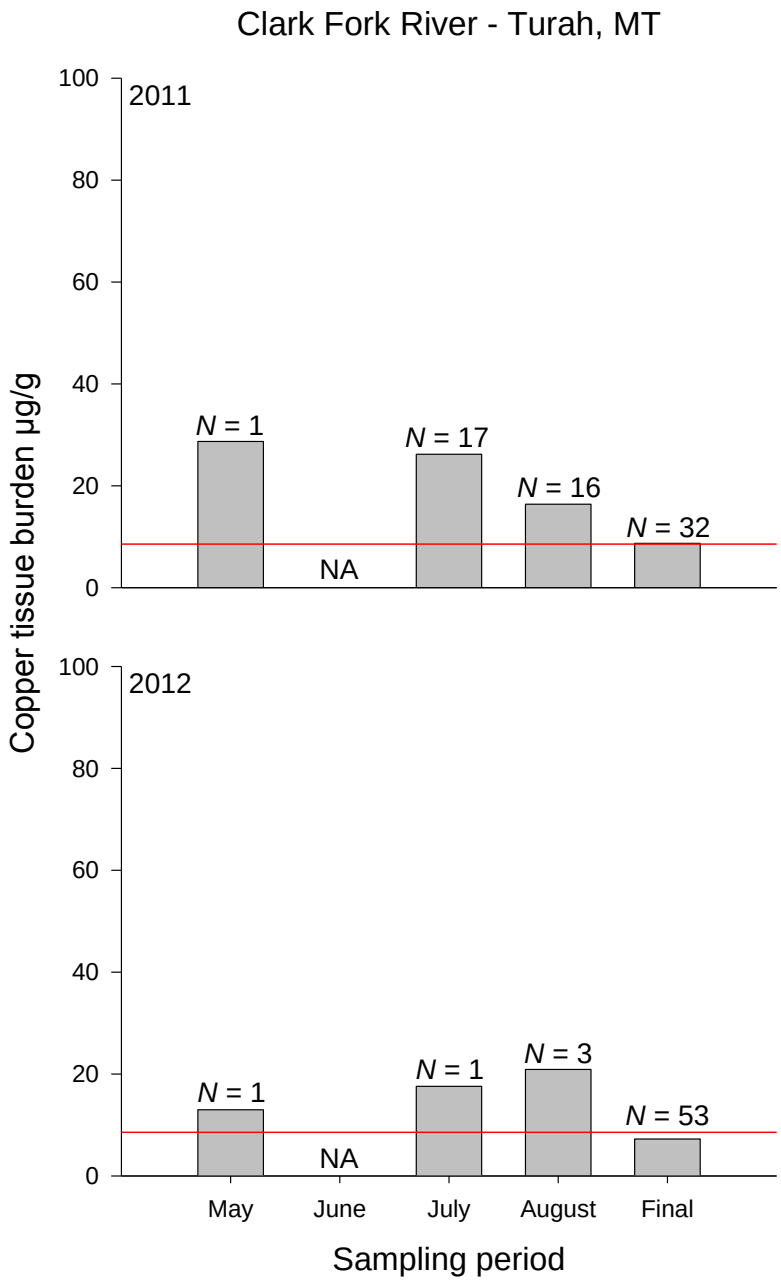

Figure 5-38. Copper tissue burdens in the Clark Fork River near Turah, Montana. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

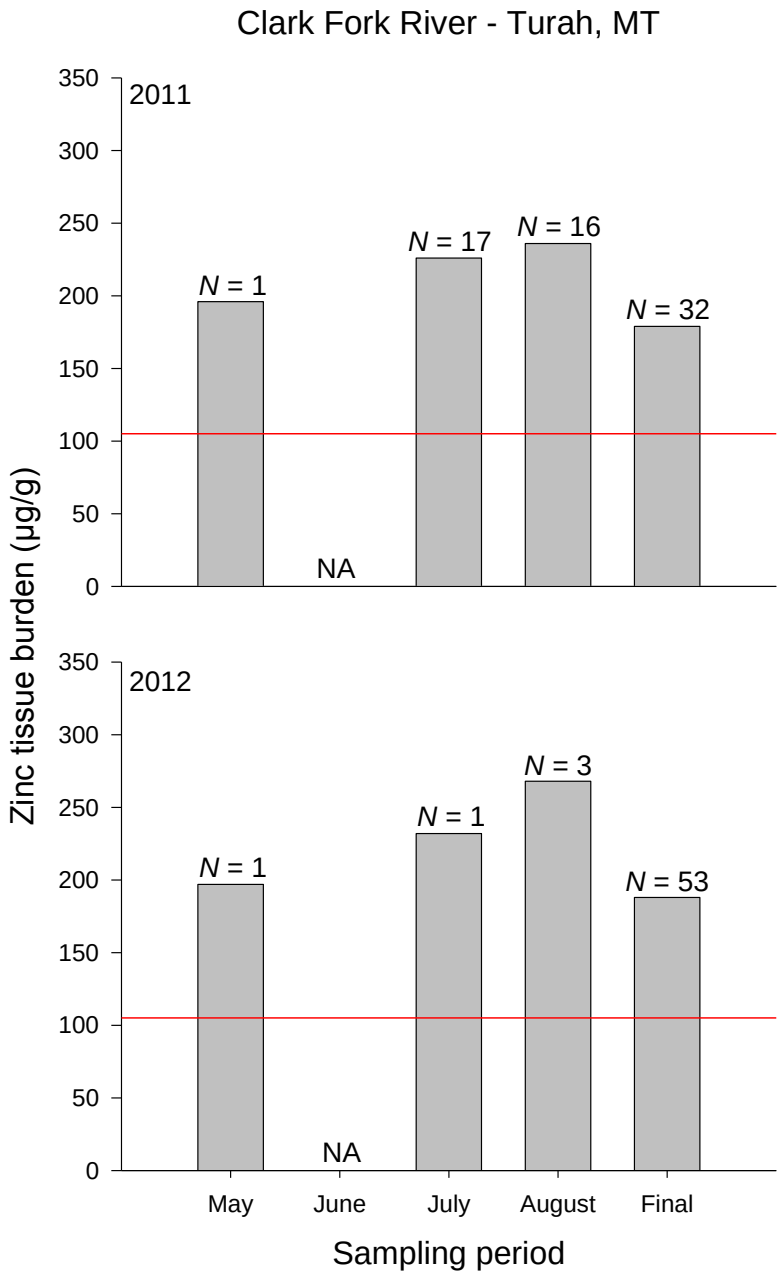

Figure 5-39. Zinc tissue burdens in Clark Fork River near Turah, Montana. The red line in each panel indicates the minimum effect threshold identified for salmonids. The sample sizes for May through August represent the number of mortalities in each sample (NA = 0), while the final sample size represents the number of fish remaining alive in each sample at the end of each field season.

5.3.6 Water Contaminants

Chronic freshwater ALS values for metals in surface water are evaluated based upon the analysis of samples following a total recoverable method (Atkins 2012a; MDEQ 2012b); therefore discussion of water sampling results will focus on total recoverable levels. Dissolved metals concentrations generally followed the same trends as total recoverable concentrations. Ammonia nitrogen aNH_3-N) was only detected once at Deer Lodge on May 10, 2011 at a concentration of 0.06 mg/L.

In 2011, total recoverable arsenic concentration was lower at control sites (mean = 0.012 mg/L; SD = 0.008) than at mainstem treatment sites (mean = 0.025 mg/L; SD = 0.009). In 2012, total recoverable arsenic concentration was also lower at control sites (mean = 0.012 mg/L; SD = 0.008) than at mainstem treatment sites (mean = 0.017 mg/L; SD = 0.007). Total recoverable arsenic did not exceed the chronic ALS values in either year (Figures 5-40 and 5-41). Overall, total recoverable arsenic concentrations at the mainstem sites were highest at the four upper sites and decreased downstream in both years. The exception is the sample collected on May 10, 2011 where elevated arsenic concentrations remained similar at the six upper sites.

In 2011, total recoverable cadmium concentration was lower at control sites (mean = 0.00017 mg/L; SD = 0.00010) than at mainstem treatment sites (mean = 0.00033 mg/L; SD = 0.00028). Total recoverable cadmium concentration in 2012 was also lower at control sites (mean = 0.00018 mg/L; SD = 0.00014) than at mainstem treatment sites (mean = 0.00021 mg/L; SD = 0.00009). Total recoverable cadmium concentrations in 2011 exceeded chronic ALS values at least once at one control site (Flint Creek), and all mainstem treatment sites excluding the two furthest upstream sites (Warm Springs and Galen) (Figure 5-42). In 2012, total recoverable cadmium concentrations did not exceed chronic ALS values (Figure 5-43). Overall, total recoverable cadmium concentration at the mainstem sites in 2011 was highest at Deer Lodge and decreased downstream, with the exception of the samples collected on May 10 where the highest cadmium concentration was seen at Bearmouth. In 2012, overall total recoverable cadmium concentration at the mainstem sites was highest upstream of the Little Blackfoot River and decreased at sites both up- and downstream of there.

In 2011, total recoverable copper concentration was lower at control sites (mean = 0.006 mg/L; SD = 0.006) than at mainstem treatment sites (mean = 0.057 mg/L; SD = 0.049). Total recoverable copper was also lower at control sites (mean = 0.003 mg/L; SD = 0.003) than at mainstem treatment sites (mean = 0.032 mg/L; SD = 0.029) in 2012. Total recoverable copper exceeded the chronic ALS at least once at all seven mainstem treatment sites as well as two control sites (Flint Creek and the Clinton spring) in 2011 (Figure 5-44). In 2012, total recoverable copper exceeded the chronic ALS at all mainstem treatment sites (Figure 5-45). In 2011, overall total recoverable copper at the mainstem sites was highest at Deer Lodge and decreased at sites both up- and downstream of there. However, on May 10, 2011 the highest total recoverable copper was seen at Bearmouth followed by the site upstream of the Little Blackfoot River. In 2012, overall total recoverable copper at the mainstem sites was highest upstream of the Little Blackfoot River and decreased at sites both up- and downstream of this site.

In 2011 total recoverable lead concentration was similar at control sites (mean = 0.0072 mg/L; SD = 0.0101) and mainstem treatment sites (mean = 0.0074 mg/L; SD = 0.008). Total recoverable lead concentration in 2012 was higher at control sites (mean = 0.0071 mg/L; SD = 0.0118) than at mainstem treatment sites (mean = 0.0047 mg/L; SD = 0.0039). Total recoverable lead concentrations in 2011exceeded the chronic ALS value at all mainstem treatment sites and two tributary control sites (Little Blackfoot River and Flint Creek) (Figure 5-

46). Total recoverable lead concentrations in 2012 exceeded the chronic ALS values at one control site (Flint Creek) and all mainstem treatment sites excluding the two furthest upstream sites (Warm Springs and Galen) (Figure 5-47). Overall, total recoverable lead at the mainstem sites in both years was highest upstream of the Little Blackfoot River and decreased at sites up- and downstream of this site; however, on May 10, 2011 the highest total recoverable lead concentration was seen at Bearmouth and decreased at sites up- and downstream of this site.

In 2011, total recoverable zinc concentration was lower at control sites (mean = 0.03 mg/L; SD = 0.03) than at mainstem treatment sites (mean = 0.07 mg/L; SD = 0.07). Total recoverable zinc concentration was also lower at control sites (mean = 0.03 mg/L; SD = 0.03) than at mainstem treatment sites (mean = 0.04 mg/L; SD = 0.02) in 2012. Total recoverable zinc concentration exceeded the chronic ALS value at three mainstem treatment sites in 2011 (Deer Lodge, Bearmouth, and Turah) (Figure 5-48). Total recoverable zinc concentration in 2012 did not exceed the chronic ALS value at any of the treatment or control sites (Figure 5-49). Overall, total recoverable zinc concentration at the mainstem sites in 2011 was highest at Deer Lodge and decreased at sites up- and downstream of there, with the exception of the samples collected on May 10, where the highest zinc concentration was seen at Bearmouth. In 2012, overall total recoverable zinc concentration at the mainstem sites in 2012 was highest upstream of the Little Blackfoot River and at Bearmouth and decreased at sites up- and downstream of those sites.

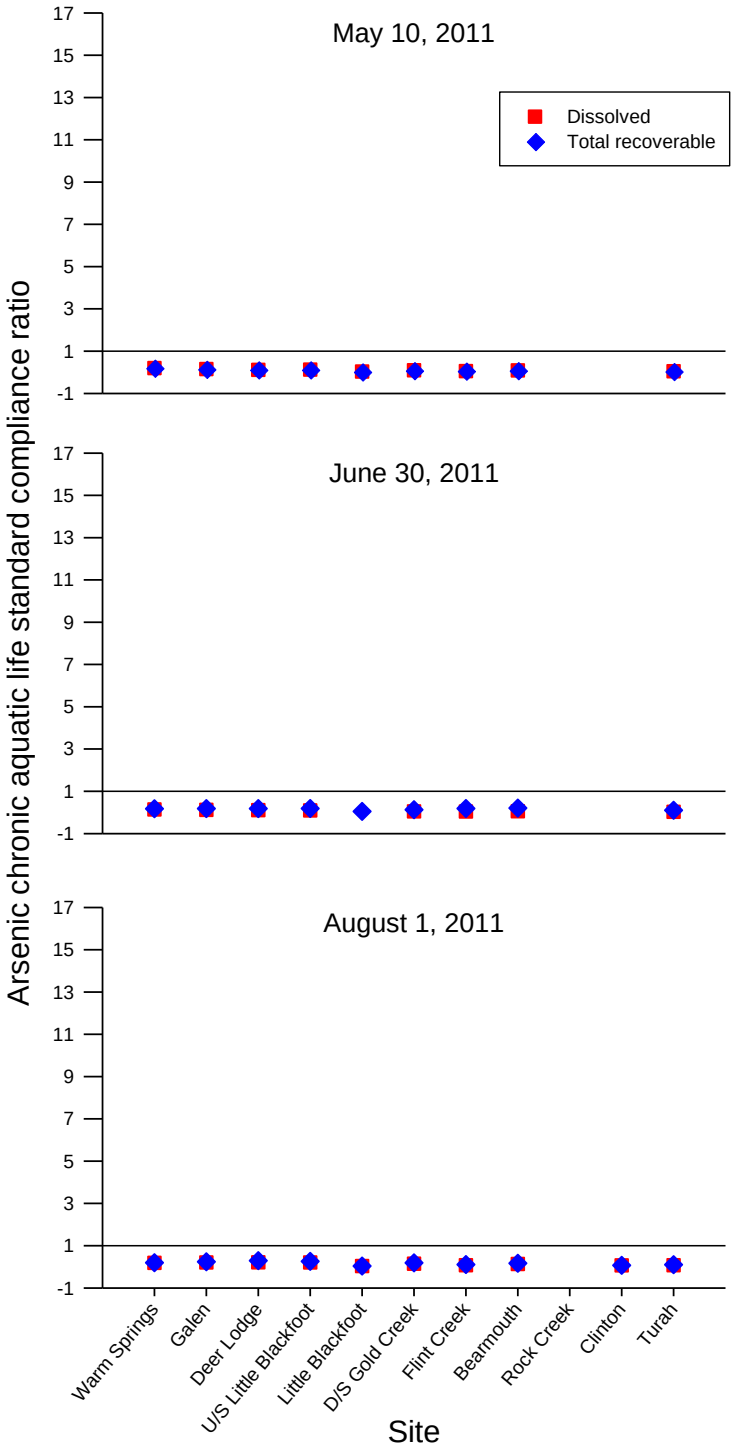

Figure 5-40. Arsenic compliance ratios at the cage sites in 2011 arranged from upstream to downstream. Compliance ratios were calculated by dividing arsenic concentrations by the calculated chronic aquatic life standards. Compliance ratio values <1 indicate arsenic levels below the aquatic life standard (compliance) while values >1 indicate levels above the standard (non-compliance).

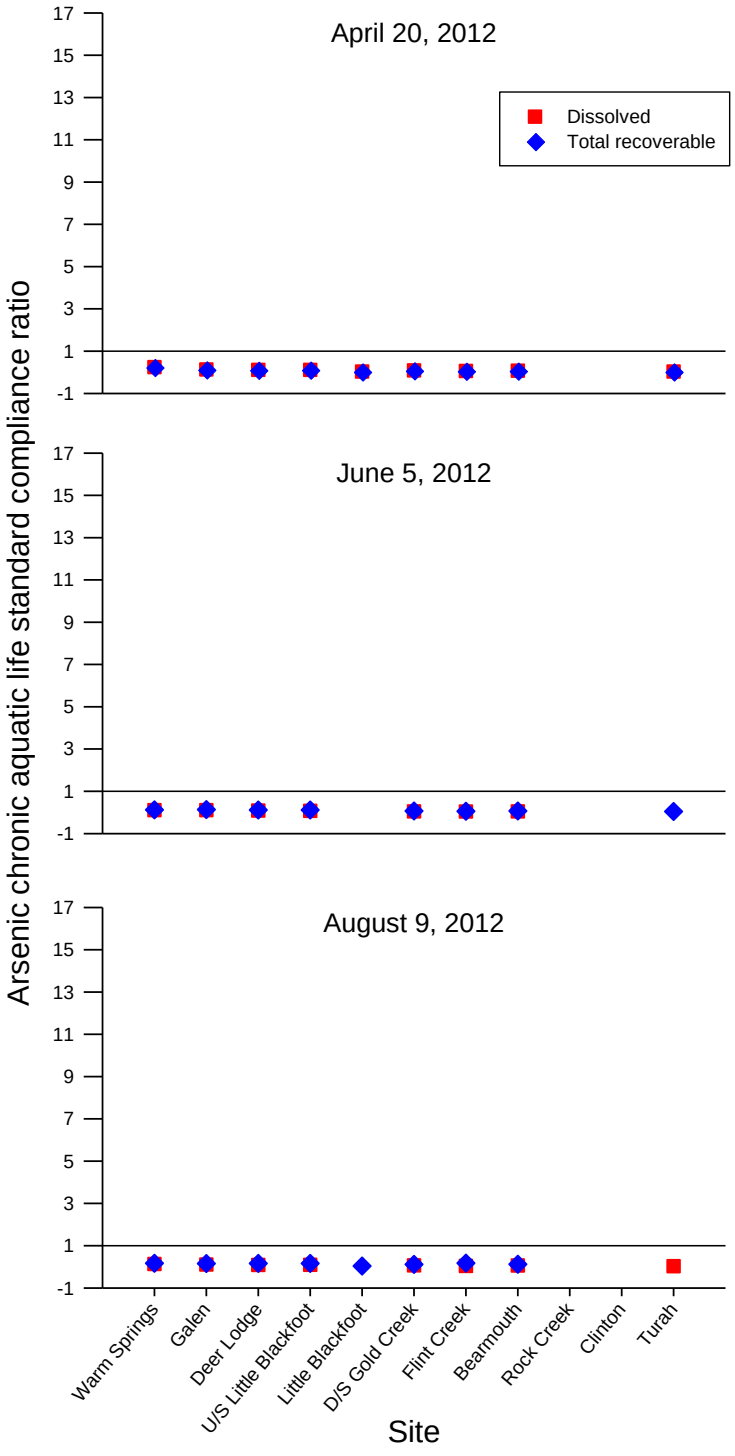

Figure 5-41. Arsenic compliance ratios at the cage sites in 2012 arranged from upstream to downstream. Compliance ratios were calculated by dividing arsenic concentrations by the calculated chronic aquatic life standards. Compliance ratio values <1 indicate arsenic levels below the aquatic life standard (compliance) while values >1 indicate levels above the standard (non-compliance).

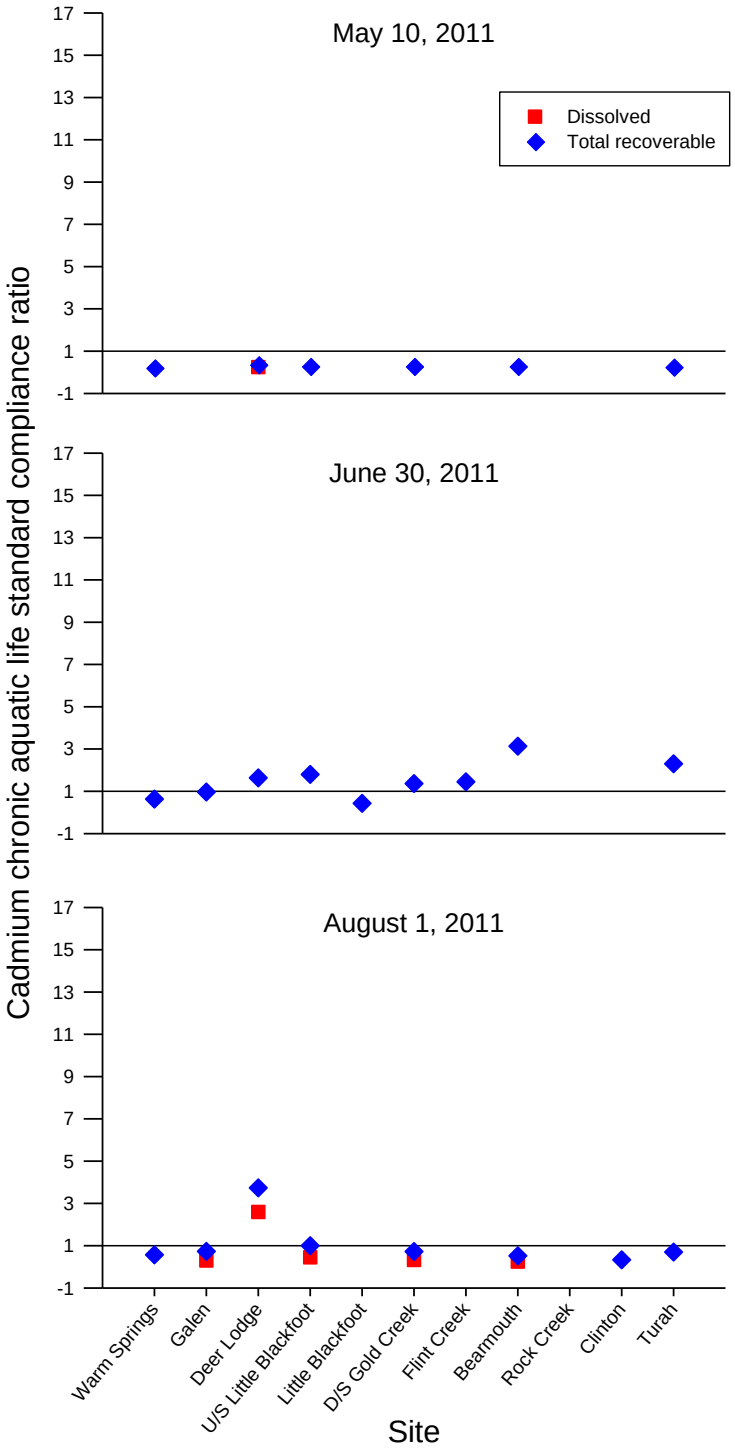

Figure 5-42. Cadmium compliance ratios at the cage sites in 2011 arranged from upstream to downstream. Compliance ratios were calculated by dividing cadmium concentrations by the calculated chronic aquatic life standards. Compliance ratio values <1 indicate cadmium levels below the aquatic life standard (compliance) while values >1 indicate levels above the standard (non-compliance).

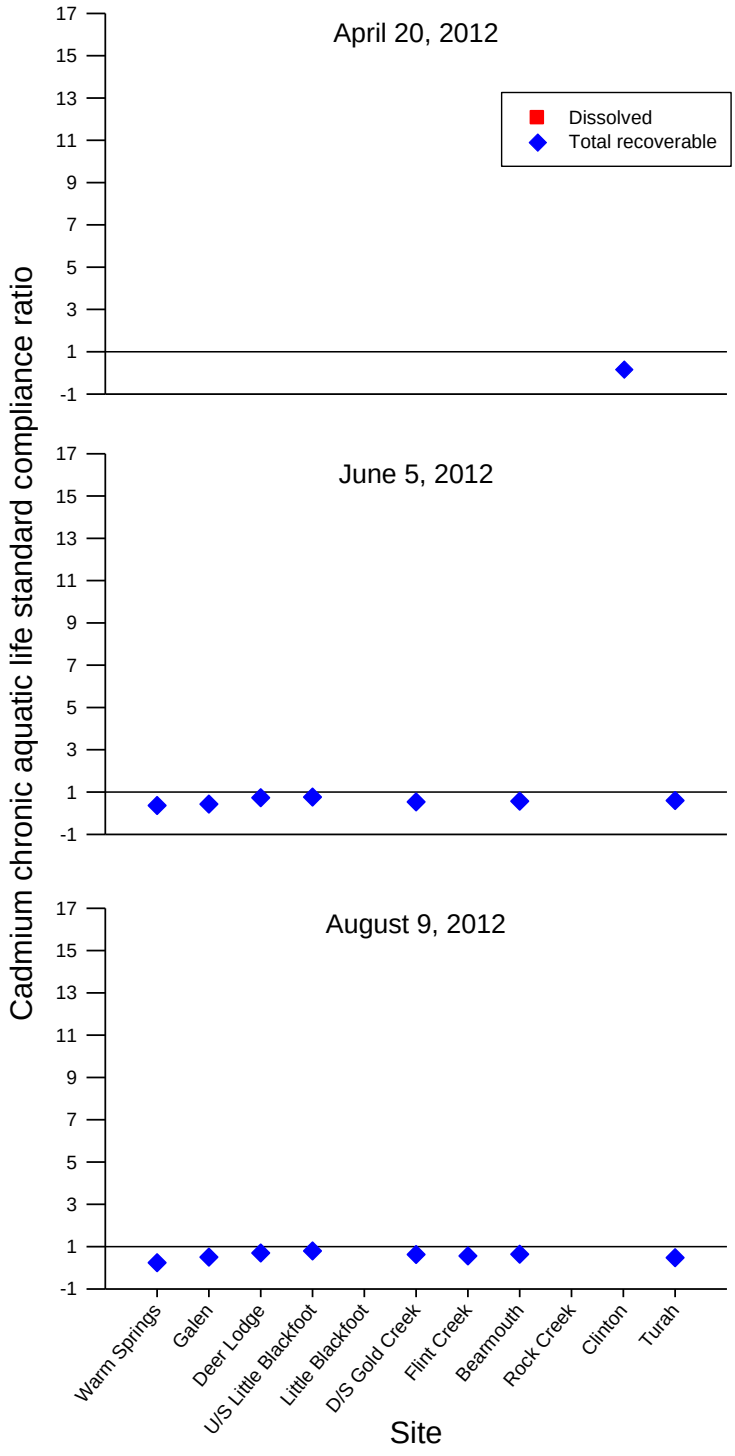

Figure 5-43. Cadmium compliance ratios at the cage sites in 2012 arranged from upstream to downstream. Compliance ratios were calculated by dividing cadmium concentrations by the calculated chronic aquatic life standards. Compliance ratio values <1 indicate arsenic levels below the aquatic life standard (compliance) while values >1 indicate levels above the standard (non-compliance).

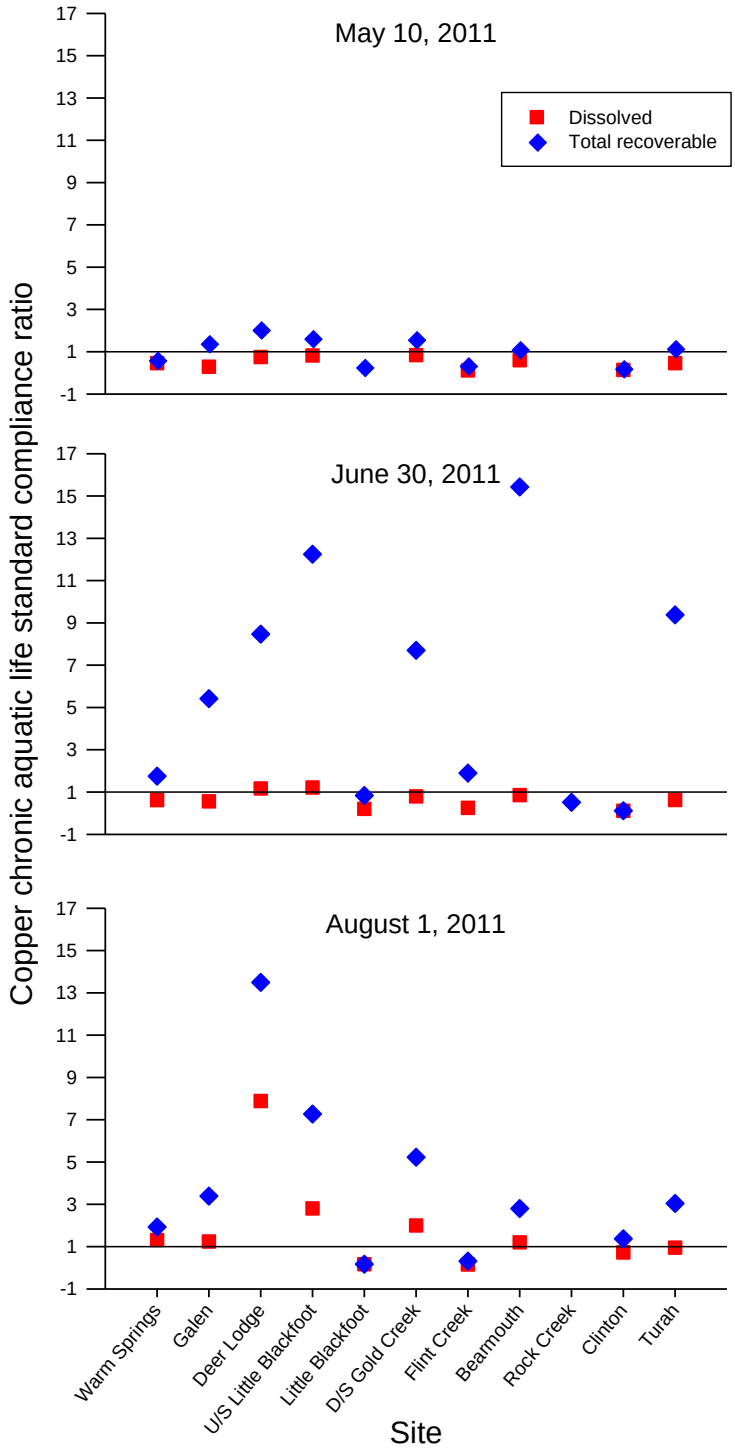

Figure 5-44. Copper compliance ratios at the cage sites in 2011 arranged from upstream to downstream. Compliance ratios were calculated by dividing arsenic concentrations by the calculated chronic aquatic life standards. Compliance ratio values <1 indicate copper levels below the aquatic life standard (compliance) while values >1 indicate levels above the standard (non-compliance).

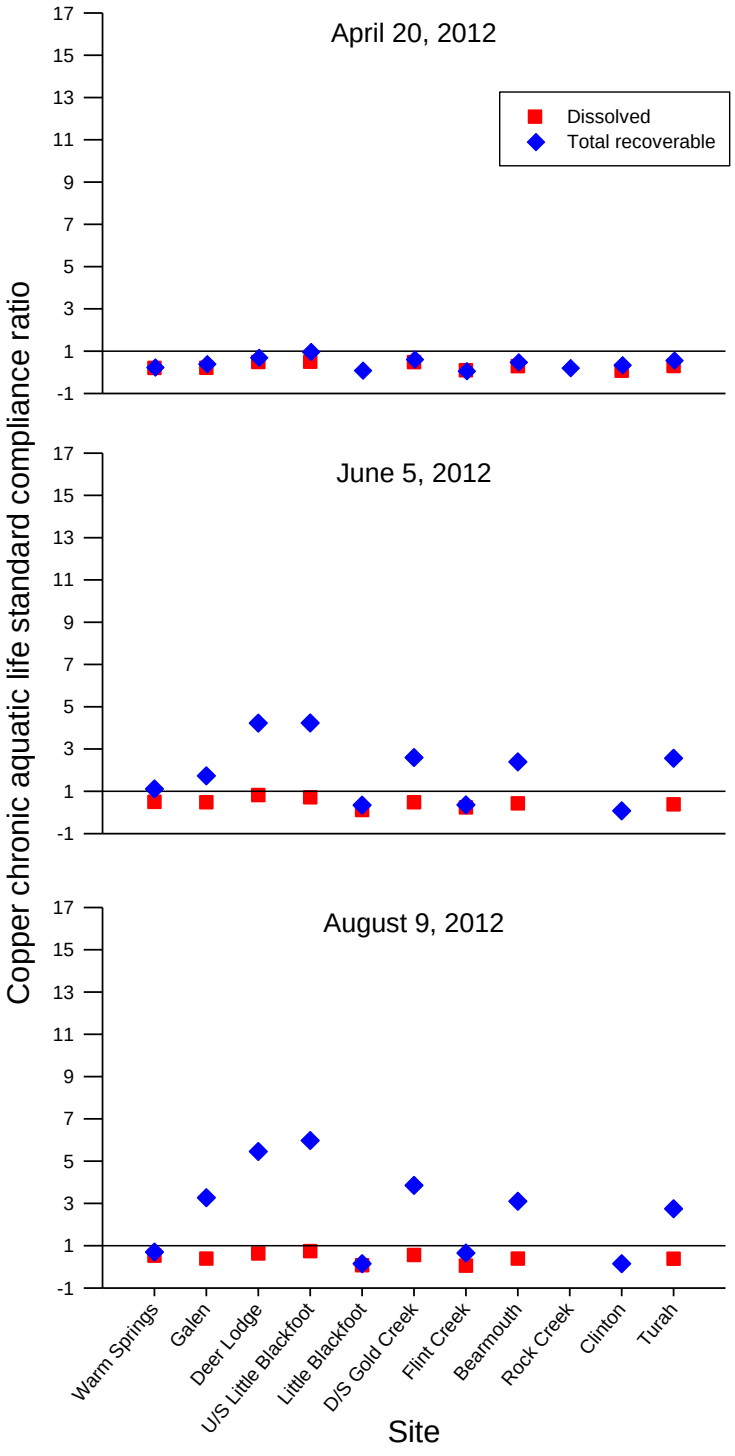

Figure 5-45. Copper compliance ratios at the cage sites in 2012 arranged from upstream to downstream. Compliance ratios were calculated by dividing copper concentrations by the calculated chronic aquatic life standards. Compliance ratio values <1 indicate copper levels below the aquatic life standard (compliance) while values >1 indicate levels above the standard (non-compliance).

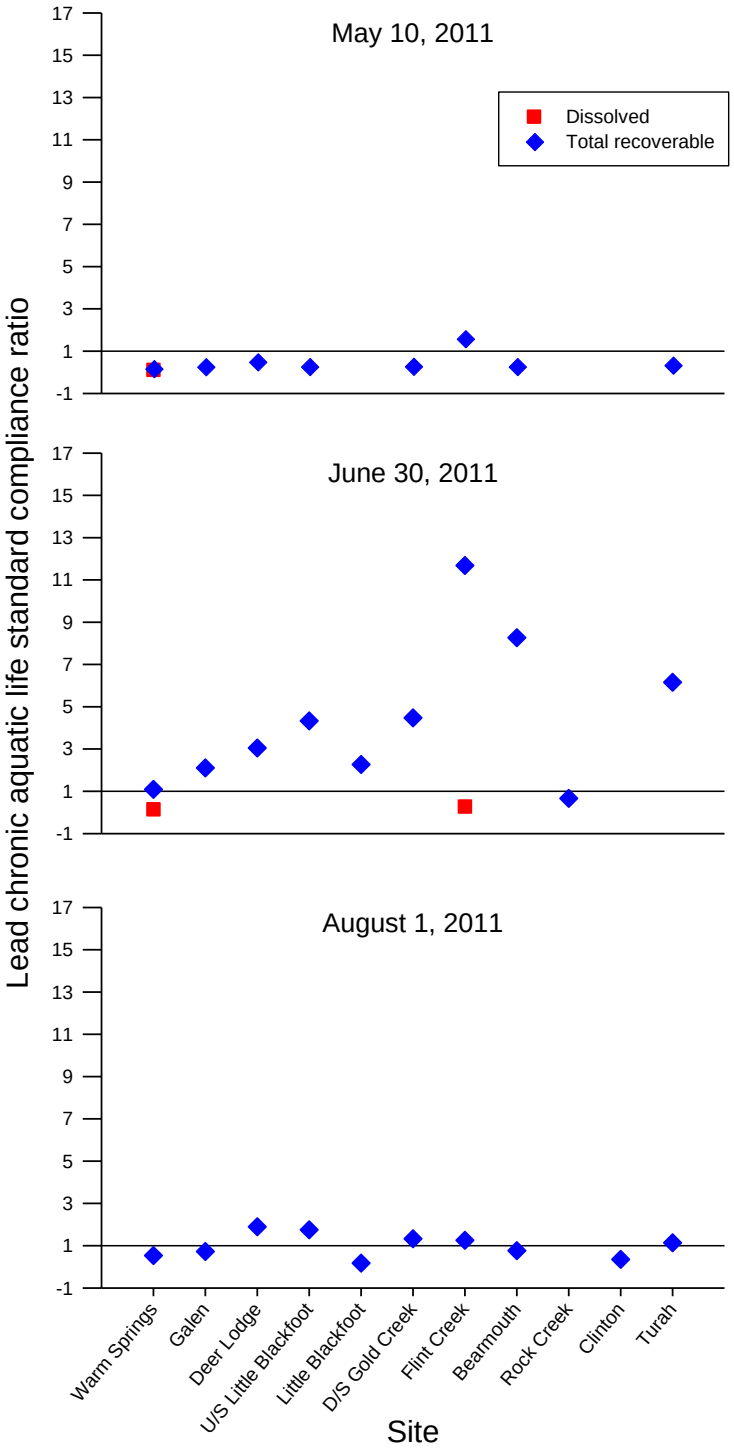

Figure 5-46. Lead compliance ratios at the cage sites in 2011 arranged from upstream to downstream. Compliance ratios were calculated by dividing lead concentrations by the calculated chronic aquatic life standards. Compliance ratio values <1 indicate lead levels below the aquatic life standard (compliance) while values >1 indicate levels above the standard (non-compliance).

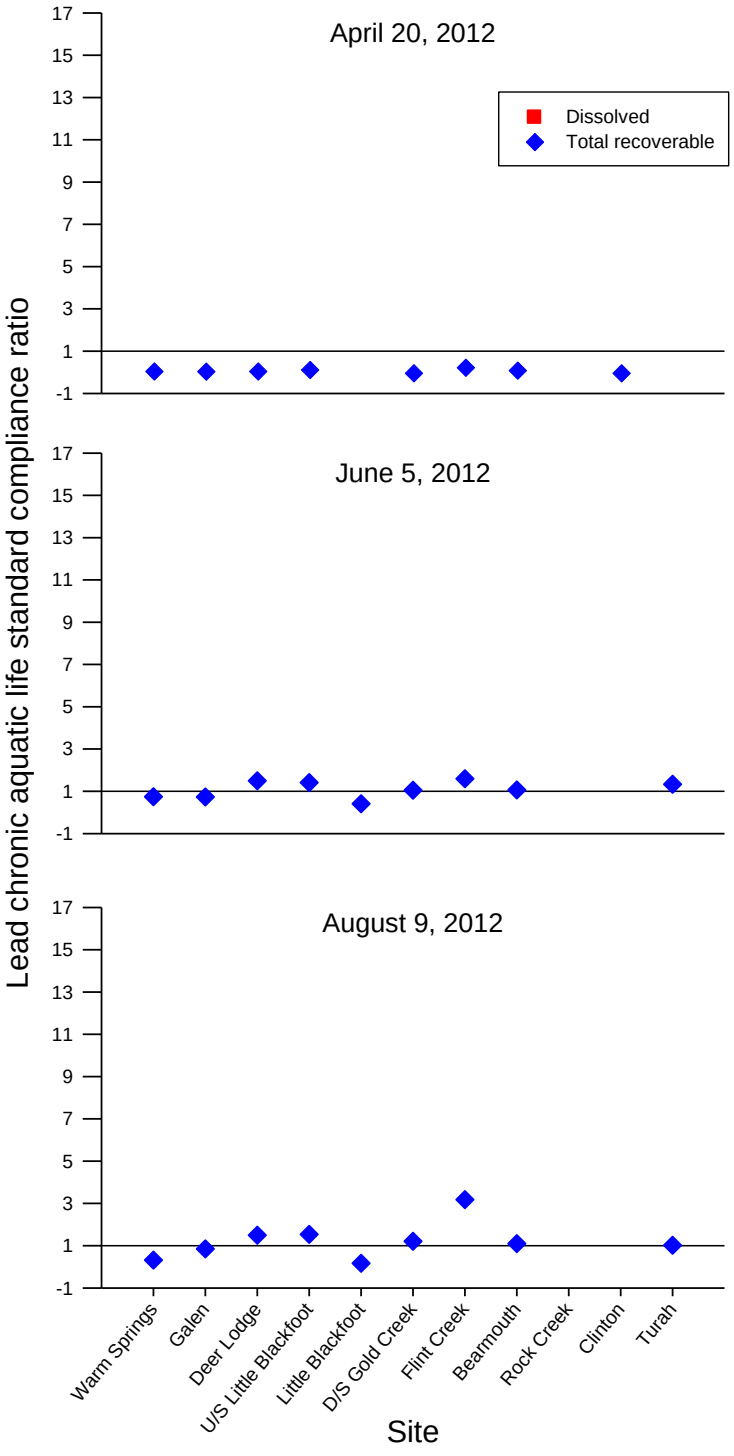

Figure 5-47. Lead compliance ratios at the cage sites in 2012 arranged from upstream to downstream. Compliance ratios were calculated by dividing lead concentrations by the calculated chronic aquatic life standards. Compliance ratio values <1 indicate lead levels below the aquatic life standard (compliance) while values >1 indicate levels above the standard (non-compliance).

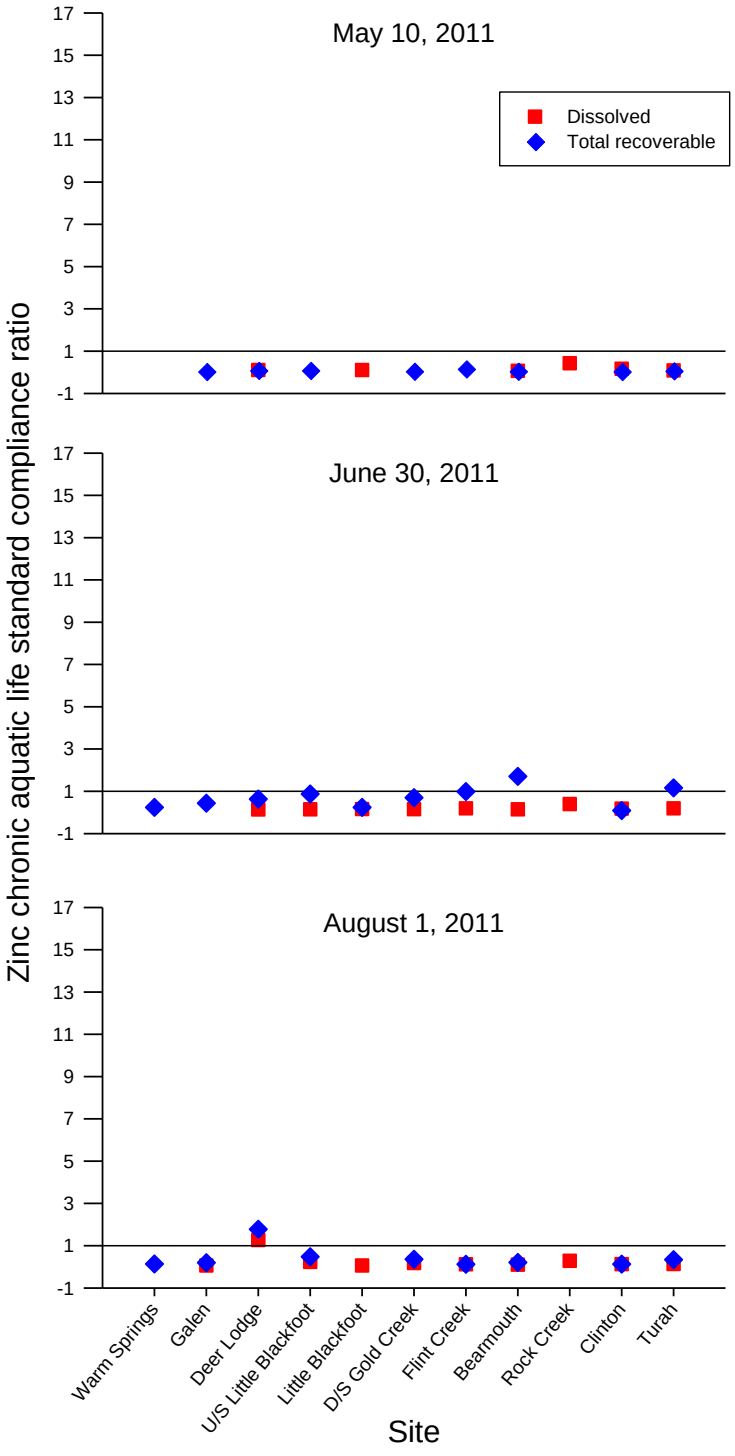

Figure 5-48. Zinc compliance ratios at the cage sites in 2011 arranged from upstream to downstream. Compliance ratios were calculated by dividing zinc concentrations by the calculated chronic aquatic life standards. Compliance ratio values <1 indicate zinc levels below the aquatic life standard (compliance) while values >1 indicate levels above the standard (non-compliance).

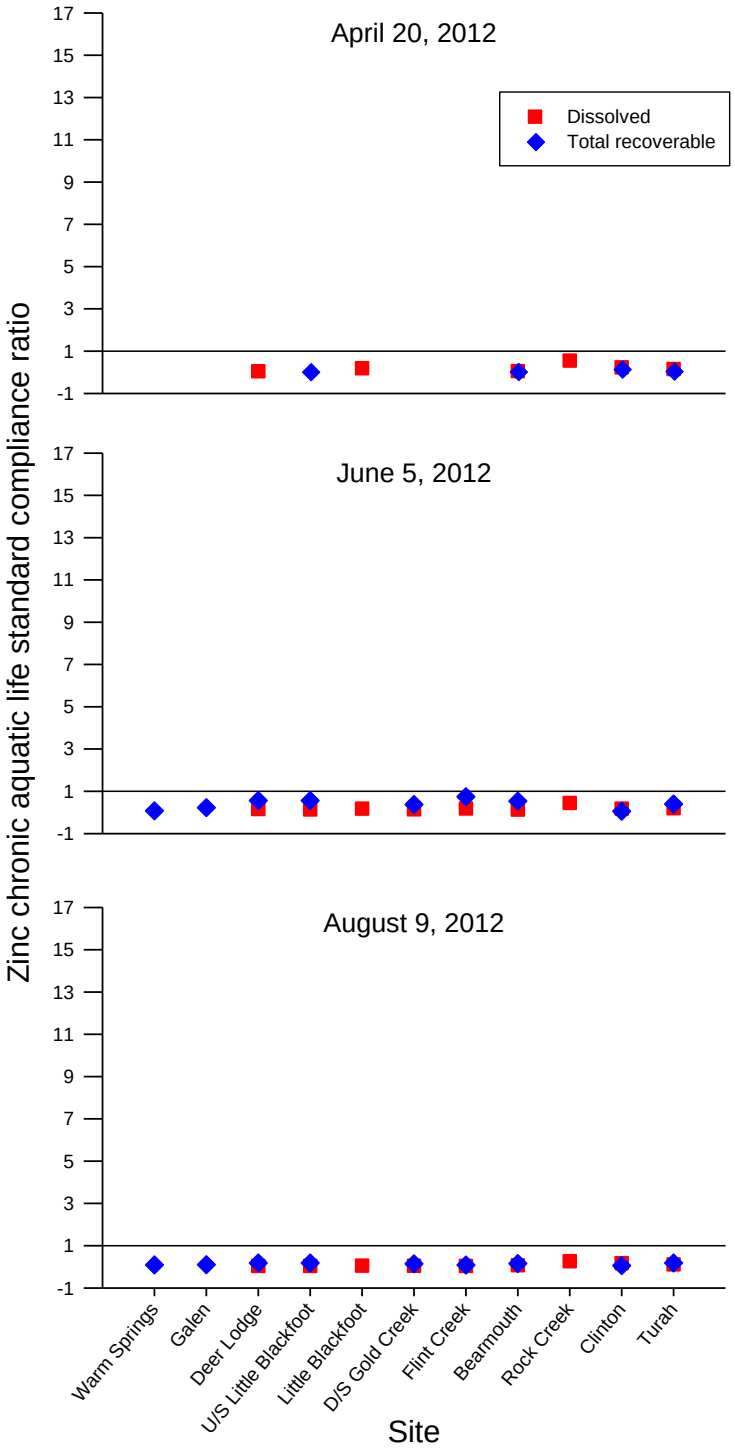

Figure 5-49. Zinc compliance ratios at the cage sites in 2012 arranged from upstream to downstream. Compliance ratios were calculated by dividing zinc concentrations by the calculated chronic aquatic life standards. Compliance ratio values <1 indicate zinc levels below the aquatic life standard (compliance) while values >1 indicate levels above the standard (non-compliance).

5.3.7 Water Quality

Water quality parameters recorded on continuously recording water quality probes upstream of Warm Springs Creek, at Galen, upstream of the Little Blackfoot River, upstream of Gold Creek, and at Bearmouth are outlined in the following sections.

pH

Elevated pH was observed at Warm Springs and Galen (Figure 5-50). Extended exposure to pH > 9 may be harmful to trout (Colt et al. 1979). Mean daily values for pH exceeded 9 in late May and early June 2011 at Galen, and at Warm Springs in every month during the analysis period in 2012; pH at Galen in 2012 was consistently > 8.5. In contrast, mean daily pH at the remaining mainstem sites with probes deployed rarely exceeded 8.5 and generally varied from 7.5 to 8.5 (Figure 5-50) which is considered within the ranges suitable for trout (Colt et al. 1979). For comparison, mean pH as measured with a handheld probe varied from 6.5 to 7.5 at control sites.

Oxidation Reduction Potential

Oxidation reduction potential (ORP) is a general indicator of water quality with positive measurements indicating aerobic or oxidative conditions and negative measurements indicating anaerobic or reductive conditions (Pearson and Black 2001; Apps 2012). Typically surface waters have an ORP from 100 to 200 mV, with more pristine, oxygenated water having an ORP of up to 400 mV; ORP < 200 mV indicates reduced levels of dissolved oxygen and/or oxidative potential (Apps 2012). Mean daily oxidation reduction potential was low throughout the study area in 2012, with most sites having ORP values centered on zero with many negative values (Figure 5-51). Two sites show deviation from this trend including upstream of the Little Blackfoot River which has a negative trend in June and achieves values < -500 mV, and Bearmouth which has a positive trend in June and achieves values > 900 mV (Figure 5-51). Neither of these deviations coincided with increased mortality.

Specific Conductivity

Specific conductivity is a measure of the ability of water to conduct electricity and can be used as a relative measure of water quality. Specific conductivity typically varies from 10 to 1000 µS/cm, but may exceed 1000 µS/cm in polluted waters or waters receiving large quantities of land runoff (Chapman 1996). Mean daily specific conductivity at all sites in both years was within normal ranges (Figure 5-52). However, specific conductivity increased sharply upstream of the Little Blackfoot River in June 2012. While this may reflect an actual increase in specific conductivity it is likely this is the result of a probe failure as none of the other sites exhibit the same increase (Figure 5-52).

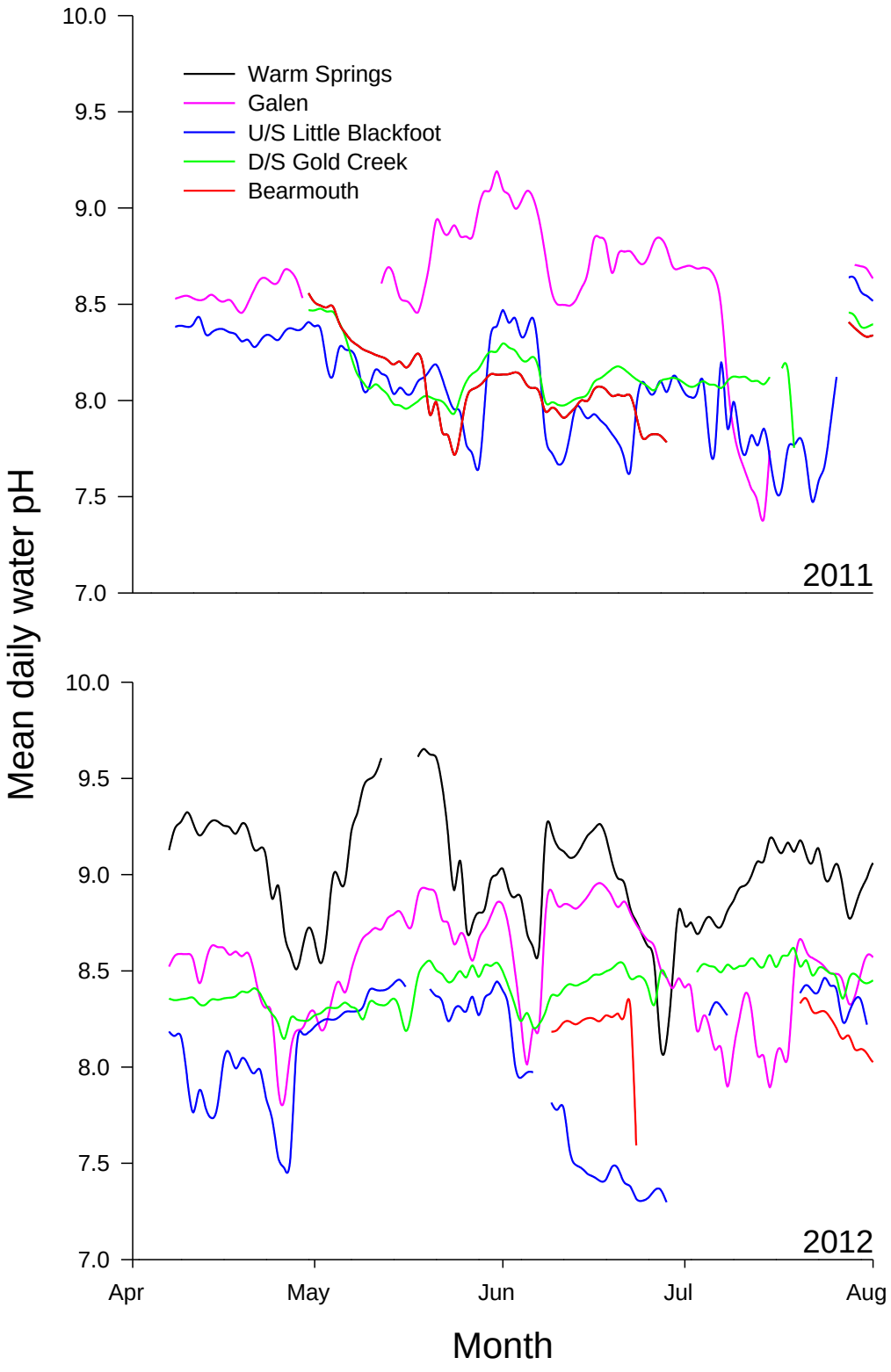

Figure 5-50. Mean daily water pH at Clark Fork River sites with probes deployed in 2011 and 2012.

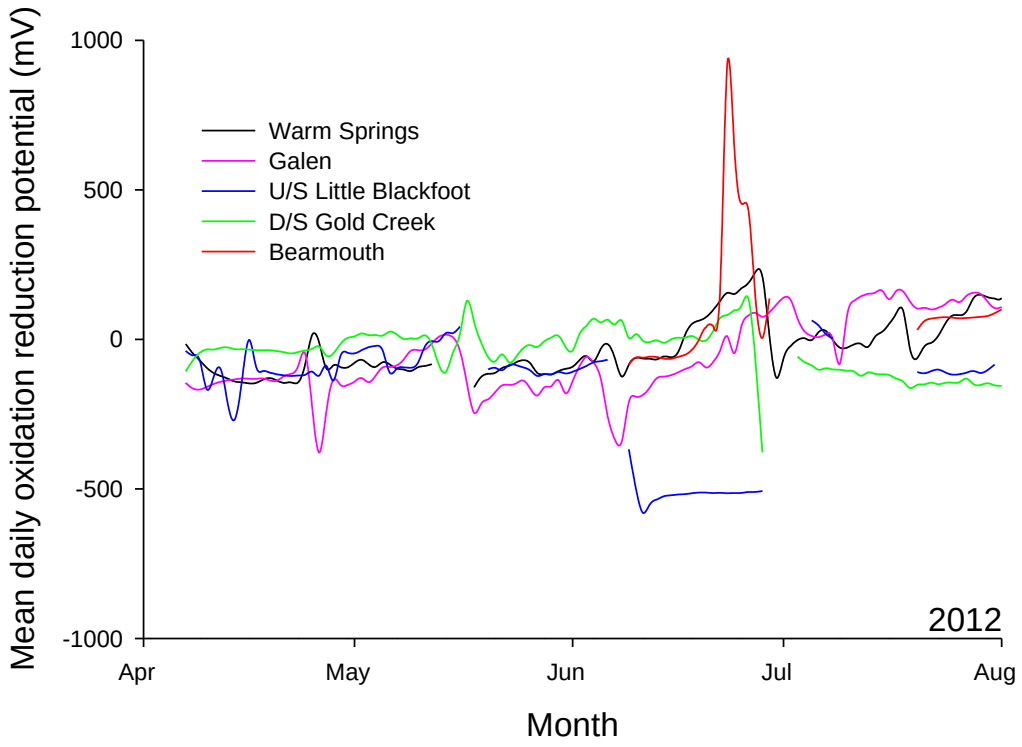

Figure 5-51. Mean daily oxidation reduction potential at Clark Fork River sites with probes deployed in 2012.

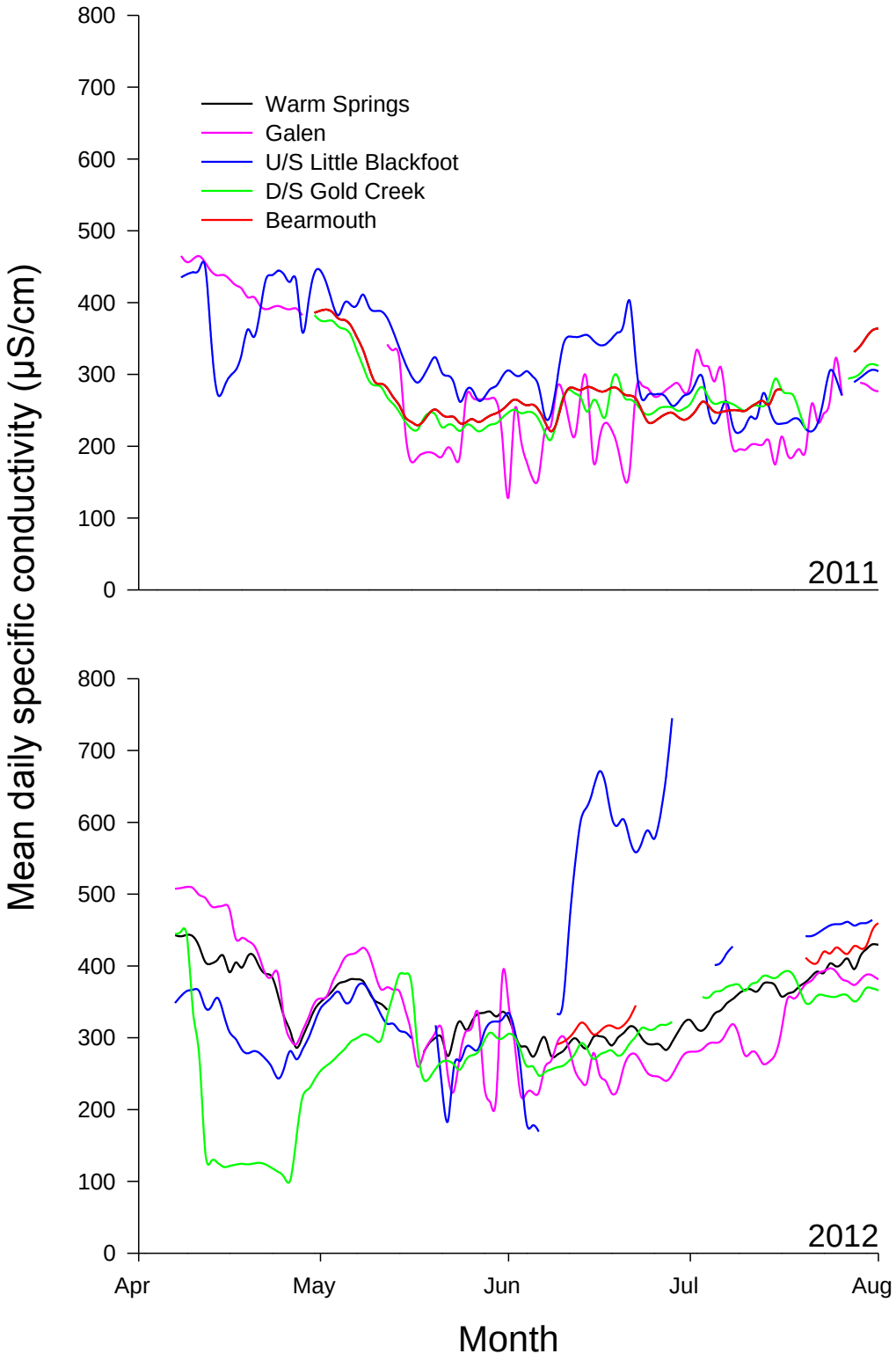

Figure 5-52. Mean daily specific conductivity at Clark Fork River sites with probes deployed in 2011 and 2012.

Luminescent Dissolved Oxygen

The freshwater ALS one day minimum for dissolved oxygen for fish >30 days post-hatch in the Clark Fork River is 4.0 mg/L (MTDEQ 2012b). Mean daily dissolved oxygen levels were below this threshold in early June 2011 at Galen, and twice in April 2012 upstream of the Little Blackfoot River. Mean daily dissolved oxygen levels also approached this threshold in early June 2012 at Warm Springs (Figure 5-53). Reduced dissolved oxygen levels at Galen in 2011 and upstream of the Little Blackfoot River in 2012 likely represent actual oxygen depression at those sites rather than probe failures as the oxygen levels rebound after dropping whereas probe failure results in dropping oxygen levels that do not rebound. The drop in oxygen at Warm Springs in 2012 rebounded after probe calibration (Figure 5-53) making it difficult to ascertain if this was an actual depression or the result of probe failure. None of the depressed oxygen levels coincided with increased mortality in either year. The overall trend in mean daily dissolved oxygen levels was values >10.0 mg/L at all sites at the beginning of each field season that gradually decreased to values of approximately 7-9 mg/L by the end of July each year (Figure 5-53).

Total Ammonia

Total ammonia ($NH_4 + NH_3$) was measured at Galen in 2011 and at Galen and Warm Springs in 2012. Average daily total ammonia concentrations were below 0.5 mg/L (Figure 5-54). The calculated acute or chronic ALS values for total ammonia were never exceeded in 2011 or 2012 during the periods for which complete data existed. Toxicity of total ammonia is dependent on other water parameters including water temperature and pH (Emerson et al. 1975; MDEQ 2012b). The increased toxicity is due to the conversion of the generally inert form (NH_4) to the highly toxic form (NH_3) through the process of de-ionization which is intensified at pH > 8 (Barton 1996; Stickney 1991). Emerson et al. (1975) reported an increase in the percent of toxic NH_3 in the total ammonia makeup from <1% at 0 °C and pH of 7.0 to 72 % at 30 °C and a pH of 9.5. The exposure of trout to ammonia can be sublethal or acutely toxic (Molony 2001). Both high water temperature and pH > 9 were recorded at Galen and Warm Springs (see previous sections) likely indicating a synergistic effect of multiple water quality parameters on brown trout survival at those sites.

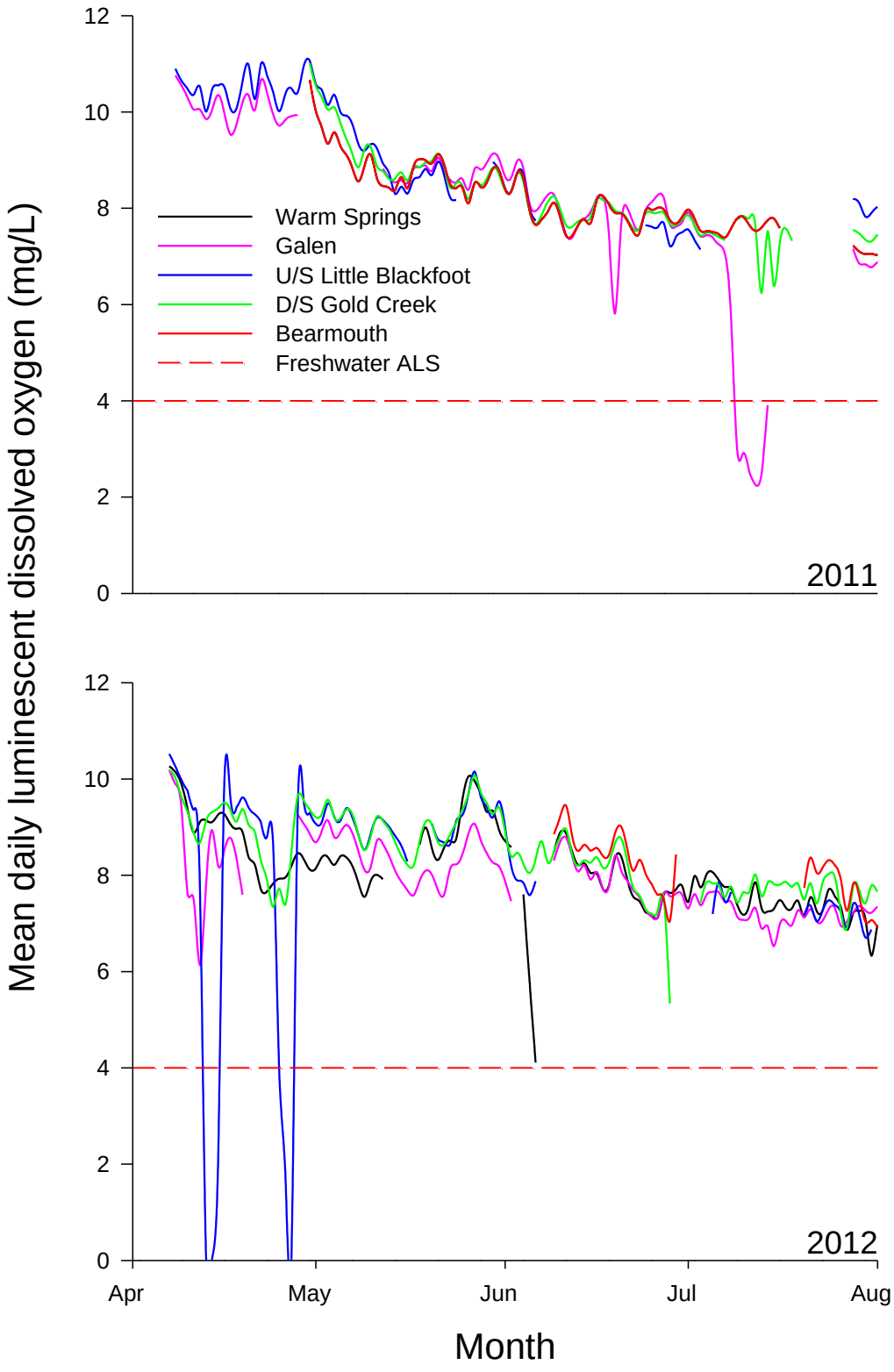

Figure 5-53. Mean daily luminescent dissolved oxygen at sites with probes deployed in 2011 and 2012. The red dashed horizontal lines denote the freshwater ALS one day minimum.

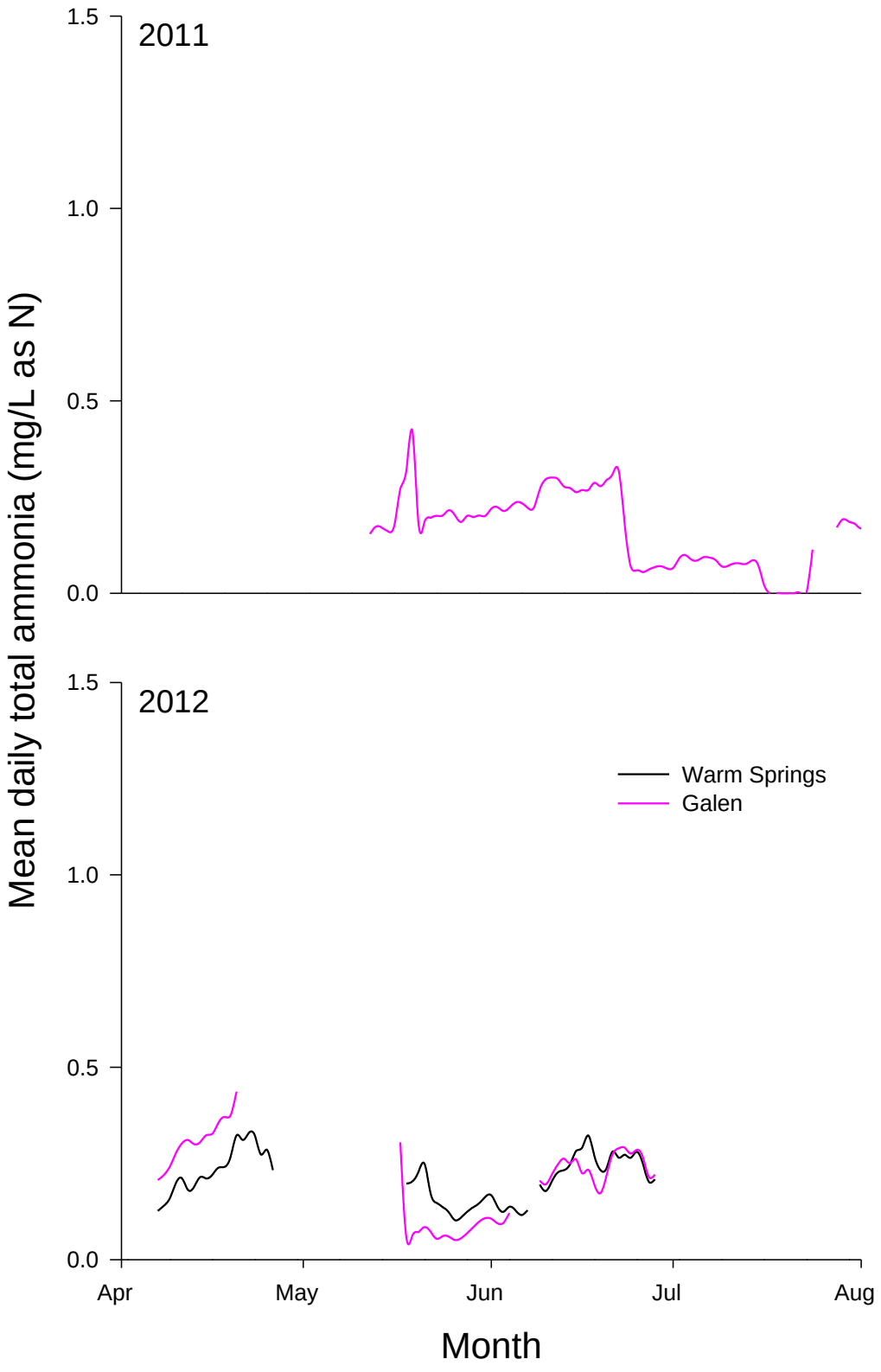

Figure 5-54. Mean daily total ammonia at Clark Fork River sites with probes deployed in 2011 and 2012.

5.4 Discussion

The synergistic effect of elevated concentrations of metals, high water temperatures, and high pH induced high mortality of brown trout at some monitoring sites. The disparities seen in water quality from upstream to downstream could explain the spatial distribution of brown trout mortality, and alludes to the importance of site specific field studies such as this to determine the effect of mining contamination on trout populations in the upper Clark Fork River. This study further documented impairment of trout habitat in the upper Clark Fork River. Many of the detrimental environmental conditions observed are more likely to result in sub-lethal effects than in direct mortality (Blazer et al. 1987; Molony 2001) and these conditions often interact synergistically or cumulatively to influence fish growth, survival, and ultimately populations (Driedzic and Hochachka 1978; Hellawell 1986; Boyd and Tucker 1998; Molony 2001; Kiser et al. 2010).

The majority of mortality observed during the study was on the descending limb of the hydrograph as water temperatures approached or exceeded the upper critical temperature threshold for brown trout of 19.0 °C (Elliot 1994). However, when high water temperatures were observed without elevated metals concentrations or high pH, mortality was not elevated. For example, water temperatures were elevated in the control tributaries but overall metals concentrations were lower than mainstem sites and pH was within normal ranges. We generally observed minimal mortality in these streams. Water temperatures in the Clark Fork River exceeded the upper incipient lethal temperature for brown trout of 24.7 °C (Elliot 1994) at only two sites, Warm Springs and upstream of the Little Blackfoot River in 2012; however water temperatures were elevated in late summer and approached upper incipient lethal values at numerous sites. In addition to direct mortality, elevated water temperatures can influence feeding and growth of brown trout which can result in decreases in condition (Elliot 1994; Elliot and Hurley 2001) and increased susceptibility to other environmental stressors and diseases which can ultimately affect populations (Wahli et al. 2002; Hari et al. 2006; Jonsson and Jonsson 2009). High water temperature can also make fish more susceptible to metals exposure. As water temperature increases so does respiration, resulting in increased metals uptake by fish (Sorensen 1991).

Brown trout from cages in the Clark Fork River drainage showed evidence of cellular changes that occur due to chronic exposure to mining contaminants. The effects of chronic exposure to mining contaminants on the cellular structure of trout have been well documented in previous studies. These same cellular changes, including moderately severe necrosis of hepatocytes, increased numbers of macrophage aggregates, and swelling of gill epithelium were seen in cutthroat trout exposed to metals at elevated concentrations (Farag et al. 1999). These types of cellular changes attributed to elevated metals exposure would likely reduce growth and survival of fish in the wild and have an effect at the population level (Farag et al. 1999). Woodward et al. (1995) observed degeneration of hepatocytes in rainbow trout fed a diet contaminated with metals. Similar results were seen in histologies of the livers of bull trout subjected to mining contaminants in Idaho (Kiser et al. 2010). In that study, waterborne metals concentrations were below acute and chronic thresholds while those in invertebrates and sediments were elevated. Histologies of bull trout livers revealed degeneration and necrosis of hepatocytes indicating contaminant exposure (Kiser et al. 2010). These cellular changes were also seen in the livers of brown trout from cages in the Clark Fork River during this study. Kiser et al. (2010) concluded that the stress associated with dynamic natural environments likely made trout more susceptible to exposure to mining contaminants. Additionally, it was concluded that exposure to metals likely decreased the ability of young salmonids to compete for food, cover, and elude predators, as well as compromised the ability to cope with environmental stressors such as

thermal, oxygen, and water chemistry regimes which could lead to effects on populations (Kiser et al. 2010).

Tissue metals burdens have been shown to compromise trout health (Woodward et al. 1995a; Farag et al. 1999, 2003), and tissue metals burdens may be correlated to histopathological effects (Hansen et al. 2004). Results of tissue metals burden analyses indicate effects from copper and zinc in the Clark Fork River; the average tissue metals burdens for the remaining metals tested for were below previously identified effect thresholds. Average whole body arsenic concentrations in brown trout held in cages in the Clark Fork River (0.95-2.60 µg/g) were lower than the level previously reported to cause decreased growth in juvenile rainbow trout, 6.8 µg/g (McGeachy and Dixon 1990). A previous study has shown no effect on growth in juvenile rainbow trout at tissue cadmium burdens of 4.64 µg/g (Hollis et al. 2001). Cadmium burdens were detected at all mainstem sites in the Clark Fork River as well as Rock Creek and were well below the threshold identified above with average burdens varying from 0.26-0.72 µg/g. Average whole body lead burdens at cage sites varied from 0.27-3.89 µg/g, well below the threshold of 20.1 µg/g identified as causing an effect on growth in Eastern brook trout (Holcombe et al. 1976). One study that identified whole body selenium burden thresholds for salmonids utilized rainbow trout (Hilton and Hodson 1983). That study identified an effect level of 4.00 µg/g for whole body tissue selenium burdens, well above the average values seen in brown trout held in cages in the Clark Fork River drainage which were 0.83-1.77 µg/g. Whole body copper burdens were found to have an effect on rainbow trout at 8.57 µg/g after exposure for 60 days (Marr et al. 1996). In 2011, whole body copper burdens exceeded this value at all mainstem sites and all control sites excluding the spring channel at Clinton; this value was exceeded at all mainstem sites as well as the Little Blackfoot River in 2012. Difficulty in respiration, decreased feeding, and decreased growth were observed in rainbow trout with average whole body zinc burdens varying from 105.09 to 178.66 µg/g after experimental exposure (Gundogdu and Erdem 2008). The lower value in the range for whole body zinc burden from that study was surpassed at least once at all sites in both years while the upper value in that range was surpassed at all mainstem sites and control sites excluding Rock Creek in 2011, and at all mainstem sites and control sites excluding the spring channel at Clinton in 2012.

The highest mortality rates did not occur at sites with the highest water temperatures, waterborne metals concentrations, or tissue metals burdens, but rather at sites exhibiting a combination of these factors or others such as increased pH. This is likely due to a cumulative effect of environmental stressors (Kiser et al. 2010). For example, chronic freshwater ALS values for cadmium, copper, lead, and zinc were exceeded in water samples collected during the study, indicating that waterborne metals influenced mortality in fish cages. However, metals concentrations were highest on the ascending limb and peak of the hydrograph and the majority of mortalities were on the descending limb as discharges achieved or approached base flow. This likely indicates a chronic effect of waterborne metals that was exacerbated by environmental conditions such as elevated water temperature and pH, the cumulative effect of which resulted in increased mortalities. It should be kept in mind that fish placed in these cages came from a hatchery environment with no past exposure to metals. Thus, these fish likely required longer exposure to metals in the Clark Fork River to cause mortality than wild fish that are rearing or inhabiting the Clark Fork River. Mayfield (2013) found significant mortality in adult brown trout implanted with radio transmitters in the Clark Fork River. The high mortality observed was believed to be due to long term chronic exposure to metals endured by these wild adult fish.

Values for pH at Warm Springs and Galen often exceeded those tolerable to trout (Colt 1979). However, in addition to direct adverse effects, pH may influence toxicity of metals (Couture and Pyle 2012). Studies have shown that cadmium, copper, and zinc are more toxic to steelhead trout (*Salmo gairdneri*) at high pH values (Cusimano et al. 1986). In addition to influencing the toxicity of metals, high pH results in a higher concentration of toxic NH_3 in the total ammonia makeup (Emerson 1975). Average daily pH was high at Warm Springs and Galen and generally decreased at sites downstream of those. This is due to the addition of lime to the settling ponds upstream of these sites that is an attempt to decrease water acidity and reduce metals contamination leaving Warm Springs Ponds. An unintended consequence to the addition of lime to the settling ponds is likely an increase in metals toxicity, that when combined with other stressors such as high water temperature, results in increased mortality at the upstream sites. Additionally, low dissolved oxygen levels were observed at Galen and potentially at Warm Springs. This could indicate a synergistic effect of pH, metals, high water temperature and periods of low dissolved oxygen, and explains why mortality was higher at Warm Springs and Galen than directly downstream at Deer Lodge which had similar tissue metals burdens.

Our results indicate that mortality was statistically significantly higher than expected at Warm Springs, Galen, and Turah. Mortality at Turah in 2011 was likely the result of the cumulative effect of many environmental stressors including increased zinc concentrations and high water temperatures, although further work is necessary to better understand the conditions causing the mortality observed at Turah. The cumulative effect of environmental stressors such as unsuitable pH, dissolved oxygen, ammonia, and water temperature in addition to metals exposure likely explain the high mortality seen at Warm Springs and Galen and could potentially indicate a point source of poor water quality. Water quality appears to improve downstream of these sites, potentially due to inflow of clean water from tributaries, with lower than expected mortality observed downstream of Gold Creek and at Bearmouth.

5.5 Acknowledgements

In addition to the co-authors of this report, several individuals were involved with this study. Montana FWP technicians Lindsey Gilstrap, Russell Adams, Colin Cooney, Maurie McLaughlin, and Jeremiah Purdum assisted with laboratory and 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. Jim Drissell authorized the delivery of brown trout from Big Springs Trout Hatchery. Brian Bartkowiak provided water sampling equipment and technical support. The implementation of this study yielded few complications thanks to the support of the individuals listed above.

6 REVIEW OF FISHERY INVESTIGATIONS FOR THE UPPER CLARK FORK RIVER

6.1 Introduction

Historically fish were extirpated from major portions of the Clark Fork River in western Montana because of metal contamination from copper mining activities in the headwaters. More recently, large-scale environmental restoration has occurred in portions of the watershed, and remediation is in progress in other portions of the watershed. Although other rivers in the region are highly regarded trout angling destinations (e.g., Rock Creek, the Big Hole, Bitterroot, and Blackfoot Rivers), trout population densities in the Clark Fork River remain depressed (estimated at one-fifth of expected densities, Saffel et al. 2011) and economic losses from lost angling expenditures are substantial (estimated at $1.369 million per year in 1992 dollars, Morey et al. 2002). Today, numerous sites along the Clark Fork River are Superfund operable units and the Superfund complex of the Clark Fork River system has been described as the largest in the United States (Luoma et al. 2008).

One of the most conspicuous effects of the metal contamination in the Clark Fork River system is the extirpation of fish. This report provides a review and synthesis of fisheries research in the Clark Fork River to date. The focus of fisheries research in the Clark Fork River has changed over time. Prior to the 1980s, fisheries monitoring data collected in the Clark Fork River generally tracked population abundance and was conducted primarily by Montana Fish Wildlife and Parks (MFWP). During the 1980s and early 1990s, a period of focused experimental research occurred as environmental damages were assessed and quantified. More recently, fisheries research in the Clark Fork River has shifted toward monitoring the response of fish to environmental remediation, and to evaluating baseline fishery conditions prior to major remedial work.

Major remediation projects have been completed, or are near completion, in some portions of the Clark Fork River system, and are ongoing in other portions of the system. For example, extensive remediation has occurred in the Clark Fork River tributary Silver Bow Creek (see https://doj.mt.gov/lands), which was historically the primary metal contaminant source to the Clark Fork River. Milltown Dam, which blocked upstream fish movements by trout (Swanberg 1997a; Swanberg 1997b; Schmetterling 2003) and other species (Schmetterling and McEvoy 2000; Schmetterling and McFee 2006), and was located at the confluence of the Blackfoot and Clark Fork Rivers, was removed in March 2009 (see https://doj.mt.gov/lands).

Fish populations in the upper Clark Fork River have responded to remedial measures in some unexpected ways. Fish kills in the upper Clark Fork River were relatively common events until 1992. However, no fish kills have occurred since, suggesting that the severity of acute pollution events is decreasing. However, population data suggests that trout distribution and abundance patterns in the upper Clark Fork River have changed during the five decade period in which monitoring has occurred (1967-2012), and abundance is substantially reduced in some portions of the river. The causes of these abundance changes are not yet understood.

6.2 Contamination history

A review of the history of mining, contamination, and the consequences of the contamination on fisheries of the Clark Fork River was provided by Luoma et al. (2008). Mining operations began in the Butte Hill mining district in the upper headwaters of the Clark Fork River in 1864. By the

1880s, mining and smelting efforts had shifted primarily to copper ore deposits and these operations were sustained through 1983. The scale of the mining effort was massive; in total over 16,000 kilometers of underground mine workings were established beneath the Butte Hill (see www.pitwatch.org). In addition to ore extraction and smelting near the mines in the Butte Hill, a large smelter in the town of Anaconda, Montana began operation around 1900. When the Anaconda smelter had finished production in 1980, an estimated mass of more than 1 billion tons of waste rock and ore had been mined form the Butte Hill. The majority of the waste material was deposited directly on the surrounding landscape and distributed downstream into the Clark Fork River by two primary headwater tributary systems; the Silver Bow Creek watershed capturing contaminants in wastes of the Butte Hill area mines and smelters, and the Warm Springs Creek watershed capturing contaminants in wastes from the Anaconda smelter.

Until the 1950s, efforts to minimize the effects of mining contaminants to the Clark Fork River ecosystem were minimal (Luoma et al. 2008). Construction of a tailings pond system (the Warm Springs Ponds) began in 1911 at a site immediately upstream from the Silver Bow Creek-Warm Springs Creek confluence (Phillips and Lipton 1995). The Warm Springs Ponds were intended to capture contaminated Silver Bow Creek water prior to reaching the Clark Fork River. Construction of additional tailings ponds during the 1950s, and initiation of lime treatment procedures in 1959, improved the functioning of the pond system.

6.3 Fish kills

Fish may have been extirpated from portions of the upper Clark Fork River within a decade of the initiation of copper mining operations in Butte in the 1880s. By 1891 major portions of the river were apparently fishless; seine net surveys yielded no fish in the river near Deer Lodge (approximately 50 river miles downstream from the Butte Hill mines and smelters) and the water quality throughout the river was characterized as having “the consistency of thick soup” due to the mining and smelting wastes (Everman 1891, cited by Phillips and Lipton 1995). The river was assumed to be uninhabitable to fish from the Rock Creek confluence upstream to the Warm Springs Ponds until at least 1957 (Columbia Basin Interagency Steering Committee 1957, cited by Phillips and Lipton 1995). Following lime treatment of the Warm Springs Tailings Ponds in 1959, fish began to colonize the upper Clark Fork River (Phillips and Lipton 1995). However, between 1959 and 1991, nascent fish populations colonizing the river upstream from Rock Creek were subjected to frequent acute periods of poor water quality characterized by red, yellow, and green colored water (Phillips 1992). Additionally, metal concentration spikes and rapid drops in pH and alkalinity occurred in the river following local thunderstorms as accumulated metal salts in streamside tailings deposits were washed into the river (Phillips and Lipton 1995).

Red-water and thunderstorm events were associated with fish kill events in the upper Clark Fork River between 1959 and 1991 (Phillips 1992; Phillips and Lipton 1995). Table 6-1 summarizes characteristics of each documented fish kill. The Warm Springs Pond system buffered the water quality of the Clark Fork River from metals derived from Silver Bow Creek. Whereas metal concentrations in Silver Bow Creek were too toxic for nearly all fish of any species (Spindler 1977; Hillman et al. 1995), the Warm Springs Ponds allowed fish, including trout, to inhabit the Clark Fork River. However, fish kills and associated “red-water” events were apparently the result of inadvertent discharges of water from the Warm Springs Pond system or insufficient treatment methods (Phillips 1992). Failures in the Warm Springs Ponds water quality buffering system resulting in fish kills were attributed to flood releases, dike failures, labor strikes interrupting liming operations, and winds lifting metal precipitates from the pond bottoms into the water column and thus into the pond discharge (Johnson and Schmidt 1988).

Table 6-1. Documented fish kills in the Clark Fork River, Montana (Source: Phillips 1992).

Date	Approximate river location	Species	Number killed	Associated event and notable water characteristics
1-Dec-59	Immediately upstream from Rock Creek confluence	Whitefish	≥17 total	Yellow water discharge from Warm Springs Ponds (WSP)
		Suckers		
		Redside shiner		pH = 5.2 (below WSP)
		N. pikeminnow		Fe = 20 mg/L (below WSP)
15-Mar-60	Near Geyser Slew	Suckers	"a few"	Red water for ≥2 months below WSP
				Fe = 110 mg/L (below WSP)
				copper = 9.0 mg/L (below WSP)
30-Jul-62	Between Warm Springs and Racetrack	Not specified	~650	Thunderstorm
3-Oct-67	WSP to Garrison	All species	All fish	Red water for multiple months below WSP (C. Brink, Montana Water Pollution Council)
May-71	Entire river upstream from Dempsey	All species	All fish	Continued toxic discharge from WSP (USEPA 1971)
23-Aug-73	Deer Lodge area	Not specified	≥ 200 adults	Thunderstorm
			≥ 2000 juveniles	
1-Aug-83	Perkins Lane bridge	Not specified	Not specified	Thunderstorm and red water
1-Aug-84	Mill-Willow Bypass to Racetrack Bridge	Not specified	≥ 10,000	Thunderstorm and red water
				Cu in gill tissue of dead fish ranged from 43-139 µg/g
				Fall population estimates of adult brown trout in affected reach dropped from 4,223/mile (1983) to 1,630/mile (1984)
19-Jul-85	Lost Creek Bridge	Brown trout	~50	Thunderstorm
3-Jul-85	Mill-Willow Bypass to Warm Springs Creek confluence	Not specified	Not specified	Thunderstorm
				copper in gill tissue of dead fish ranged from 8-44 µg/g
27-May-88	Mill-Willow Bypass	Suckers	Not specified	Thunderstorm
		Whitefish		copper in gill tissue of dead fish ranged from 22-92 µg/g
		Brown trout		
				copper = 2.48 mg/L (in Mill-Willow Bypass)
12-Jul-89	10 mile reach of the Mill-Willow Bypass	Not specified	≥ 5,000	Thunderstorm causing the following water quality changes:

				pH decreased from 7.93 to 4.14
				copper increased from 0.12 to 13.3 mg/L
				Cd increased from 0.003 to 0.085 mg/L
				zinc increased from 0.14 to 14.00 mg/L
				Fe increased from 0.41 to 43.9 mg/L
				lead increased from 0.002 to 0.030 mg/L
				Al increased from 0.28 o 37.7 mg/L
2-Jul-90	Mill-Willow Bypass	Brown trout (juv.)	~100	Thunderstorm
		Whitefish (juv.)		copper = 5.8 mg/L
		Suckers (juv.)		zinc = 10.3 mg/L
20-Aug-91	Racetrack Creek bridge to 2.5 miles downstream	Brown trout	≥ 200	Thunderstorm
		Others not specified		copper in gill tissue of dead fish ranged from 29-108 µg/g

6.4 Trout populations

Trout population abundance in the upper Clark Fork River was monitored annually at reference sites near Deer Lodge by MFWP biologist W. Hadley from 1967 to 2003 (Hadley 2003). These abundance estimates were based on a version of the Peterson mark-recapture method (Peterson and Cederholm 1984) which was modified by MFWP to account for variation in river streamflow, water temperature, season, electrofishing unit type and settings, crew experience, and other potentially confounding factors. Three sample sites were monitored: a site immediately downstream from the Warm Springs Ponds ("pH Shack Section") was sampled in 1967, 1969, and each year from 1972 to 2002; a site at Galen ("Galen Section") was sampled in 1987 and in alternate years from 1999 to 2003; and a site 6 miles downstream from Deer Lodge ("Williams-Tavenner Section") which was sampled annually from 1981 to 2002.

At all sites, abundance estimates (mean trout per mile ± 95% confidence interval) were highest around 1987 (Figures 6-1, 6-2, 6-3). From the 1980s through 2002, all sites demonstrated a decreasing abundance trend (Figures 6-1, 6-2, 6-3). Mean abundance at the site immediately below the Warm Springs Ponds was substantially greater in all years compared to the two downstream sites (Figures 6-1, 6-2, 6-3). In the mid-1980s mean trout per mile was approximately 2,500 ± 1,000 downstream from the Warm Springs Ponds but decreased by 68% (to 800 ± 200) by 2002 (Figure 6-1). By comparison, at Galen and the site downstream from Deer Lodge, the highest abundance estimates were approximately 400 ± 100 (84% lower than the site immediately below the Warm Springs Ponds) at the respective abundance peaks for both sites in 1987, and had decreased by 50% (to 200 ± 80) at the Galen site in 2003, and by 75% (to 100 ± 25) at the site downstream from Deer Lodge in 2002 (Figures 6-2 and 6-3). Abundance increased sharply between 1973 and 1980 at the site immediately below the Warm Springs Ponds (the only site sampled during that period), from abundances below suitable thresholds required for abundance estimates prior to 1973, to approximately 1,900 ± 600 in 1980 (Figure 6-1). Phillips (1982) attributed this increase in trout abundance directly to the implementation of pollution control programs and waste treatment procedures initiated with the Clean Water Act of 1972. However, the cause of the declines in abundances at these sites from the mid-1980s through 2002 is not understood.

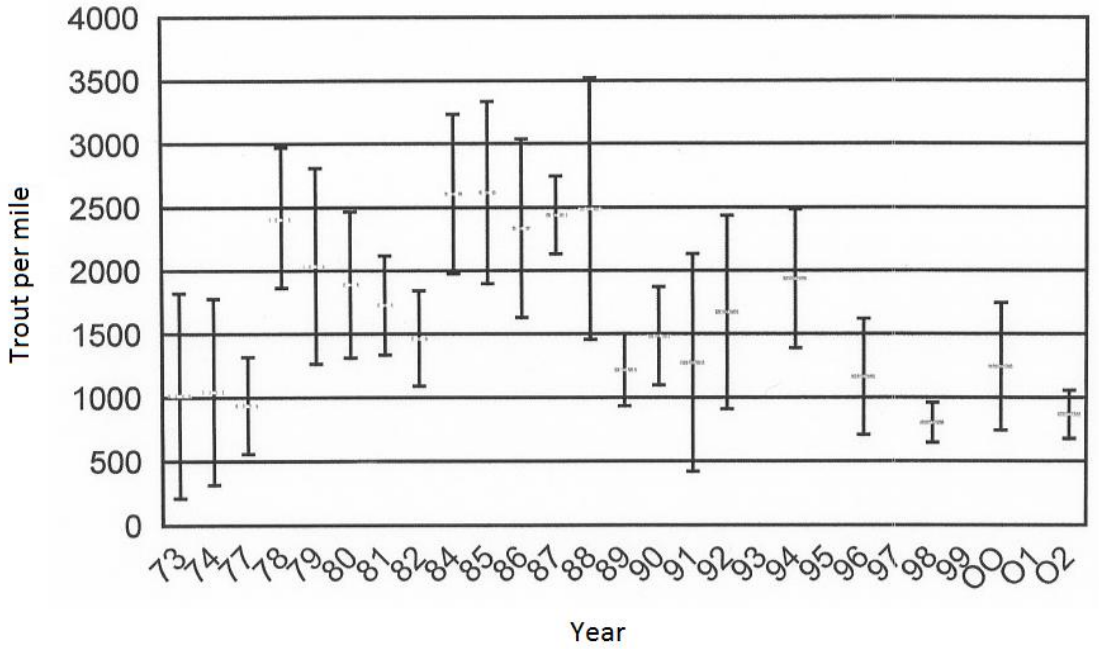

Figure 6-1. Annual brown trout abundance estimates in the Clark Fork River at the "pH Shack Section" immediately downstream from the Warm Springs Creek confluence (Source: Hadley 2003).

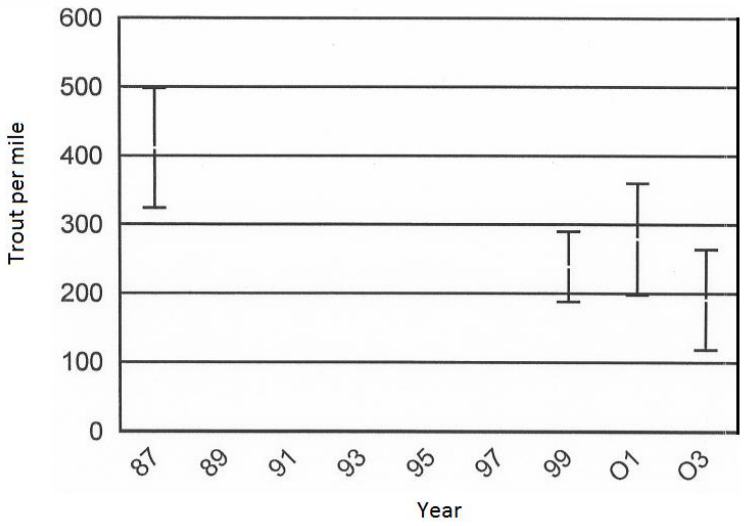

Figure 6-2. Annual brown trout abundance estimates in the Clark Fork River at the "Galen Section" near Galen, Montana (Source: Hadley 2003).

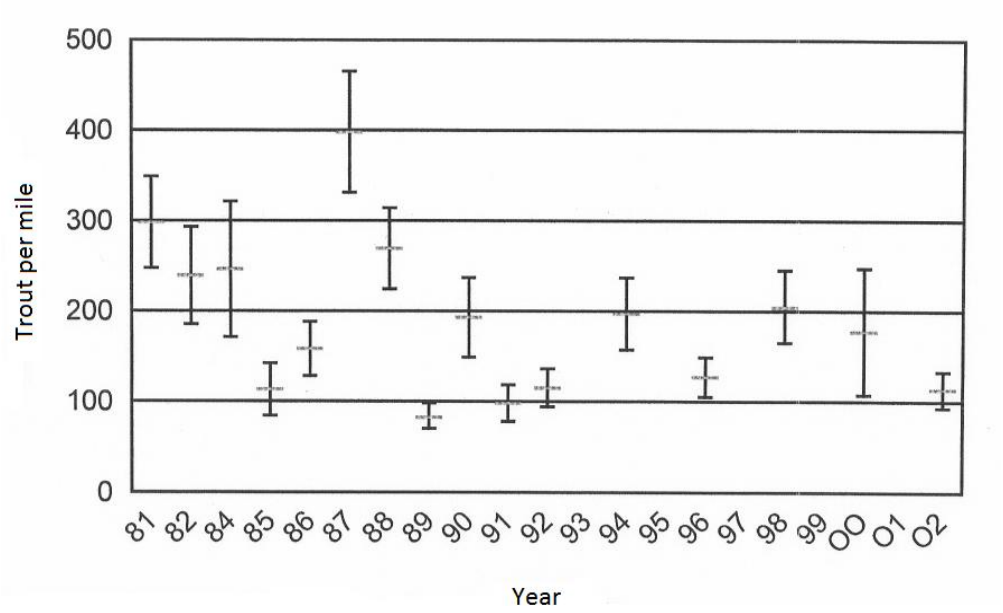

Figure 6-3. Annual brown trout abundance estimates in the Clark Fork River at the "Williams-Tavenner Section", approximately six miles downstream from Deer Lodge, Montana (Source: Hadley 2003).

To assess and quantify the aquatic injury to the Clark Fork River from mining contaminants, Hillman et al. (1995) compared trout densities in Clark Fork River sample reaches to paired reference reaches in other river systems that had similar habitat characteristics but lower metal concentrations. Reference reaches were selected from either the Big Hole River or from tributaries of the Clark Fork River (Rock Creek and Flint Creek) that were not directly affected by mining and smelting contaminants from Butte and Anaconda operations. Findings indicated that trout densities in Clark Fork River sample sites were consistently lower than in paired reference reaches. Additionally, sampled trout densities in the Clark Fork River in 1991 were below projected "baseline" trout densities, as estimated by habitat-normalized population data. Habitat normalization was based on trout density-habitat relationships observed in paired reference reaches. By extrapolating trout densities from sample reaches to the total sample area of the Clark Fork River, the estimated abundance of trout in 1991 was 28,000, less than one-fifth the projected "baseline" total of 160,000. The Hillman et al. (1995) study has been particularly influential in setting expectations for trout population recovery goals for remedial activities in the Clark Fork River, in particular the finding that the difference between projected and "baseline" trout abundances is approximately one-fifth (e.g., Saffel et al. 2011).

In 1987 and 2009, MFWP conducted spatially-continuous trout abundance estimates for the entire upper Clark Fork River from the Warm Springs Creek confluence downstream to at least Rock Creek, using similar methods to those described by Hadley (2003) (Lindstrom 2011). The sampling in 1987 and 2009 was more extensive than the sampling between 1973-2002; in 1987 and 2009, sampling was conducted throughout the entire river (i.e., spatially-continuous sampling), whereas the sampling conducted in all other years was in a small number (1-3) of sites (i.e., discrete sampling).

In 2009, mean trout abundance in the upper Clark Fork River was 186 trout per mile, approximately one-fifth of MFWPs target goal (Saffel et al. 2011). A major shift in longitudinal trout abundance patterns occurred in the uppermost 45 river miles of the Clark Fork River

between 1987 and 2009, particularly in the 10 river miles immediately downstream from the Warm Springs Ponds. Trout abundance in 2009 was substantially lower than in 1987 in the first 10 miles below the Warm Springs Ponds, and declines appeared to increase with proximity to the ponds (Figure 6-4). However, from river mile 322.8 downstream to 294.5, abundances were similar in 1987 and in 2009 (Figure 6-4). These data are consistent with the long-term annual declines observed by Hadley (2003) below the Warm Springs Ponds (in the "pH Shack Section") between the 1980s and 2002, and suggest that salmonid population declines below the Warm Spring Ponds continued between 2002 and 2009.

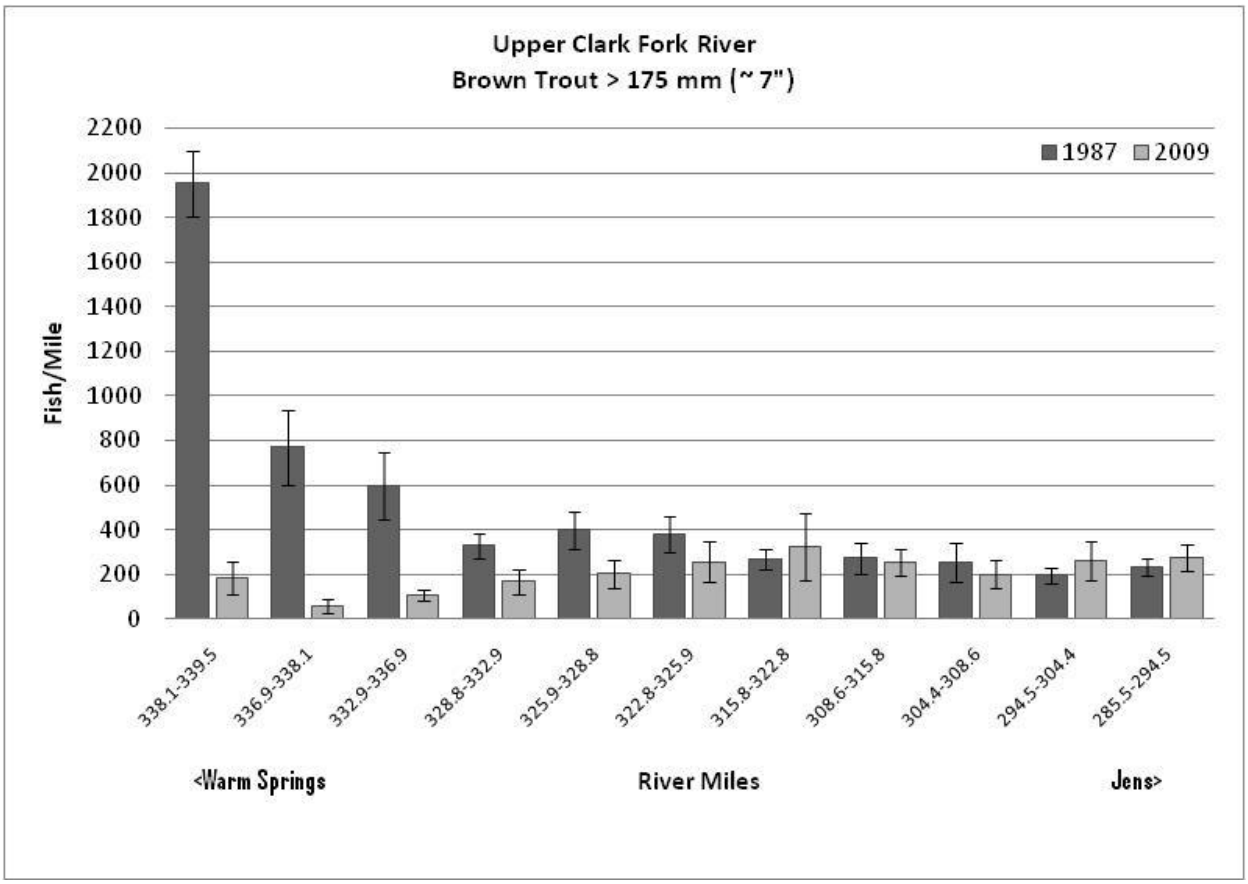

Figure 6-4. Brown trout abundance in the upper Clark Fork River in 1987 and 2009 (Source: Lindstrom 2011).

Since the 1970s, the salmonid assemblage of the upper Clark Fork River has been dominated by brown trout (*Salmo trutta*) (Hillman et al. 1995; Hadley 2003; Lindstrom 2011). To our knowledge, there has been no effort to quantify population parameters for non-salmonids in the upper Clark Fork River.

6.5 Tributary populations

This report is intended to review fisheries literature directly related to the upper Clark Fork River. However, many of the adult fish species inhabiting the upper Clark Fork River require access to tributaries to complete portions of the life cycle (e.g., to spawn). Larvae and juveniles of many species use tributary habitats for refuge and growth prior to moving into the mainstem Clark Fork River as adults. Therefore, studies related to fisheries in some of those tributaries are

briefly highlighted here. In 2007 and 2008, MFWP fishery biologists collected and summarized fish population abundance data, stream habitat data, and water quality data (e.g., stream temperature and streamflow) to inventory upper Clark Fork River tributary fish populations (Lindstrom et al. 2008; Liermann et al. 2009). Data collected were used to establish tributary prioritization goals for the upper Clark Fork River (see Saffel et al. 2011). In addition, as Superfund remediation of Silver Bow Creek has occurred, and fish have begun to recolonize Silver Bow Creek, fish abundance and movement patterns have been monitored by MFWP biologists and others. For details of those studies see Atkins (2012c) or Naughton (2013).

6.6 *In-situ* toxicity tests

To investigate the effect of Clark Fork River water quality on fish survival, MFWP biologists and others have conducted a series of *in situ* (on-site) trout toxicity studies. These studies evaluate the effects of ambient river conditions on the likelihood of survival of particular organisms. *In situ* toxicity tests were conducted in the upper Clark Fork River in 1960 (B. Averett, MFWP, see Phillips and Lipton 1995), in 1979 (Binomics 1979, see Phillips and Lipton 1995), and from 1986-1989 (Phillips and Spooon 1990). Similar studies have been conducted more recently; in 2011 (Atkins 2012b), and in 2012 (see Section 5). In 1960, 100% mortality of rainbow trout occurred at all sites in the upper Clark Fork River within three days of the initiation of the study. In 1979, survival of adult rainbow trout and hatchability of their eggs was not reduced by exposure to discharge water from the Warm Springs Ponds; however, fry exposed to diluted pond discharge water had reduced growth. Between 1986 and 1989, significantly greater mortality occurred among rainbow trout at some sites in the upper Clark Fork compared to control sites in watershed tributaries with low metal concentrations.

More recent *in situ* toxicity studies have been conducted by MFWP in 2011 (Atkins 2012b) and 2012 (Section 5). In these more recent studies, brown trout fry have been used to assess spatial and temporal variation in trout mortality in the upper Clark Fork River between the snowmelt runoff period and mid-summer. Overall, spatial variation in brown trout fry survival was generally low, and typically ranged from 75-90% in Clark Fork River. Sites with relatively low survival in 2011 did not have abnormally low survival in 2012, and vice versa. No spikes in mortality were observed that would suggest severe toxic metal pulses occurred. However, mortality increased during the post-runoff period as water temperatures approached, and often exceeded, 20C.

6.7 Laboratory experiments

In several controlled experiments, water quality of the Clark Fork River has been simulated and the effects of those conditions have been quantified for trout survival, growth, and other physiological response metrics. These controlled experimental settings have been particularly important for identifying relative differences in metal bioavailability related to dietary uptake or to direct uptake of metal through the gills, for differentiating the effects of chronic exposure versus pulsed metal exposure, for differentiating species specific tolerance differences, and for identifying contaminant thresholds that are likely to trigger behavioral responses such as avoidance.

Dietary bioavailability of metals to trout has been particularly well studied in the Clark Fork River. In two related studies, Woodward et al. (1994) and Woodward et al. (1995a), rainbow trout and brown trout fry were exposed to metal (cadmium, copper, lead, and zinc) concentrations similar to those in the Clark Fork River (but not simulating acute metal concentration spikes), and were also fed a diet of benthic invertebrates collected in the Clark Fork River. Results of these studies indicated that exposure to metals through the water and

through diet resulted in reduced growth, and increased body burdens (i.e., tissue concentrations) of arsenic, cadmium, copper, and lead. An important finding of these two studies was that dietary metal accumulation had a relatively large influence on growth and metal body burden relative to the influence of water-borne metals. Mount et al. (1994) determined that rainbow trout, ingesting brine shrimp (*Artemia*), exposed to metal ions through the water for 24-hour periods, did not experience adverse physiological consequences. The brine shrimp diet was intended to simulate a diet of benthic invertebrates from the Clark Fork River. However, Farag et al. (2000) hypothesized that the brine shrimp diet used by Mount et al. (1994) did not adequately simulate metal levels in benthic invertebrates of the Clark Fork River. Moreover, Farag et al. (2000) determined that cutthroat trout digested a brine shrimp diet, prepared in the same manner as described by Mount et al. (1994), differently than an actual diet of benthic invertebrates from the Clark Fork River.

To understand specifically what caused the fish kills in the Clark Fork River (described by Phillips 1992; Table 6-1), Marr et al. (1995a) tested the effect of metal concentration spikes on brown trout and rainbow trout survival. Rainbow trout and brown trout were exposed to metal concentrations simulating those in the Clark Fork River following thunderstorms and during red water events. In the laboratory, metal spikes were lethal to juveniles and fry of both species, establishing that metal concentration spikes were the most likely cause of the fish kills in the Clark Fork River.

To investigate the specific causes of the low trout densities in the Clark Fork River (described by Hillman et al. 1995), Woodward et al. (1995b) examined the avoidance response of brown trout exposed to water with metal concentrations simulating those in the Clark Fork River. Brown trout favored clean reference water over simulated Clark Fork River water in all trials except one trial in which simulated Clark Fork River water was diluted by 90%. Brown trout also avoided more acidic water when metals were present. In a similar experiment, rainbow trout avoided simulated Clark Fork River water in all trials including the 90% dilution. Taken together, these studies suggest that avoidance is at least partially responsible for the low overall trout densities of the Clark Fork River, and may partially explain why brown trout populations are substantially more abundant than the two *Oncorhynchus* species present in the Clark Fork River mainstem; rainbow trout (*O. mykiss*) and westslope cutthroat trout (*O. clarkii lewisi*).

To investigate the causes for the scarcity of *Oncorhynchus* species in the upper Clark Fork River, differences in the relative ability of brown trout and rainbow trout species to acclimate (i.e., adjust physiologically, Helfman et al. 1997) to metals were investigated by Marr et al. (1995b). Naïve (i.e., not acclimated to metals) juvenile rainbow trout were more tolerant (higher proportion surviving 96-hour exposure) to a metal mixture simulating Clark Fork River water compared to brown trout, but were about equally resistant (mean time to death). However, metal-acclimated brown trout were more resistant than metal-acclimated rainbow trout. Brown trout were able to acclimate to metals for a longer period (up to 5 weeks) compared to rainbow trout, but metal-acclimation was physiologically costly, as evidenced by reduced weight.

6.8 Observational studies

Whereas controlled experiments have played an important role in identifying the most likely specific causes for phenomena such as fish kills and low trout density and diversity in the Clark Fork River, observational studies have been useful for directing the focus of those experiments. Fish population abundance and density trends in the mainstem are a particular form of observational study that is discussed separately (see Section 6.4). In several controlled experiments, ambient water quality conditions of the Clark Fork River have been simulated and

the effects of those conditions have been quantified for trout survival, growth, or other physiological response. These controlled experimental settings have been particularly important for identifying relative differences in metal bioavailability related to dietary uptake or to direct uptake of metal through the gills, for differentiating the effects of chronic exposure versus pulsed metal exposure, for differentiating species specific tolerance differences, and for identifying contaminant thresholds that are likely to trigger behavioral responses such as avoidance.

In response to the recovery of fish populations in the upper Clark Fork River during the 1970s (see Hadley 2003), and increased angling interest, three tissue metal studies were conducted to assess the safety of consuming fish from the river. One study, Phillips (1982), examined metal residues in edible tissues of 50 brown trout collected from the upper Clark Fork River. No brown trout sampled by Phillips (1982) had tissue metal concentrations sufficient to induce consumption advisory warnings. Phillips noted two previous studies that also examined fish tissue metal concentrations (Van Meter 1974 and Dent 1975, neither of which were reviewed directly in this report). Phillips (1982) noted that Dent (1975) observed higher zinc concentrations in fish tissue, which may have been related to increased zinc levels during previous years, although no water quality data was reviewed that could have confirmed that hypothesis. According to Phillips (1982), the previous studies were limited because age-classes were pooled rather than grouped for analysis. Indeed, Phillips (1982) observed that mercury concentrations in fish increased with age, but did not exceed human health guidelines even in the oldest grouping.

Farag et al. (1995) assessed differences in brown trout physiology between individuals sampled in the Clark Fork River and others sampled in reference sites from the Big Hole River and Rock Creek. Brown trout sampled in the Clark Fork River had elevated copper, arsenic, and cadmium concentrations in the liver, kidney, and pyloric caeca compared to those from reference sites. Additionally, copper and cadmium were elevated in tissues of the gill, stomach, and large intestine. Although whole-body metal residues were higher in Clark Fork River fish compared to reference sites, levels were lower than those reported in 1974 (Dent 1974, cited by Farag et al. 1995). In addition to elevated metal levels in Clark Fork River brown trout, physiological and structural (i.e., histopathological) differences were noted. For example, metallothionein in the liver (likely a compensatory physiological response) was noted in Clark Fork River brown trout. Farag et al. (1995) concluded that the metabolic costs of metal exposure may reduce growth and survival, although differences in size between fish sampled in the Clark Fork River and fish sampled in reference sites were not observed.

To identify feeding, refuge, and spawning habitats in the upper Clark Fork River, Mayfield (2013) studied the movement of 256 radio-tagged trout (181 brown trout and 71 cutthroat trout or cutthroat-rainbow trout hybrids) captured and tagged in the upper Clark Fork River between 2009 and 2011. Tagged individuals were relocated each week. Brown trout spawned in the mainstem and in tributaries and spawning tributaries used by brown trout were categorized as less degraded than those used for spawning by cutthroat trout and hybrids. Cutthroat trout apparently did not spawn in the mainstem. Overall, movement distances were low, particularly among brown trout.

Radio-tags used by Mayfield (2013) had mortality sensing capabilities allowing for analysis of the survival rates of tagged individuals. Mean weekly survival estimates (i.e., the probability of living from one week to the next, ± 95% CI) for radio-tagged cutthroat trout were extremely low. Mean weekly survival of cutthroat trout inhabiting the upper Clark Fork River upstream from the Little Blackfoot River confluence was 0.90 (± 0.07), and 0.92 (± 0.05) for those inhabiting tributaries. Mean weekly survival of cutthroat trout inhabiting the Clark Fork River between the

Blackfoot River confluence and the Little Blackfoot River confluence was higher, with estimates and associated confidence bounds ranging from 0.94 to 0.99. Brown trout survival throughout the system was comparatively high with mean weekly survival estimates and confidence bounds ranging from 0.97 to 0.99. Low survival of cutthroat trout upstream from the Little Blackfoot River confluence may have been related to metal concentrations, elevated temperatures, or other stressors.

6.9 Restoration goals

The Clark Fork River restoration plan (NRDP 2007) outlined four specific goals for the upper Clark Fork River: 1) to have trout densities similar to reference rivers (see Hillman et al. 1995), 2) to have high fish species diversity (including non-salmonid fish diversity), 3) to have fish age structures suggestive of reproducing populations, and 4) to have species assemblages and composition similar to those of non-contaminated reference systems (i.e., not dominated by metal tolerant fishes). MFWP and the Montana Department of Justice, Natural Resource Damage Program (NRDP) also developed a more specific plan (referred to here as the "UCFRB Tributary Prioritization Plan") to guide fishery restoration actions in the upper Clark Fork River basin that would specifically target tributary fish populations (Saffel et al. 2011). The UCFRB Tributary Prioritization Plan identified a specific target goal for trout population density in the Clark Fork River as 500-1,000 catchable (>7 in) trout per mile.

6.10 Conclusion

In some respects, the response of fish populations to contamination in the Clark Fork River system represents a holistic assessment of the environmental damages that occurred in the Clark Fork River and the effectiveness of restoration efforts. For example, prior to any attempt at treatment of mining waste discharges, the Clark Fork River was fishless (Luoma et al. 2008). Early efforts to isolate the river from contaminants allowed fish populations to return, but toxic metal pulses occurred and fish kills were common (Phillips 1992; Table 6-1). Although, fish kills have not been reported since 1992, trout population abundance overall in the upper Clark Fork River remains low relative to other regional rivers of similar size (Saffel et al. 2011). Of particular concern are the sustained (i.e., 30 year) declines in trout abundance from a 10 mile river reach immediately downstream from the Warm Springs Ponds, which historically had very high trout abundance relative to the rest of the upper Clark Fork River (Hadley 2003; Lindstrom 2011). The causes of these declines are currently unknown. Moreover, the salmonid assemblage in the upper Clark Fork River is dominated by brown trout, and two salmonid species that were indigenous to the system (westslope cutthroat trout *Oncorhynchus clarkii lewisi* and bull trout *Salvelinus confluentus)* are rare (Saffel et al. 2011). A recent telemetry study suggested that westslope cutthroat trout survival is extremely low in the river below the Warm Springs Ponds (Mayfield 2013), which would explain the low abundance of Oncorhynchus species in the upper portion of the river. However, extrapolation of survival estimates derived from telemetered fish, to those of the general population may be tenuous. Mayfield's survival estimates may have been negatively biased by the effects of the surgery procedure, the body burden of the tag itself, or both. Survival estimates were also based on a small sampling of the overall population. Nonetheless, given the extremely low abundance of Onchorynchus species, Mayfield's results strongly suggest that there is spatial variation in trout survival in the upper Clark Fork River.

The negative effects of metal concentrations in the upper Clark Fork River on trout physiology, growth, or survival have been described by numerous studies: Farag et al. (1995), Marr et al. (1995a), Marr et al. (1995b), Mount et al. (1994), Phillips and Spoon (1990), Woodward (1994),

Woodward et al. (1995a), and Woodward et al. (1995b). These studies have been important in identifying the pathways (dietary and water-borne) by which trout accumulate metals. However, little empirical research has been conducted to assess the effects of other water quality factors, for example nutrient enrichment, which is known to affect the upper Clark Fork River (TSIC-NTS 1998). Additionally, the river has been described as a "monoculture" of brown trout (Saffel et al. 2011), but little data is available to describe non-salmonid species abundance, biomass, or diversity. Silver Bow Creek, for example, was more severely metal contaminated and nutrient enriched than the Clark Fork River, and catostomids (i.e., suckers) currently dominate the fish biomass of that system (Naughton et al. 2011). Macroinvertebrate bioassays frequently use species diversity indices such as richness and evenness when assessing the effects of contaminants on streams. A similar approach may be beneficial to assess fishery conditions in the upper Clark Fork River, particularly to help understand the influence of nutrients, temperatures, and other factors not directly related to metal contamination.

The trout population abundance trends of the upper Clark Fork River are intriguing. Whereas, population abundance in Silver Bow Creek is generally increasing since remediation has occurred (Atkins 2012c), abundance in the upper Clark Fork River has declined steadily for nearly three decades. This same Clark Fork River reach where salmonid abundance has declined most sharply is currently in the process of Superfund remediation. Improvements in trout population abundance following remediation may not occur unless the underlying causes of the declines from 1987 to 2009 are understood and addressed.

6.11 Access to references

Many of the references cited in this report are available through the MFWP information archive, the Montana Fisheries Information System "mFish" (Available: http://fwp.mt.gov/fishing/mFish/newSearch.html) or through another freely available internet website. Where possible, we have made an effort to provide a direct internet link to each document cited in this chapter. Should those internet links change, or if access to a particular reference is restricted for any reason, all references cited in this chapter are available by contacting Atkins.

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APPENDIX A

SURFACE WATER AND INSTREAM SEDIMENT: QUALITY CONTROL/QUALITY ASSURANCE REVIEW AND SUMMARY

A.1 QA/QC Review

Specific quality assurance and quality control (QA/QC) requirements for field measurements, sample collection, laboratory analysis, and the reporting of resulting data are established by protocols contained in the quality assurance project plan (QAPP) within the MDEQ, NRDP, and USEPA approved sampling and analysis plan (SAP). The Quality Control Checklist (see below) is a component of MDEQ'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.

- Sediment samples for total metals analysis collected during Q3 were not kept on ice in the field; Energy Labs noted the following temperatures for sediment samples submitted on 9/14/2012: 12.2 ºC and 13.8 ºC.
- Method for total metals (arsenic, cadmium, copper, lead, zinc) does not specify a sediment sample should be kept chilled.

_+_ Proper collection containers.

_+_ All containers were intact with the exception of one. The poly bottle with the total nitrogen sample (collected 12/5/2012 from site CFR-27H) had a small hole. Some of the sample leaked at Energy Labs. Analysis was performed on a subsample from another unpreserved sample bottle from the same site.

_+_ Sample pH of acidified samples <2.

_+_ All field documentation completed. If incomplete areas cannot be completed, document the issue.

- Minor discrepancies in site IDs and sample times between sample labels and COC forms were noted at time of laboratory check-in. These discrepancies were resolved and documented in the Energy Labs work order receipt checklists for each quarterly data report.

_+_ Holding times met.

- All analysis holding times were met for all surface water and sediment samples.
- Most dissolved organic carbon samples from Q1-Q3 were submitted unfiltered and unpreserved to Energy Labs, Helena, MT. These samples were then sub-contracted for analysis to Energy Labs, Casper, WY. Due to the transfer of these samples, preparation time (48 hours for filtration) was exceeded by the times listed for the following sampling events and sample IDs:
  - Q1: samples H12040177-001F through -0013F (20-48 hours),

- Q2: samples H12060167-001F through -019F, (46-97 hours),
- Q3: samples H12090228-001F through -019F (70-125 hours).

All analyses were completed within the prescribed holding time (28 days). Therefore these samples were not flagged. In Q4, all DOC samples were field filtered to avoid exceedance of the preparation time.

_+_ Field duplicates were collected at the proper frequency (specified in SAP).

_+_ Field blanks were collected at the proper frequency (specified in SAP)

_+_ All sample IDs matched those provided in the SAP. Field duplicates were clearly marked on samples as noted in lab results.

_+_ Analyses were 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.

- In Q1, dissolved organic carbon concentration was 0.5 mg/L in blank #1, and 0.4 mg/L in blank #2) (reporting limit [RL] = 0.1 mg/L.) Blank #2 also had a total suspended solid concentration of 2 mg/L (RL = 1 mg/L), a total nitrogen concentration of 0.06 mg/L (RL = 0.05 mg/L), and a dissolved zinc concentration of 0.03 mg/L (RL = 0.01 mg/L).
- In Q2, dissolved organic carbon concentration in blank #1 was 0.6 mg/L and 0.4 mg/L in blank #2 (RL = 0.1 mg/L). Blank #1 also had total alkalinity and bicarbonate alkalinity of 5 and 6 mg/L, respectively (RL = 1mg/L), a total nitrogen concentration of 0.16 mg/L (RL = 0.05 mg/L), and a dissolved zinc concentration of 0.02 mg/L (RL = 0.01 mg/L).
- In Q3, both blanks #1 and #2 had dissolved organic carbon concentrations of 0.5 mg/L (RL = 0.1 mg/L). Blank #1 also had a dissolved zinc concentration of 0.02 mg/L (RL = 0.01 mg/L), and Blank #2 had a total suspended solid concentration of 2 mg/L (RL = 1 mg/L).
- In Q4, all field blank concentrations were below method detection limits.

_+_ If any blanks exceed the project-required detection limit, associated data is flagged. The MDEQ project manager will set the criteria to evaluate the suitability of associated data. Contact the MDEQ project manager to discuss blank results prior to flagging data.

- In Q1, all dissolved organic carbon concentrations <5 mg/L, all total suspended solid concentrations <20 mg/L, all total nitrogen concentrations <0.6 mg/L, and all dissolved zinc concentrations <0.3 mg/L will be B-flagged.
- In Q2, all dissolved organic carbon concentrations <6 mg/L, all total alkalinity concentrations <50 mg/L, all bicarbonate alkalinity concentrations <60 mg/L, all total nitrogen concentrations <1.6 mg/L, and all dissolved zinc concentrations <0.2 mg/L will be B-flagged.

- In Q3, all dissolved organic carbon concentrations <5 mg/L, all total suspended sediment concentrations <20 mg/L, and all dissolved zinc concentrations <0.2 mg/L will be B-flagged.
- No data in Q4 required B-flags.

__+__ Laboratory blanks, duplicates, matrix spikes, and lab control samples were analyzed at a 10% frequency.

__+__ Laboratory blanks, duplicates, matrix spikes, and lab control samples were within the required control limits defined within the SAP.

__+__ Project DQOs and DQIs were met (as described in SAP).

__+__ QC analysis results, description of issues, and corrective actions were addressed.

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, instream sediment and biological monitoring samples collected in 2012 from the CFROU during four quarterly monitoring events. Assessed under the MDEQ standard quality assurance/quality control protocols are data quality objectives (DQOs). DQOs include representativeness, comparability and completeness. MDEQ standard quality assurance/quality control protocols also specify data quality indicators (DQIs) including sensitivity, lab precision, overall precision, bias, and accuracy.

Overall, DQOs and DQIs were met at all surface water monitoring sites in the CFROU in 2012. Water samples were collected and analyzed for total suspended solid, nutrient, dissolved and total recoverable metal, and common ion concentrations at 15 monitoring sites during quarter of 2012. Among the sites monitored were six Clark Fork River mainstem sites, one Silver Bow Creek site, and eight tributary sites. DQOs and DQIs for instream sediment metals monitoring were achieved at the same 15 sites in Q3. Biological sampling for macroinvertebrates and periphyton was conducted as scheduled during Q3. All DQOs were achieved, with four replicate Hess macroinvertebrate samples (sample area = 0.1 m^2) and a composite periphyton sample collected from each of the 15 sites. DQIs for macroinvertebrate sample results are assessed in Appendix E.

A.3.1 Representativeness

All 15 surface water sampling sites in the CFROU met stated objectives for spatial representativeness (i.e. sites were established at bridge crossings and road access points specified in the CFROU SAP). Instream sediment and biological samples were collected as close as possible to the surface water sampling locations. Suitable biological sites generally were identified within 100 m of each surface water sampling location. At site CFR-116A, instream sediment, macroinvertebrate, and periphyton samples were collected at the Turah fishing access, approximately 0.25 miles upstream from the surface water site at the Turah highway bridge. At site CFR-84F, instream sediment, macroinvertebrate and periphyton samples were collected approximately 200 yards downstream from the surface water sampling location at the bridge near the mouth of Bear Creek. Monitoring sites on the eight tributary streams were established at access points, generally road crossings, near their mouths.

Surface water monitoring was conducted once during each quarter of 2012, as specified in the CFROU Monitoring Plan. Within the quarterly framework, water samples and field data were to be collected during specific hydrologic conditions: prior to spring snowmelt runoff (Q1), during the rising limb of the spring snowmelt runoff (Q2), during late summer (Q3), and during late fall (Q4). Instream sediment, macroinvertebrate, and periphyton samples were collected during low streamflow conditions during Q3 sampling (second week of September).

A.3.2 Comparability

Comparability is the applicability of the project data to the project decision rule. The project decision rule stated in the Long-Term Monitoring Plan are the acute and chronic aquatic life and drinking water criteria listed in the MDEQ Numeric Water Quality Standards (MDEQ 2012a) and the Threshold of Effect and Probably Effect Concentrations (MacDonald et al. 2000). Data acquired through the 2011 monitoring are applicable to the project decision rules. All methods conformed to the requirements of the MDEQ (MDEQ 2012) and to the Clark Fork River Standard Operating Procedures SS-3, G-6 and G-8 (ARCO 1992; MDEQ 2012b).

A.3.3 Completeness

Completeness refers to the amount of useable data actually collected compared to the amount prescribed in the SAP. Data completeness for the 2012 monitoring (all four quarters combined) was essentially 100% in all categories (Table A1), which exceeded the project goal for completeness of 85%.

Table A1. Completeness evaluation for monitoring data in the Clark Fork River Operable Unit, 2012.

Analysis / Completeness Category	TSS	Metals in combination (water)	Metals in combination (sediment)	Hardness (as CaCO3)	Common Ions (water)	Nutrients in combination (water)	Dissolved Organic Carbon (water)	Macro-invertebrate samples	Periphyton Samples	Field Measures in combination	Field Notes complete	Total #	Total %
Total # of Analytical Tests Requested in SAP	76	1026	255	76	228	304	76	60	15	420	60	2596	100
Total # of Analytical Tests Reported	76	1026	255	76	228	304	76	60	15	420	60	2596	100
Tests Not Performed	0	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	0	NA	NA	NA	NA	0	0**
Total # of Tests J Flagged (not counted against completeness)	72	38	17	0	0	72	0	NA	NA	NA	NA	199	8**
Total # of Tests B Flagged (not counted against completeness)	0	19	NA	0	6	19	55	NA	NA	NA	NA	99	4**
Total # of Tests with Useful Data	76	1026	255	76	228	304	76	60	15	420	60	2596	100**
Overall Completeness (%)	100	100	100	100	100	100	100	100	100	100	100	100	

* As percent of the total number of analytical tests requested in the SAP.
** As percent of the total number of 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 the 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% of field samples collected as specified in the SAP. Two deionized water field blanks were prepared during each quarterly monitoring event in 2012 (frequency = 13.3% of surface water samples collected). Results of analyses for all metals, common ions, and suspended sediment parameters in field blanks from the four quarterly monitoring events are presented in Tables A2-A5. Results were less than detection (ND) at the Reporting Limit (RL), with the following exceptions:

- During Q1 (Table A2), dissolved organic carbon was detected in both field blanks, and total suspended solids, total nitrogen, and dissolved zinc were detected in field blank #2. All associated sample results less than 10 times the respective blank concentrations will be qualified with B flags.
- During Q2 (Table A3), dissolved organic carbon was detected in both field blanks, and total and bicarbonate alkalinity, total nitrogen, and dissolved zinc were detected in field blank #1. All associated sample results less than 10 times the respective blank concentrations will be qualified with B flags.
- During Q3 (Table A4), dissolved organic carbon was detected in both field blanks, and all associated sample results less than 10 times the respective blank concentrations will be qualified with B flags.
- During Q4 (Table A5), all parameters were less than detection at the respective RL concentrations, and no results will require qualification.

Table A2. First quarter analyte concentrations in surface water field blanks, Clark Fork River Operable Unit monitoring, 2012.

	Sample Date:	H12040177-010 04/10/2012	H12040177-017 04/11/2012
Parameter	**RL[1] (mg/L)**	**Blank 1 Concentration (mg/L)**	**Blank 2 Concentration (mg/L)**
Total Suspended Solids	1	ND	2 (B)[3]
Total Alkalinity	4	ND	ND
Bicarbonate Alkalinity	4	ND	ND
Sulfate	1	ND	ND
Hardness	1	ND	ND
Organic Carbon, Dissolved	0.1	0.5 (B)[3]	0.4 (B)[3]
Ammonia Nitrogen	0.05	ND	ND
Nitrate plus Nitrite Nitrogen	0.05	ND	ND
Total Nitrogen	0.05	ND	0.06 (B)[3]
Total Phosphorus	0.005	ND	ND
Arsenic, Dissolved	0.005	ND	ND
Cadmium, Dissolved	0.00008	ND	ND
Copper, Dissolved	0.001	ND	ND
Lead, Dissolved	0.0005	ND	ND
Zinc, Dissolved	0.01	ND	0.03 (B)[3]
Mercury, Total	0.00001	ND	ND
Arsenic, Total Recoverable	0.005	ND	ND
Cadmium, Total Recoverable	0.00008	ND	ND
Calcium, Total Recoverable	1	ND	ND
Copper, Total Recoverable	0.001	ND	ND
Lead, Total Recoverable	0.0005	ND	ND
Magnesium, Total Recoverable	1	ND	ND
Zinc, Total Recoverable	0.01	ND	ND

1. RL = Reporting limit.
2. ND = Not detected at reporting limit.
3. (B) = Associated results <10 times (require B-flag).

Table A3. Second quarter analyte concentrations in surface water field blanks, Clark Fork River Operable Unit monitoring, 2012.

	Lab ID #:	H12060167-005	H12060167-017
	Sample Date:	06/05/2012	06/07/2012
Parameter	RL[1] (mg/L)	Blank 1 Concentration (mg/L)	Blank 2 Concentration (mg/L)
Total Suspended Solids	1	ND	ND
Total Alkalinity	4	5 (B)[3]	ND
Bicarbonate Alkalinity	4	6 (B)[3]	ND
Sulfate	1	ND	ND
Hardness	1	ND	ND
Organic Carbon, Dissolved	0.1	0.4 (B)[3]	0.6 (B)[3]
Ammonia Nitrogen	0.05	ND	ND
Nitrate plus Nitrite Nitrogen	0.05	ND	ND
Total Nitrogen	0.05	0.16 (B)[3]	ND
Total Phosphorus	0.005	ND	ND
Arsenic, Dissolved	0.005	ND	ND
Cadmium, Dissolved	0.00008	ND	ND
Copper, Dissolved	0.001	ND	ND
Lead, Dissolved	0.0005	ND	ND
Zinc, Dissolved	0.01	0.02 (B)[3]	ND
Mercury, Total	0.00001	ND	ND
Methylmercury	0.05 ng/L	0.02 ng/L	0.021 ng/L
Arsenic, Total Recoverable	0.005	ND	ND
Cadmium, Total Recoverable	0.00008	ND	ND
Calcium, Total Recoverable	1	ND	ND
Copper, Total Recoverable	0.001	ND	ND
Lead, Total Recoverable	0.0005	ND	ND
Magnesium, Total Recoverable	1	ND	ND
Zinc, Total Recoverable	0.01	ND	ND

1. RL = Reporting limit.
2. ND = Not detected at reporting limit.
3. (B) = Associated results <10 times (require B-flag).

Table A4. Third quarter analyte concentrations in surface water field blanks, Clark Fork River Operable Unit monitoring, 2012.

	Lab ID #:	H12090228-007	H12090228-019
	Sample Date:	09/11/2012	09/13/2012
Parameter	RL[1] (mg/L)	Blank 1 Concentration (mg/L)	Blank 2 Concentration (mg/L)
Total Suspended Solids	1	ND	2
Total Alkalinity	4	ND	ND
Bicarbonate Alkalinity	4	ND	ND
Sulfate	1	ND	ND
Hardness	1	ND	ND
Organic Carbon, Dissolved	0.1	0.5 (B)[3]	0.5 (B)[3]
Ammonia Nitrogen	0.05	ND	ND
Nitrate plus Nitrite Nitrogen	0.05	ND	ND
Total Nitrogen	0.05	ND	ND
Total Phosphorus	0.005	ND	ND
Arsenic, Dissolved	0.005	ND	ND
Cadmium, Dissolved	0.00008	ND	ND
Copper, Dissolved	0.001	ND	ND
Lead, Dissolved	0.0005	ND	ND
Zinc, Dissolved	0.01	0.02	ND
Mercury, Total	0.00001	ND	ND
Methylmercury	0.05 ng/L	0.02 ng/L	0.02 ng/L
Arsenic, Total Recoverable	0.005	ND	ND
Cadmium, Total	0.00008	ND	ND
Calcium, Total Recoverable	1	ND	ND
Copper, Total Recoverable	0.001	ND	ND
Lead, Total Recoverable	0.0005	ND	ND
Magnesium, Total	1	ND	ND
Zinc, Total Recoverable	0.01	ND	ND

1. RL = Reporting limit.
2. ND = Not detected at reporting limit.
3. (B) = Associated results <10 times (require B-flag).

Table A5. Fourth quarter analyte concentrations in surface water field blanks, Clark Fork River Operable Unit monitoring, 2012.

	Lab ID #:	H12120119-007	H12120119-017
	Sample Date:	12/04/2012	12/06/2012
Parameter	RL[1] (mg/L)	Blank 1 Concentration (mg/L)	Blank 2 Concentration (mg/L)
Total Suspended Solids	1	ND	ND
Total Alkalinity	4	ND	ND
Bicarbonate Alkalinity	4	ND	ND
Sulfate	1	ND	ND
Hardness	1	ND	ND
Organic Carbon, Dissolved	0.1	ND	ND
Ammonia Nitrogen	0.05	ND	ND
Nitrate plus Nitrite Nitrogen	0.05	ND	ND
Total Nitrogen	0.05	ND	ND
Total Phosphorus	0.005	ND	ND
Arsenic, Dissolved	0.005	ND	ND
Cadmium, Dissolved	0.00008	ND	ND
Copper, Dissolved	0.001	ND	ND
Lead, Dissolved	0.0005	ND	ND
Zinc, Dissolved	0.01	ND	ND
Mercury, Total	0.00001	ND	ND
Methylmercury	0.005	ND	ND
Arsenic, Total Recoverable	0.00008	ND	ND
Cadmium, Total Recoverable	1	ND	ND
Calcium, Total Recoverable	0.001	ND	ND
Copper, Total Recoverable	0.0005	ND	ND
Lead, Total Recoverable	1	ND	ND
Magnesium, Total	0.01	ND	ND

1. RL = Reporting limit.
2. ND = Not detected at reporting limit.
3. (B) = Associated results <10 times (require B-flag).

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 MDEQ criteria allow a maximum of 20% RPD for water sample results >5 times the RL, and 35% 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 RPD of co-located field duplicate surface water and instream sediment samples, collected at a frequency of 13.3% of the total number of collected field samples. Established MDEQ criteria allow a maximum of 25% RPD for water sample results >5 times the RL and 40% RPD for instream sediment samples >5 times the RL. Two sets of co-located surface water field duplicate samples were collected during each of the four quarterly monitoring events in 2012; results are presented for Tables A6-A13. Duplicate surface water sample results >5 times the RL with RPD values >25% included:

- Total nitrogen (duplicate #1) and total suspended solids (duplicate #2) during Q1 (Tables A6 and A7); results for these parameters in associated samples will be J-flagged.
- Total suspended solids (duplicate #2) during Q2 (Table A9); results for total suspended solids will be J-flagged.
- Total suspended solids, total nitrogen, total phosphorus, and total recoverable copper (duplicate #1) and total recoverable lead (duplicates #1 and #2) during Q3 (Tables A10 and A11); results for these parameters in associated samples will be J-flagged.
- Total phosphorus (duplicate #1) and total suspended solids (duplicate #2) during Q4; results for these parameters in associated samples will be J-flagged in the database.

Two sets of co-located field duplicate samples of instream sediment were collected during the Q3 monitoring only (Tables A14 and A15). Duplicate instream sediment sample results >5 times the RL which also had RPD values >40% included only total zinc in the 1-2 mm size fraction in duplicate #2 (Table A15). Results for total zinc in the 1-2 mm size fraction in associated samples will be J-flagged.

Quality control procedures for macroinvertebrate sample processing involved checking sorting efficiency. These checks were conducted on 100% of the samples by independent observers who microscopically re-examined at least 20% 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 (%), n_1 = number of specimens in the first sort, n_2 = number of specimens expected in the second sort based on the results of the re-sorted 20%.

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 and Curtis 1957). QA/QC results for sample processing and taxonomic determinations are reported in Appendix E.

Table A6. Metal concentrations in the surface water sample and duplicate at monitoring station CFR-27H in the first quarter, Clark Fork River Operable Unit monitoring, 2012.

	Station ID:	CFR-27H	CFR-27H Dup		
	Lab ID #:	H12040177-009	H12040177-008		
	Sample Date:	04/10/2012	04/10/2012		
Parameter	RL (mg/L)	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD	Flags
Total Suspended Solids	1	22	24	8.7	
Total Alkalinity	4	150	150	0.0	
Bicarbonate Alkalinity	4	180	180	0.0	
Sulfate	1	83	83	0.0	
Hardness	1	210	206	1.9	
Organic Carbon, Dissolved	0.1	2.9	2.9	0.0	
Ammonia Nitrogen	0.05	ND	ND	0.0	
Nitrate plus Nitrite Nitrogen	0.05	0.21	0.21	0.0	
Total Nitrogen	0.05	0.44	1.71	118.1	J
Total Phosphorus	0.005	0.031	0.033	6.3	
Arsenic, Dissolved	0.005	0.01	0.01	0.0	
Cadmium, Dissolved	0.00008	ND	ND	0.0	
Copper, Dissolved	0.001	0.007	0.006	15.4	
Lead, Dissolved	0.0005	ND	ND	0.0	
Zinc, Dissolved	0.01	0.02	0.01	66.7	
Mercury, Total	0.00001	0.00001	0.00003	100.0	
Arsenic, Total Recoverable	0.005	0.015	0.015	0.0	
Cadmium, Total Recoverable	0.00008	0.00023	0.00021	9.1	
Calcium, Total Recoverable	1	62	61	1.6	
Copper, Total Recoverable	0.001	0.041	0.036	13.0	
Lead, Total Recoverable	0.0005	0.005	0.0047	6.2	
Magnesium, TR	1	13	13	0.0	
Zinc, Total Recoverable	0.01	0.04	0.03	28.6	

Table A7. Metal concentrations in the surface water sample and duplicate at monitoring station MCWC-MWB in the first quarter, Clark Fork River Operable Unit monitoring, 2012.

	Station ID:	MCWC-MWB	MCWC-MWB Dup		
	Lab ID #:	H12040177-018	H12040177-019		
	Sample Date:	04/11/2012	04/11/2012		
Parameter	RL (mg/L)	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD	Flags
Total Suspended Solids	1	4	10	85.7	J
Total Alkalinity	4	89	89	0.0	
Bicarbonate Alkalinity	4	110	110	0.0	
Sulfate	1	25	26	3.9	
Hardness	1	97	95	2.1	
Organic Carbon, Dissolved	0.1	3	3	0.0	
Ammonia Nitrogen	0.05	ND	ND	0.0	
Nitrate plus Nitrite Nitrogen	0.05	ND	ND	0.0	
Total Nitrogen	0.05	0.07	0.08	13.3	
Total Phosphorus	0.005	0.024	0.023	4.3	
Arsenic, Dissolved	0.005	0.016	0.017	6.1	
Cadmium, Dissolved	0.00008	ND	ND	0.0	
Copper, Dissolved	0.001	0.003	0.003	0.0	
Lead, Dissolved	0.0005	ND	ND	0.0	
Zinc, Dissolved	0.01	ND	0.02	66.7	
Mercury, Total	0.00001	0.00001	0.00001	0.0	
Arsenic, Total Recoverable	0.005	0.02	0.019	5.1	
Cadmium, Total	0.00008	0.0001	0.00009	10.5	
Calcium, Total Recoverable	1	28	27	3.6	
Copper, Total Recoverable	0.001	0.008	0.007	13.3	
Lead, Total Recoverable	0.0005	0.0017	0.0014	19.4	
Magnesium, TR	1	7	7	0.0	
Zinc, Total Recoverable	0.01	0.01	0.01	0.0	

Table A8. Metal concentrations in the surface water sample and duplicate at monitoring station FC-CFR in the second quarter, Clark Fork River Operable Unit monitoring, 2012.

	Station ID:	FC-CFR	FC-CFR Dup		
	Lab ID #:	H12060167-006	H12060167-007		
	Sample Date:	06/05/2012	06/05/2012		
Parameter	RL (mg/L)	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD	Flags
Total Suspended Solids	1	146	174	17.5	
Total Alkalinity	4	99	99	0.0	
Bicarbonate Alkalinity	4	120	120	0.0	
Sulfate	1	6	6	0.0	
Hardness	1	97	96	1.0	
Organic Carbon, Dissolved	0.1	4.8	4.8	0.0	
Ammonia Nitrogen	0.05	ND	ND	0.0	
Nitrate plus Nitrite Nitrogen	0.05	ND	ND	0.0	
Total Nitrogen	0.05	0.34	0.29	15.9	
Total Phosphorus	0.005	0.114	0.121	6.0	
Arsenic, Dissolved	0.005	0.009	0.009	0.0	
Cadmium, Dissolved	0.00008	ND	ND	0.0	
Copper, Dissolved	0.001	0.002	0.002	0.0	
Lead, Dissolved	0.0005	ND	ND	0.0	
Zinc, Dissolved	0.01	0.02	0.02	0.0	
Mercury, Total	0.00001	0.0015	0.0015	0.0	
Methylmercury	0.05 ng/L	4.56 ng/L	4.74 ng/L	3.9	
Arsenic, Total Recoverable	0.005	0.044	0.042	4.7	
Cadmium, Total Recoverable	0.00008	0.00039	0.00039	0.0	
Calcium, Total Recoverable	1	27	26	3.8	
Copper, Total Recoverable	0.001	0.016	0.015	6.5	
Lead, Total Recoverable	0.0005	0.0416	0.0405	2.7	
Magnesium, Total Recoverable	1	7	7	0.0	
Zinc, Total Recoverable	0.01	0.12	0.12	0.0	

Table A9. Metal concentrations in the surface water sample and duplicate at monitoring station MCWC-MWB in the second quarter, Clark Fork River Operable Unit monitoring, 2012.

	Station ID:	MCWC-MWB	MCWC-MWB Dup		
	Lab ID #:	H12060167-018	H12060167-019		
	Sample Date:	06/07/2012	06/07/2012		
Parameter	RL (mg/L)	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD	Flags
Total Suspended Solids	1	20	10	66.7	J
Total Alkalinity	4	62	61	1.6	
Bicarbonate Alkalinity	4	75	75	0.0	
Sulfate	1	7	7	0.0	
Hardness	1	50	49	2.0	
Organic Carbon, Dissolved	0.1	3.5	3.6	2.8	
Ammonia Nitrogen	0.05	ND	ND	0.0	
Nitrate plus Nitrite Nitrogen	0.05	ND	ND	0.0	
Total Nitrogen	0.05	0.2	0.17	16.2	
Total Phosphorus	0.005	0.029	0.027	7.1	
Arsenic, Dissolved	0.005	0.023	0.022	4.4	
Cadmium, Dissolved	0.00008	ND	ND	0.0	
Copper, Dissolved	0.001	0.004	0.004	0.0	
Lead, Dissolved	0.0005	ND	ND	0.0	
Zinc, Dissolved	0.01	0.02	0.02	0.0	
Mercury, Total	0.00001	ND	ND	0.0	
Methylmercury	0.05 ng/L	0.095 ng/L	0.094 ng/L	1.1	
Arsenic, Total Recoverable	0.005	0.027	0.026	3.8	
Cadmium, Total Recoverable	0.00008	0.0001	0.0001	0.0	
Calcium, Total Recoverable	1	15	14	6.9	
Copper, Total Recoverable	0.001	0.009	0.009	0.0	
Lead, Total Recoverable	0.0005	0.0019	0.0018	5.4	
Magnesium, Total Recoverable	1	3	3	0.0	
Zinc, Total Recoverable	0.01	0.01	ND	0.0	

Table A10. Metal concentrations in the surface water sample and duplicate at monitoring station CFR-53C in the third quarter, Clark Fork River Operable Unit monitoring, 2012.

Station ID:		CFR-53C	CFR-53C Dup		
Lab ID #:		H12090228-006	H12090228-005		
Sample Date:		09/11/2012	09/11/2012		
Parameter	RL (mg/L)	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD	Flags
Total Suspended Solids	1	24	12	66.7	J
Total Alkalinity	4	140	160	13.3	
Bicarbonate Alkalinity	4	170	170	0.0	
Sulfate	1	52	58	10.9	
Hardness	1	168	192	13.3	
Organic Carbon, Dissolved	0.1	3.1	2.7	13.8	
Ammonia Nitrogen	0.05	ND	ND	0.0	
Nitrate plus Nitrite Nitrogen	0.05	0.09	ND	0.0	
Total Nitrogen	0.05	0.37	0.18	69.1	J
Total Phosphorus	0.005	0.04	0.024	50.0	J
Arsenic, Dissolved	0.005	0.007	0.01	35.3	
Cadmium, Dissolved	0.00008	ND	ND	0.0	
Copper, Dissolved	0.001	0.005	0.005	0.0	
Lead, Dissolved	0.0005	ND	ND	0.0	
Zinc, Dissolved	0.01	0.02	ND	0.0	
Mercury, Total	0.00001	0.00001	ND	0.0	
Methylmercury	0.05 ng/L	0.151	0.157	3.9	
Arsenic, Total Recoverable	0.005	0.01	0.01	0.0	
Cadmium, Total Recoverable	0.00008	0.00017	ND	0.0	
Calcium, Total Recoverable	1	50	56	11.3	
Copper, Total Recoverable	0.001	0.028	0.009	102.7	J
Lead, Total Recoverable	0.0005	0.0038	0.0006	145.5	J
Magnesium, Total Recoverable	1	11	13	16.7	
Zinc, Total Recoverable	0.01	0.03	ND	0.0	

Table A11. Metal concentrations in the surface water sample and duplicate at monitoring station MCWC-MWB in the third quarter, Clark Fork River Operable Unit monitoring, 2012.

Station ID:		MCWC-MWB	MCWC-MWB Dup		
Lab ID #:		H12090228-017	H12090228-018		
Sample Date:		09/13/2012	09/13/2012		
Parameter	**RL (mg/L)**	**Sample Result (mg/L)**	**Duplicate Result (mg/L)**	**RPD**	**Flags**
Total Suspended Solids	1	4	2	66.7	
Total Alkalinity	4	120	120	0.0	
Bicarbonate Alkalinity	4	130	130	0.0	
Sulfate	1	27	27	0.0	
Hardness	1	127	128	0.8	
Organic Carbon, Dissolved	0.1	2	1.8	10.5	
Ammonia Nitrogen	0.05	ND	ND	0.0	
Nitrate plus Nitrite Nitrogen	0.05	ND	ND	0.0	
Total Nitrogen	0.05	0.11	0.11	0.0	
Total Phosphorus	0.005	0.013	0.015	14.3	
Arsenic, Dissolved	0.005	0.012	0.012	0.0	
Cadmium, Dissolved	0.00008	ND	ND	0.0	
Copper, Dissolved	0.001	0.002	0.002	0.0	
Lead, Dissolved	0.0005	ND	ND	0.0	
Zinc, Dissolved	0.01	ND	ND	0.0	
Mercury, Total	0.00001	ND	ND	0.0	
Arsenic, Total Recoverable	0.005	0.111	0.123	10.3	
Cadmium, Total Recoverable	0.00008	0.013	0.013	0.0	
Calcium, Total Recoverable	1	ND	ND	0.0	
Copper, Total Recoverable	0.001	36	36	0.0	
Lead, Total Recoverable	0.0005	0.007	0.005	33.3	J
Magnesium, Total Recoverable	1	0.001	0.0011	9.5	
Zinc, Total Recoverable	0.01	9	9	0.0	

Table A12. Metal concentrations in the surface water sample and duplicate at monitoring station CFR-53C in the fourth quarter, Clark Fork River Operable Unit monitoring, 2012.

Station ID:		CFR-53C	CFR-53C Dup		
Lab ID #:		H12120119-005	H12120119-006		
Sample Date:		12/04/2012	12/04/2012		
Parameter	RL (mg/L)	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD	Flags
Total Suspended Solids	1	14	14	0.0	
Total Alkalinity	4	160	160	0.0	
Bicarbonate Alkalinity	4	180	180	0.0	
Sulfate	1	61	61	0.0	
Hardness	1	201	201	0.0	
Organic Carbon, Dissolved	0.1	1.9	1.9	0.0	
Ammonia Nitrogen	0.05	ND	ND	0.0	
Nitrate plus Nitrite Nitrogen	0.05	0.1	0.11	9.5	
Total Nitrogen	0.05	0.28	0.33	16.4	
Total Phosphorus	0.005	0.026	0.039	40.0	J
Arsenic, Dissolved	0.005	0.009	0.008	11.8	
Cadmium, Dissolved	0.00008	ND	ND	0.0	
Copper, Dissolved	0.001	0.004	0.004	0.0	
Lead, Dissolved	0.0005	ND	ND	0.0	
Zinc, Dissolved	0.01	ND	ND	0.0	
Mercury, Total	0.00001	ND	ND	0.0	
Arsenic, Total Recoverable	0.005	0.01	0.01	0.0	
Cadmium, Total Recoverable	0.00008	0.00012	0.0001	18.2	
Calcium, Total Recoverable	1	59	59	0.0	
Copper, Total Recoverable	0.001	0.018	0.018	0.0	
Lead, Total Recoverable	0.0005	0.0021	0.0021	0.0	
Magnesium, Total	1	13	13	0.0	
Zinc, Total Recoverable	0.01	0.02	0.02	0.0	

Table A13. Metal concentrations in the surface water sample and duplicate at monitoring station MCWC-MWB in the fourth quarter, Clark Fork River Operable Unit monitoring, 2012.

Station ID:		MCWC-MWB	MCWC-MWB Dup		
Lab ID #:		H12120119-018	H12120119-019		
Sample Date:		12/06/2012	12/06/2012		
Parameter	**RL (mg/L)**	**Sample Result (mg/L)**	**Duplicate Result (mg/L)**	**RPD**	**Flags**
Total Suspended Solids	1	18	14	25.0	J
Total Alkalinity	4	93	92	1.1	
Bicarbonate Alkalinity	4	110	110	0.0	
Sulfate	1	24	24	0.0	
Hardness	1	102	102	0.0	
Organic Carbon, Dissolved	0.1	2.2	2.3	4.4	
Ammonia Nitrogen	0.05	ND	ND	0.0	
Nitrate plus Nitrite Nitrogen	0.05	0.06	0.06	0.0	
Total Nitrogen	0.05	0.2	0.21	4.9	
Total Phosphorus	0.005	0.03	0.033	9.5	
Arsenic, Dissolved	0.005	0.014	0.014	0.0	
Cadmium, Dissolved	0.00008	ND	ND	0.0	
Copper, Dissolved	0.001	0.003	0.003	0.0	
Lead, Dissolved	0.0005	ND	ND	0.0	
Zinc, Dissolved	0.01	0.02	0.02	0.0	
Mercury, Total	0.00001	ND	ND	0.0	
Arsenic, Total Recoverable	0.005	0.019	0.019	0.0	
Cadmium, Total Recoverable	0.00008	0.00024	0.00023	4.3	
Calcium, Total Recoverable	1	29	29	0.0	
Copper, Total Recoverable	0.001	0.023	0.019	19.0	
Lead, Total Recoverable	0.0005	0.0067	0.0055	19.7	
Magnesium, Total	1	7	7	0.0	
Zinc, Total Recoverable	0.01	0.04	0.03	28.6	

Table A14. Metal concentrations in the sediment metal sample and duplicate at monitoring station CFR-27H in the third quarter, Clark Fork River Operable Unit monitoring, 2012.

Sediment Parameter (size fraction<0.065mm)	Lab ID #:	H12090228-041	H12090228-044	RPD	Flags
	RL (mg/kg)	Sample Result (mg/kg)	Duplicate Result (mg/kg)		
Arsenic, Total	5	32	37	14.5	
Cadmium, Total	0.2	2	2.5	22.2	
Copper, Total	5	437	472	7.7	
Lead, Total	10	82	91	10.4	
Zinc, Total	5	373	412	9.9	
Sediment Parameter (size fraction 0.065-1mm)	**Lab ID #:**	**H12090228-042**	**H12090228-045**	**RPD**	**Flags**
	RL (mg/kg)	**Sample Result (mg/kg)**	**Duplicate Result (mg/kg)**		
Arsenic, Total	5	19	19	0.0	
Cadmium, Total	0.2	0.6	0.6	0.0	
Copper, Total	5	132	142	7.3	
Lead, Total	10	35	35	0.0	
Zinc, Total	5	210	196	6.9	
Sediment Parameter (size fraction 1-2mm)	**Lab ID #:**	**H12090228-043**	**H12090228-046**	**RPD**	**Flags**
	RL (mg/kg)	**Sample Result (mg/kg)**	**Duplicate Result (mg/kg)**		
Arsenic, Total	5	8	10	22.2	
Cadmium, Total	0.2	0.3	0.5	0.0	
Copper, Total	5	87	116	28.6	
Lead, Total	10	26	21	21.3	
Zinc, Total	5	68	110	47.2	J

Table A15. Metal concentrations in the sediment metal sample and duplicate at monitoring station MCWC-MWB in the third quarter, Clark Fork River Operable Unit monitoring, 2012.

Parameter (size fraction<0.065mm)	Lab ID #:	H12090228-065	H12090228-068	RPD	Flags
	RL (mg/kg)	Sample Result (mg/kg)	Duplicate Result (mg/kg)		
Arsenic, Total	5	48	51	6.1	
Cadmium, Total	0.2	2.1	2.3	9.1	
Copper, Total	5	193	195	1.0	
Lead, Total	10	141	159	12.0	
Zinc, Total	5	255	248	2.8	
Sediment Parameter (size fraction 0.065-1mm)	**Lab ID #:**	**H12090228-066**	**H12090228-069**	**RPD**	**Flags**
	RL (mg/kg)	**Sample Result (mg/kg)**	**Duplicate Result (mg/kg)**		
Arsenic, Total	5	11	11	0.0	
Cadmium, Total	0.2	ND	0.2	0.0	
Copper, Total	5	18	19	5.4	
Lead, Total	10	10	12	18.2	
Zinc, Total	5	41	45	9.3	
Sediment Parameter (size fraction 1-2mm)	**Lab ID #:**	**H12090228-067**	**H12090228-070**	**RPD**	**Flags**
	RL (mg/kg)	**Sample Result (mg/kg)**	**Duplicate Result (mg/kg)**		
Arsenic, Total	5	9	7	25.0	
Cadmium, Total	0.2	ND	ND	0.0	
Copper, Total	5	6	6	0.0	
Lead, Total	10	8	9	11.8	
Zinc, Total	5	19	20	5.1	

A.3.7 Bias and Accuracy

Bias is directional error from the true value of a measurement. For field measurements (water temperature, pH, specific conductance, dissolved oxygen [DO] concentration, DO saturation, and turbidity), potential bias was minimized by frequent calibration of field instruments. Calibration activities were documented in calibration logs. For water chemistry and sediment results, potential bias was minimized by adherence to approved field procedures for sample collection and handling, and by cleaning 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. None of the analytical method controls or analytical batch controls had values outside of the acceptable recovery range, as detailed in the Energy Labs reports in Appendix B.

A.4 References

ARCO (Atlantic Richfield Company). 1992. Clark Fork River Superfund Site Investigations Standard Operating Field Procedures (SOPs). Anaconda, Montana.

Bray, J.R., and J.T. Curtis. 1957. An ordination of upland forest communities of southern Wisconsin. Ecological Monographs 27:325-349.

MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. Archives of Environmental Contamination and Toxicology 39:20-31.

MDEQ (Montana Department of Environmental Quality). 2012a. Field procedures manual for water quality assessment monitoring, Version 3.0. Helena, Montana. Available: http://deq.mt.gov/wqinfo/qaprogram/PDF/SOPs/WQPBWQM-020.pdf. (November 2013).

MDEQ (Montana Department of Environmental Quality). 2012b. Circular DEQ-7, Montana numeric water quality standards. Helena, Montana. Available: http://deq.mt.gov/wqinfo/circulars.mcpx. (November 2013).

APPENDIX B

SURFACE WATER AND INSTREAM SEDIMENT: ANALYTICAL LABORATORY RESULTS

APPENDIX B1

SURFACE WATER AND INSTREAM SEDIMENT: ANALYTICAL LABORATORY RESULTS, FIRST QUARTER

ANALYTICAL SUMMARY REPORT

April 24, 2012

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

Workorder No.: H12040177 Quote ID: H624 - CFR Monitoring-474374

Project Name: CFR OU Monitoring

Energy Laboratories Inc Helena MT received the following 19 samples for MT DEQ-Federal Superfund on 4/11/2012 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H12040177-001	CFR-116A	04/09/12 9:45	04/11/12	Aqueous	Metals by ICP/ICPMS, Dissolved Metals by ICP/ICPMS, Tot. Rec. Alkalinity Carbon, Dissolved Organic Conductivity Mercury, Total Hardness as CaCO3 Anions by Ion Chromatography Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite Nitrogen, Total Persulfate Metals Digestion by EPA 200.2 Digestion, Mercury by CVAA Digestion, Total P Water Nitrogen, Total Persulfate Preparation for TSS Phosphorus, Total Solids, Total Suspended
H12040177-002	RC-CFR	04/09/12 12:00	04/11/12	Aqueous	Same As Above
H12040177-003	CFR-84F	04/09/12 13:30	04/11/12	Aqueous	Same As Above
H12040177-004	FC-CFR	04/09/12 15:15	04/11/12	Aqueous	Same As Above
H12040177-005	CFR-53C	04/09/12 17:15	04/11/12	Aqueous	Same As Above
H12040177-006	CFR-42G	04/10/12 8:30	04/11/12	Aqueous	Same As Above
H12040177-007	LBR-CFR	04/10/12 9:45	04/11/12	Aqueous	Same As Above
H12040177-008	CFR-27 H	04/10/12 11:00	04/11/12	Aqueous	Same As Above
H12040177-009	CFR-27 H Dupe	04/10/12 11:30	04/11/12	Aqueous	Same As Above
H12040177-010	Field Blank 1	04/10/12 12:00	04/11/12	Aqueous	Same As Above
H12040177-011	RTC-1	04/10/12 12:30	04/11/12	Aqueous	Same As Above
H12040177-012	LC-7	04/10/12 14:00	04/11/12	Aqueous	Same As Above
H12040177-013	CFR-03A	04/10/12 14:45	04/11/12	Aqueous	Same As Above
H12040177-014	WSC-SBC	04/11/12 9:15	04/11/12	Aqueous	Same As Above
H12040177-015	SS-25	04/11/12 10:30	04/11/12	Aqueous	Same As Above
H12040177-016	MWB-SBC	04/11/12 11:15	04/11/12	Aqueous	Same As Above
H12040177-017	Field Blank 2	04/11/12 12:00	04/11/12	Aqueous	Same As Above
H12040177-018	MCWC-MWB	04/11/12 12:15	04/11/12	Aqueous	Same As Above

ANALYTICAL SUMMARY REPORT

H12040177-019	MCWC-MWB Dupe	04/11/12 12:45 04/11/12	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.

Report Approved By:

CLIENT: MT DEQ-Federal Superfund
Project: CFR OU Monitoring
Sample Delivery Group: H12040177

Report Date: 04/26/12

CASE NARRATIVE

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002 and WY00937.

Comments imported for SUBBED Workorder: C12040731
Prep Comments for Sample H12040177-001F, Test PRP-FILT-W: The prep hold time was exceeded by 2.00 days.
Prep Comments for Sample H12040177-002F, Test PRP-FILT-W: The prep hold time was exceeded by 1.91 days.
Prep Comments for Sample H12040177-003F, Test PRP-FILT-W: The prep hold time was exceeded by 1.85 days.
Prep Comments for Sample H12040177-004F, Test PRP-FILT-W: The prep hold time was exceeded by 1.78 days.
Prep Comments for Sample H12040177-005F, Test PRP-FILT-W: The prep hold time was exceeded by 1.69 days.
Prep Comments for Sample H12040177-006F, Test PRP-FILT-W: The prep hold time was exceeded by 1.06 days.
Prep Comments for Sample H12040177-007F, Test PRP-FILT-W: The prep hold time was exceeded by 1.00 days.
Prep Comments for Sample H12040177-008F, Test PRP-FILT-W: The prep hold time was exceeded by 0.952 days.
Prep Comments for Sample H12040177-009F, Test PRP-FILT-W: The prep hold time was exceeded by 0.932 days.
Prep Comments for Sample H12040177-010F, Test PRP-FILT-W: The prep hold time was exceeded by 0.911 days.
Prep Comments for Sample H12040177-011F, Test PRP-FILT-W: The prep hold time was exceeded by 0.890 days.
Prep Comments for Sample H12040177-012F, Test PRP-FILT-W: The prep hold time was exceeded by 0.827 days.
Prep Comments for Sample H12040177-013F, Test PRP-FILT-W: The prep hold time was exceeded by 0.796 days.

The PRP-FILT-W prep was for filtering for the Dissolved Organic Carbon analysis.

End of comments imported for SUBBED Workorder: C12040731

Zinc was detected at higher concentrations for sample H12040177-011, 014 and 016. The Zinc detections were confirmed by duplicate analysis for both dissolved and total recoverable metals. Abb 4/24/12

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID CFR-116A
Lab ID: H12040177-001
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/09/12 09:45
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	22	mg/L		1		A2540 D	04/12/12 15:08 / cmm	04/12/12 14:17	J-124 (14410200)_120412A	4	16258
INORGANICS											
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	04/13/12 14:28 / cmm		MAN-TECH_120416A	10	R79266
Bicarbonate as HCO3	140	mg/L		4		A2320 B	04/13/12 14:28 / cmm		MAN-TECH_120416A	10	R79266
Sulfate	37	mg/L		1		E300.0	04/17/12 16:04 / cmm		IC102-H_120417A	36	R79316
Hardness as CaCO3	138	mg/L		1		A2340 B	04/17/12 14:49 / sld		WATERCALC_120417B	1	R79300
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	2.7	mg/L		0.1		A5310 C	04/13/12 19:11 / eli-c	04/13/12 09:51	SUB-C158451	17	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:17 / jaw		FIA203-HE_120412D	27	R79198
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L		0.05		E353.2	04/12/12 14:17 / jaw		FIA203-HE_120412B	28	R79196
Nitrogen, Total	0.25	mg/L		0.05		A4500 N-C	04/23/12 12:35 / reh	04/12/12 10:48	NUTRIENTS_120423A	7	16252
Phosphorus, Total as P	0.031	mg/L		0.005		E365.1	04/16/12 15:18 / jaw	04/16/12 09:55	FIA202-HE_120416B	28	16278
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	04/16/12 17:48 / sld		ICPMS204-B_120416A	40	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 17:48 / sld		ICPMS204-B_120416A	40	R79294
Copper	0.004	mg/L		0.001		E200.8	04/16/12 17:48 / sld		ICPMS204-B_120416A	40	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 17:48 / sld		ICPMS204-B_120416A	40	R79294
Zinc	0.01	mg/L		0.01		E200.8	04/16/12 17:48 / sld		ICPMS204-B_120416A	40	R79294
METALS, TOTAL											
Mercury	0.00004	mg/L		0.00001		E245.1	04/16/12 14:52 / sbk	04/16/12 08:39	HGCV201-H_120416A	7	16271
METALS, TOTAL RECOVERABLE											
Arsenic	0.007	mg/L		0.005		E200.8	04/16/12 18:43 / sld	04/12/12 12:59	ICPMS204-B_120416A	52	16256
Cadmium	0.00012	mg/L		0.00008		E200.8	04/16/12 18:43 / sld	04/12/12 12:59	ICPMS204-B_120416A	52	16256
Calcium	39	mg/L		1		E200.7	04/16/12 19:15 / sld	04/12/12 12:59	ICP2-HE_120416C	92	16256

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
Lab ID: H12040177-001
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/09/12 09:45
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.017	mg/L		0.001		E200.8	04/16/12 18:43 / sld	04/12/12 12:59	ICPMS204-B_120416A	52	16256
Lead	0.0027	mg/L		0.0005		E200.8	04/16/12 18:43 / sld	04/12/12 12:59	ICPMS204-B_120416A	52	16256
Magnesium	10	mg/L		1		E200.7	04/16/12 19:15 / sld	04/12/12 12:59	ICP2-HE_120416C	92	16256
Zinc	0.03	mg/L		0.01		E200.8	04/16/12 18:43 / sld	04/12/12 12:59	ICPMS204-B_120416A	52	16256

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 RC-CFR
Lab ID: H12040177-002
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/09/12 12:00
DateReceived: 04/11/12
Report Date: 04/24/12

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	04/12/12 15:09 / cmm	04/12/12 14:17	J-124 (14410200)_120412A	5	16258
INORGANICS											
Alkalinity, Total as CaCO3	52	mg/L		4		A2320 B	04/13/12 14:34 / cmm		MAN-TECH_120416A	11	R79266
Bicarbonate as HCO3	63	mg/L		4		A2320 B	04/13/12 14:34 / cmm		MAN-TECH_120416A	11	R79266
Sulfate	4	mg/L		1		E300.0	04/17/12 16:18 / cmm		IC102-H_120417A	37	R79316
Hardness as CaCO3	48	mg/L		1		A2340 B	04/16/12 19:34 / abb		CALC_120418B	69	R79325
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	3.4	mg/L		0.1		A5310 C	04/13/12 19:21 / eli-c	04/13/12 09:51	SUB-C158451	18	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:20 / jaw		FIA203-HE_120412D	29	R79198
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	04/12/12 14:21 / jaw		FIA203-HE_120412B	31	R79196
Nitrogen, Total	0.07	mg/L		0.05		A4500 N-C	04/23/12 12:37 / reh	04/12/12 10:48	NUTRIENTS_120423A	8	16252
Phosphorus, Total as P	0.012	mg/L		0.005		E365.1	04/16/12 15:19 / jaw	04/16/12 09:55	FIA202-HE_120416B	29	16278
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	04/16/12 19:20 / sld		ICPMS204-B_120416A	60	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 19:20 / sld		ICPMS204-B_120416A	60	R79294
Copper	ND	mg/L		0.001		E200.8	04/16/12 19:20 / sld		ICPMS204-B_120416A	60	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 19:20 / sld		ICPMS204-B_120416A	60	R79294
Zinc	0.02	mg/L		0.01		E200.8	04/18/12 12:32 / sld		ICPMS204-B_120418A	26	R79333
METALS, TOTAL											
Mercury	0.00001	mg/L		0.00001		E245.1	04/16/12 14:54 / sbk	04/16/12 08:39	HGCV201-H_120416A	8	16271
METALS, TOTAL RECOVERABLE											
Arsenic	ND	mg/L		0.005		E200.8	04/16/12 19:25 / sld	04/12/12 12:59	ICPMS204-B_120416A	61	16256
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 19:25 / sld	04/12/12 12:59	ICPMS204-B_120416A	61	16256
Calcium	12	mg/L		1		E200.7	04/16/12 19:34 / sld	04/12/12 12:59	ICP2-HE_120416C	97	16256

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 RC-CFR
Lab ID: H12040177-002
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/09/12 12:00
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	ND	mg/L		0.001		E200.8	04/16/12 19:25 / sld	04/12/12 12:59	ICPMS204-B_120416A	61	16256
Lead	ND	mg/L		0.0005		E200.8	04/16/12 19:25 / sld	04/12/12 12:59	ICPMS204-B_120416A	61	16256
Magnesium	4	mg/L		1		E200.7	04/16/12 19:34 / sld	04/12/12 12:59	ICP2-HE_120416C	97	16256
Zinc	ND	mg/L		0.01		E200.8	04/18/12 13:19 / sld	04/12/12 12:59	ICPMS204-B_120418A	36	16256

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: H12040177-003
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/09/12 13:30
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	32	mg/L		1		A2540 D	04/12/12 15:09 / cmm	04/12/12 14:17	J-124 (14410200)_120412A	6	16258
INORGANICS											
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	04/13/12 14:49 / cmm		MAN-TECH_120416A	13	R79266
Bicarbonate as HCO3	180	mg/L		4		A2320 B	04/13/12 14:49 / cmm		MAN-TECH_120416A	13	R79266
Sulfate	57	mg/L		1		E300.0	04/17/12 16:59 / cmm		IC102-H_120417A	40	R79316
Hardness as CaCO3	177	mg/L		1		A2340 B	04/17/12 14:49 / sld		WATERCALC_120417B	2	R79300
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	2.9	mg/L		0.1		A5310 C	04/13/12 19:31 / eli-c	04/13/12 09:51	SUB-C158451	19	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:23 / jaw		FIA203-HE_120412D	32	R79198
Nitrogen, Nitrate+Nitrite as N	0.09	mg/L		0.05		E353.2	04/12/12 14:24 / jaw		FIA203-HE_120412B	34	R79196
Nitrogen, Total	0.25	mg/L		0.05		A4500 N-C	04/23/12 12:43 / reh	04/12/12 10:48	NUTRIENTS_120423A	9	16252
Phosphorus, Total as P	0.046	mg/L		0.005		E365.1	04/16/12 15:23 / jaw	04/16/12 09:55	FIA202-HE_120416B	33	16278
METALS, DISSOLVED											
Arsenic	0.007	mg/L		0.005		E200.8	04/16/12 19:29 / sld		ICPMS204-B_120416A	62	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 19:29 / sld		ICPMS204-B_120416A	62	R79294
Copper	0.005	mg/L		0.001		E200.8	04/16/12 19:29 / sld		ICPMS204-B_120416A	62	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 19:29 / sld		ICPMS204-B_120416A	62	R79294
Zinc	0.01	mg/L		0.01		E200.8	04/16/12 19:29 / sld		ICPMS204-B_120416A	62	R79294
METALS, TOTAL											
Mercury	0.00005	mg/L		0.00001		E245.1	04/16/12 14:56 / sbk	04/16/12 08:39	HGCV201-H_120416A	9	16271
METALS, TOTAL RECOVERABLE											
Arsenic	0.010	mg/L		0.005		E200.8	04/16/12 19:34 / sld	04/12/12 12:59	ICPMS204-B_120416A	63	16256
Cadmium	0.00017	mg/L		0.00008		E200.8	04/16/12 19:34 / sld	04/12/12 12:59	ICPMS204-B_120416A	63	16256
Calcium	51	mg/L		1		E200.7	04/16/12 19:45 / sld	04/12/12 12:59	ICP2-HE_120416C	100	16256

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: H12040177-003
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/09/12 13:30
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.028	mg/L		0.001		E200.8	04/16/12 19:34 / sld	04/12/12 12:59	ICPMS204-B_120416A	63	16256
Lead	0.0043	mg/L		0.0005		E200.8	04/16/12 19:34 / sld	04/12/12 12:59	ICPMS204-B_120416A	63	16256
Magnesium	12	mg/L		1		E200.7	04/16/12 19:45 / sld	04/12/12 12:59	ICP2-HE_120416C	100	16256
Zinc	0.04	mg/L		0.01		E200.8	04/16/12 19:34 / sld	04/12/12 12:59	ICPMS204-B_120416A	63	16256

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 FC-CFR
Lab ID: H12040177-004
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/09/12 15:15
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	18	mg/L		1		A2540 D	04/12/12 15:09 / cmm	04/12/12 14:17	J-124 (14410200)_120412A	8	16258
INORGANICS											
Alkalinity, Total as CaCO3	130	mg/L		4		A2320 B	04/13/12 14:56 / cmm		MAN-TECH_120416A	14	R79266
Bicarbonate as HCO3	160	mg/L		4		A2320 B	04/13/12 14:56 / cmm		MAN-TECH_120416A	14	R79266
Sulfate	12	mg/L		1		E300.0	04/17/12 17:12 / cmm		IC102-H_120417A	41	R79316
Hardness as CaCO3	131	mg/L		1		A2340 B	04/16/12 19:49 / abb		CALC_120418B	91	R79325
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	3.1	mg/L		0.1		A5310 C	04/13/12 19:41 / eli-c	04/13/12 09:51	SUB-C158451	20	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:24 / jaw		FIA203-HE_120412D	33	R79198
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	04/12/12 14:25 / jaw		FIA203-HE_120412B	35	R79196
Nitrogen, Total	0.19	mg/L		0.05		A4500 N-C	04/23/12 12:45 / reh	04/12/12 10:48	NUTRIENTS_120423A	10	16252
Phosphorus, Total as P	0.032	mg/L		0.005		E365.1	04/16/12 15:24 / jaw	04/16/12 09:55	FIA202-HE_120416B	34	16278
METALS, DISSOLVED											
Arsenic	0.006	mg/L		0.005		E200.8	04/16/12 19:38 / sld		ICPMS204-B_120416A	64	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 19:38 / sld		ICPMS204-B_120416A	64	R79294
Copper	0.001	mg/L		0.001		E200.8	04/16/12 19:38 / sld		ICPMS204-B_120416A	64	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 19:38 / sld		ICPMS204-B_120416A	64	R79294
Zinc	0.01	mg/L		0.01		E200.8	04/18/12 13:23 / sld		ICPMS204-B_120418A	37	R79333
METALS, TOTAL											
Mercury	0.00010	mg/L		0.00001		E245.1	04/16/12 14:59 / sbk	04/16/12 08:39	HGCV201-H_120416A	10	16271
METALS, TOTAL RECOVERABLE											
Arsenic	0.008	mg/L		0.005		E200.8	04/16/12 19:43 / sld	04/12/12 12:59	ICPMS204-B_120416A	65	16256
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 19:43 / sld	04/12/12 12:59	ICPMS204-B_120416A	65	16256
Calcium	35	mg/L		1		E200.7	04/16/12 19:49 / sld	04/12/12 12:59	ICP2-HE_120416C	101	16256

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 FC-CFR
Lab ID: H12040177-004
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/09/12 15:15
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.003	mg/L		0.001		E200.8	04/16/12 19:43 / sld	04/12/12 12:59	ICPMS204-B_120416A	65	16256
Lead	0.0029	mg/L		0.0005		E200.8	04/16/12 19:43 / sld	04/12/12 12:59	ICPMS204-B_120416A	65	16256
Magnesium	11	mg/L		1		E200.7	04/16/12 19:49 / sld	04/12/12 12:59	ICP2-HE_120416C	101	16256
Zinc	0.01	mg/L		0.01		E200.8	04/18/12 13:28 / sld	04/12/12 12:59	ICPMS204-B_120418A	38	16256

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: H12040177-005
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/09/12 17:15
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	24	mg/L		1		A2540 D	04/12/12 15:09 / cmm	04/12/12 14:17	J-124 (14410200)_120412A	9	16258
INORGANICS											
Alkalinity, Total as CaCO3	140	mg/L		4		A2320 B	04/13/12 15:03 / cmm		MAN-TECH_120416A	15	R79266
Bicarbonate as HCO3	170	mg/L		4		A2320 B	04/13/12 15:03 / cmm		MAN-TECH_120416A	15	R79266
Sulfate	52	mg/L		1		E300.0	04/17/12 17:26 / cmm		IC102-H_120417A	42	R79316
Hardness as CaCO3	168	mg/L		1		A2340 B	04/17/12 14:49 / sld		WATERCALC_120417B	3	R79300
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	3.1	mg/L		0.1		A5310 C	04/13/12 19:51 / eli-c	04/13/12 09:51	SUB-C158451	21	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:26 / jaw		FIA203-HE_120412D	34	R79198
Nitrogen, Nitrate+Nitrite as N	0.09	mg/L		0.05		E353.2	04/12/12 14:27 / jaw		FIA203-HE_120412B	36	R79196
Nitrogen, Total	0.37	mg/L		0.05		A4500 N-C	04/23/12 12:47 / reh	04/12/12 10:48	NUTRIENTS_120423A	11	16252
Phosphorus, Total as P	0.040	mg/L		0.005		E365.1	04/16/12 15:25 / jaw	04/16/12 09:55	FIA202-HE_120416B	35	16278
METALS, DISSOLVED											
Arsenic	0.007	mg/L		0.005		E200.8	04/16/12 19:47 / sld		ICPMS204-B_120416A	66	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 19:47 / sld		ICPMS204-B_120416A	66	R79294
Copper	0.005	mg/L		0.001		E200.8	04/16/12 19:47 / sld		ICPMS204-B_120416A	66	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 19:47 / sld		ICPMS204-B_120416A	66	R79294
Zinc	0.02	mg/L		0.01		E200.8	04/16/12 19:47 / sld		ICPMS204-B_120416A	66	R79294
METALS, TOTAL											
Mercury	0.00001	mg/L		0.00001		E245.1	04/16/12 15:06 / sbk	04/16/12 08:39	HGCV201-H_120416A	13	16271
METALS, TOTAL RECOVERABLE											
Arsenic	0.010	mg/L		0.005		E200.8	04/16/12 19:52 / sld	04/12/12 12:59	ICPMS204-B_120416A	67	16256
Cadmium	0.00017	mg/L		0.00008		E200.8	04/16/12 19:52 / sld	04/12/12 12:59	ICPMS204-B_120416A	67	16256
Calcium	50	mg/L		1		E200.7	04/16/12 19:53 / sld	04/12/12 12:59	ICP2-HE_120416C	102	16256

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: H12040177-005
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/09/12 17:15
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.028	mg/L		0.001		E200.8	04/16/12 19:52 / sld	04/12/12 12:59	ICPMS204-B_120416A	67	16256
Lead	0.0038	mg/L		0.0005		E200.8	04/16/12 19:52 / sld	04/12/12 12:59	ICPMS204-B_120416A	67	16256
Magnesium	11	mg/L		1		E200.7	04/16/12 19:53 / sld	04/12/12 12:59	ICP2-HE_120416C	102	16256
Zinc	0.03	mg/L		0.01		E200.8	04/16/12 19:52 / sld	04/12/12 12:59	ICPMS204-B_120416A	67	16256

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: H12040177-006
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 08:30
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	44	mg/L		1		A2540 D	04/12/12 15:09 / cmm	04/12/12 14:17	-124 (14410200)_120412A	10	16258
INORGANICS											
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	04/13/12 15:10 / cmm		MAN-TECH_120416A	16	R79266
Bicarbonate as HCO3	180	mg/L		4		A2320 B	04/13/12 15:10 / cmm		MAN-TECH_120416A	16	R79266
Sulfate	76	mg/L		1		E300.0	04/17/12 17:39 / cmm		IC102-H_120417A	43	R79316
Hardness as CaCO3	206	mg/L		1		A2340 B	04/17/12 14:49 / sld		WATERCALC_120417B	4	R79300
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	2.8	mg/L		0.1		A5310 C	04/13/12 20:01 / eli-c	04/13/12 09:51	SUB-C158451	22	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:27 / jaw		FIA203-HE_120412D	35	R79198
Nitrogen, Nitrate+Nitrite as N	0.19	mg/L		0.05		E353.2	04/12/12 14:28 / jaw		FIA203-HE_120412B	37	R79196
Nitrogen, Total	0.42	mg/L		0.05		A4500 N-C	04/23/12 12:49 / reh	04/12/12 10:48	NUTRIENTS_120423A	12	16252
Phosphorus, Total as P	0.042	mg/L		0.005		E365.1	04/16/12 15:26 / jaw	04/16/12 09:55	FIA202-HE_120416B	36	16278
METALS, DISSOLVED											
Arsenic	0.010	mg/L		0.005		E200.8	04/16/12 19:56 / sld		ICPMS204-B_120416A	68	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 19:56 / sld		ICPMS204-B_120416A	68	R79294
Copper	0.007	mg/L		0.001		E200.8	04/16/12 19:56 / sld		ICPMS204-B_120416A	68	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 19:56 / sld		ICPMS204-B_120416A	68	R79294
Zinc	0.02	mg/L		0.01		E200.8	04/16/12 19:56 / sld		ICPMS204-B_120416A	68	R79294
METALS, TOTAL											
Mercury	0.00005	mg/L		0.00001		E245.1	04/16/12 15:08 / sbk	04/16/12 08:39	HGCV201-H_120416A	14	16271
METALS, TOTAL RECOVERABLE											
Arsenic	0.016	mg/L		0.005		E200.8	04/16/12 20:19 / sld	04/12/12 12:59	ICPMS204-B_120416A	73	16256
Cadmium	0.00029	mg/L		0.00008		E200.8	04/16/12 20:19 / sld	04/12/12 12:59	ICPMS204-B_120416A	73	16256
Calcium	61	mg/L		1		E200.7	04/16/12 19:56 / sld	04/12/12 12:59	ICP2-HE_120416C	103	16256

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: H12040177-006
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 08:30
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.055	mg/L		0.001		E200.8	04/16/12 20:19 / sld	04/12/12 12:59	ICPMS204-B_120416A	73	16256
Lead	0.0068	mg/L		0.0005		E200.8	04/16/12 20:19 / sld	04/12/12 12:59	ICPMS204-B_120416A	73	16256
Magnesium	13	mg/L		1		E200.7	04/16/12 19:56 / sld	04/12/12 12:59	ICP2-HE_120416C	103	16256
Zinc	0.05	mg/L		0.01		E200.8	04/16/12 20:19 / sld	04/12/12 12:59	ICPMS204-B_120416A	73	16256

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 LBR-CFR
Lab ID: H12040177-007
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 09:45
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	8	mg/L		1		A2540 D	04/12/12 15:09 / cmm	04/12/12 14:17	-124 (14410200)_120412A	11	16258
INORGANICS											
Alkalinity, Total as CaCO3	110	mg/L		4		A2320 B	04/13/12 15:18 / cmm		MAN-TECH_120416A	17	R79266
Bicarbonate as HCO3	130	mg/L		4		A2320 B	04/13/12 15:18 / cmm		MAN-TECH_120416A	17	R79266
Sulfate	14	mg/L		1		E300.0	04/17/12 17:53 / cmm		IC102-H_120417A	44	R79316
Hardness as CaCO3	105	mg/L		1		A2340 B	04/16/12 20:00 / abb		CALC_120418B	124	R79325
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	3.6	mg/L		0.1		A5310 C	04/13/12 20:11 / eli-c	04/13/12 09:51	SUB-C158451	23	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:28 / jaw		FIA203-HE_120412D	36	R79198
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	04/12/12 14:29 / jaw		FIA203-HE_120412B	38	R79196
Nitrogen, Total	0.11	mg/L		0.05		A4500 N-C	04/23/12 12:51 / reh	04/12/12 10:48	NUTRIENTS_120423A	13	16252
Phosphorus, Total as P	0.026	mg/L		0.005		E365.1	04/16/12 15:27 / jaw	04/16/12 09:55	FIA202-HE_120416B	37	16278
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	04/16/12 20:24 / sld		ICPMS204-B_120416A	74	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 20:24 / sld		ICPMS204-B_120416A	74	R79294
Copper	ND	mg/L		0.001		E200.8	04/16/12 20:24 / sld		ICPMS204-B_120416A	74	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 20:24 / sld		ICPMS204-B_120416A	74	R79294
Zinc	0.02	mg/L		0.01		E200.8	04/18/12 13:32 / sld		ICPMS204-B_120418A	39	R79333
METALS, TOTAL											
Mercury	ND	mg/L		0.00001		E245.1	04/16/12 15:11 / sbk	04/16/12 08:39	HGCV201-H_120416A	15	16271
METALS, TOTAL RECOVERABLE											
Arsenic	ND	mg/L		0.005		E200.8	04/16/12 20:28 / sld	04/12/12 12:59	ICPMS204-B_120416A	75	16256
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 20:28 / sld	04/12/12 12:59	ICPMS204-B_120416A	75	16256
Calcium	30	mg/L		1		E200.7	04/16/12 20:00 / sld	04/12/12 12:59	ICP2-HE_120416C	104	16256

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 LBR-CFR
Lab ID: H12040177-007
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 09:45
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.002	mg/L		0.001		E200.8	04/16/12 20:28 / sld	04/12/12 12:59	ICPMS204-B_120416A	75	16256
Lead	0.0007	mg/L		0.0005		E200.8	04/16/12 20:28 / sld	04/12/12 12:59	ICPMS204-B_120416A	75	16256
Magnesium	7	mg/L		1		E200.7	04/16/12 20:00 / sld	04/12/12 12:59	ICP2-HE_120416C	104	16256
Zinc	ND	mg/L		0.01		E200.8	04/18/12 13:37 / sld	04/12/12 12:59	ICPMS204-B_120418A	40	16256

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-27 H
Lab ID: H12040177-008
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 11:00
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	24	mg/L		1		A2540 D	04/12/12 15:10 / cmm	04/12/12 14:17	-124 (14410200)_120412A	12	16258
INORGANICS											
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	04/13/12 15:33 / cmm		MAN-TECH_120416A	19	R79266
Bicarbonate as HCO3	180	mg/L		4		A2320 B	04/13/12 15:33 / cmm		MAN-TECH_120416A	19	R79266
Sulfate	83	mg/L		1		E300.0	04/17/12 18:07 / cmm		IC102-H_120417A	45	R79316
Hardness as CaCO3	206	mg/L		1		A2340 B	04/17/12 14:49 / sld		WATERCALC_120417B	5	R79300
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	2.9	mg/L		0.1		A5310 C	04/13/12 20:21 / eli-c	04/13/12 09:51	SUB-C158451	24	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:29 / jaw		FIA203-HE_120412D	37	R79198
Nitrogen, Nitrate+Nitrite as N	0.21	mg/L		0.05		E353.2	04/12/12 14:30 / jaw		FIA203-HE_120412B	39	R79196
Nitrogen, Total	1.71	mg/L		0.05		A4500 N-C	04/23/12 12:53 / reh	04/12/12 10:48	NUTRIENTS_120423A	14	16252
Phosphorus, Total as P	0.033	mg/L		0.005		E365.1	04/16/12 15:28 / jaw	04/16/12 09:55	FIA202-HE_120416B	38	16278
METALS, DISSOLVED											
Arsenic	0.010	mg/L		0.005		E200.8	04/16/12 20:33 / sld		ICPMS204-B_120416A	76	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 20:33 / sld		ICPMS204-B_120416A	76	R79294
Copper	0.006	mg/L		0.001		E200.8	04/16/12 20:33 / sld		ICPMS204-B_120416A	76	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 20:33 / sld		ICPMS204-B_120416A	76	R79294
Zinc	0.01	mg/L		0.01		E200.8	04/16/12 20:33 / sld		ICPMS204-B_120416A	76	R79294
METALS, TOTAL											
Mercury	0.00003	mg/L		0.00001		E245.1	04/16/12 15:13 / sbk	04/16/12 08:39	HGCV201-H_120416A	16	16271
METALS, TOTAL RECOVERABLE											
Arsenic	0.015	mg/L		0.005		E200.8	04/16/12 20:37 / sld	04/12/12 12:59	ICPMS204-B_120416A	77	16256
Cadmium	0.00021	mg/L		0.00008		E200.8	04/16/12 20:37 / sld	04/12/12 12:59	ICPMS204-B_120416A	77	16256
Calcium	61	mg/L		1		E200.7	04/16/12 20:04 / sld	04/12/12 12:59	ICP2-HE_120416C	105	16256

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-27 H
Lab ID: H12040177-008
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 11:00
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.036	mg/L		0.001		E200.8	04/16/12 20:37 / sld	04/12/12 12:59	ICPMS204-B_120416A	77	16256
Lead	0.0047	mg/L		0.0005		E200.8	04/16/12 20:37 / sld	04/12/12 12:59	ICPMS204-B_120416A	77	16256
Magnesium	13	mg/L		1		E200.7	04/16/12 20:04 / sld	04/12/12 12:59	ICP2-HE_120416C	105	16256
Zinc	0.03	mg/L		0.01		E200.8	04/16/12 20:37 / sld	04/12/12 12:59	ICPMS204-B_120416A	77	16256

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-27 H Dupe
Lab ID: H12040177-009
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 11:30
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	22	mg/L		1		A2540 D	04/12/12 15:10 / cmm	04/12/12 14:17	-124 (14410200)_120412A	13	16258
INORGANICS											
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	04/13/12 15:40 / cmm		MAN-TECH_120416A	20	R79266
Bicarbonate as HCO3	180	mg/L		4		A2320 B	04/13/12 15:40 / cmm		MAN-TECH_120416A	20	R79266
Sulfate	83	mg/L		1		E300.0	04/17/12 18:47 / cmm		IC102-H_120417A	48	R79316
Hardness as CaCO3	210	mg/L		1		A2340 B	04/17/12 14:49 / sld		WATERCALC_120417B	6	R79300
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	2.9	mg/L		0.1		A5310 C	04/13/12 20:31 / eli-c	04/13/12 09:51	SUB-C158451	25	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:30 / jaw		FIA203-HE_120412D	38	R79198
Nitrogen, Nitrate+Nitrite as N	0.21	mg/L		0.05		E353.2	04/12/12 14:31 / jaw		FIA203-HE_120412B	40	R79196
Nitrogen, Total	0.44	mg/L		0.05		A4500 N-C	04/23/12 12:55 / reh	04/12/12 10:48	NUTRIENTS_120423A	15	16252
Phosphorus, Total as P	0.031	mg/L		0.005		E365.1	04/16/12 15:29 / jaw	04/16/12 09:55	FIA202-HE_120416B	39	16278
METALS, DISSOLVED											
Arsenic	0.010	mg/L		0.005		E200.8	04/16/12 20:42 / sld		ICPMS204-B_120416A	78	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 20:42 / sld		ICPMS204-B_120416A	78	R79294
Copper	0.007	mg/L		0.001		E200.8	04/16/12 20:42 / sld		ICPMS204-B_120416A	78	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 20:42 / sld		ICPMS204-B_120416A	78	R79294
Zinc	0.02	mg/L		0.01		E200.8	04/16/12 20:42 / sld		ICPMS204-B_120416A	78	R79294
METALS, TOTAL											
Mercury	0.00001	mg/L		0.00001		E245.1	04/16/12 15:16 / sbk	04/16/12 08:39	HGCV201-H_120416A	17	16271
METALS, TOTAL RECOVERABLE											
Arsenic	0.015	mg/L		0.005		E200.8	04/16/12 20:46 / sld	04/12/12 12:59	ICPMS204-B_120416A	79	16256
Cadmium	0.00023	mg/L		0.00008		E200.8	04/16/12 20:46 / sld	04/12/12 12:59	ICPMS204-B_120416A	79	16256
Calcium	62	mg/L		1		E200.7	04/16/12 20:08 / sld	04/12/12 12:59	ICP2-HE_120416C	106	16256

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-27 H Dupe
Lab ID: H12040177-009
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 11:30
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.041	mg/L		0.001		E200.8	04/16/12 20:46 / sld	04/12/12 12:59	ICPMS204-B_120416A	79	16256
Lead	0.0050	mg/L		0.0005		E200.8	04/16/12 20:46 / sld	04/12/12 12:59	ICPMS204-B_120416A	79	16256
Magnesium	13	mg/L		1		E200.7	04/16/12 20:08 / sld	04/12/12 12:59	ICP2-HE_120416C	106	16256
Zinc	0.04	mg/L		0.01		E200.8	04/16/12 20:46 / sld	04/12/12 12:59	ICPMS204-B_120416A	79	16256

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 Field Blank 1
Lab ID: H12040177-010
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 12:00
DateReceived: 04/11/12
Report Date: 04/24/12

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	04/12/12 15:10 / cmm	04/12/12 14:17	-124 (14410200)_120412A	14	16258
INORGANICS											
Alkalinity, Total as CaCO3	ND	mg/L		4		A2320 B	04/13/12 15:44 / cmm		MAN-TECH_120416A	21	R79266
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	04/13/12 15:44 / cmm		MAN-TECH_120416A	21	R79266
Sulfate	ND	mg/L		1		E300.0	04/17/12 19:28 / cmm		IC102-H_120417A	51	R79316
Hardness as CaCO3	ND	mg/L		1		A2340 B	04/19/12 13:35 / sld		WATERCALC_120419A	1	R79348
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	0.5	mg/L		0.1		A5310 C	04/13/12 20:41 / eli-c	04/13/12 09:51	SUB-C158451	26	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:31 / jaw		FIA203-HE_120412D	39	R79198
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	04/12/12 14:33 / jaw		FIA203-HE_120412B	41	R79196
Nitrogen, Total	ND	mg/L		0.05		A4500 N-C	04/23/12 12:57 / reh	04/12/12 10:51	NUTRIENTS_120423A	16	16253
Phosphorus, Total as P	ND	mg/L		0.005		E365.1	04/16/12 15:30 / jaw	04/16/12 09:55	FIA202-HE_120416B	40	16278
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	04/16/12 20:51 / sld		ICPMS204-B_120416A	80	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 20:51 / sld		ICPMS204-B_120416A	80	R79294
Copper	ND	mg/L		0.001		E200.8	04/16/12 20:51 / sld		ICPMS204-B_120416A	80	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 20:51 / sld		ICPMS204-B_120416A	80	R79294
Zinc	ND	mg/L		0.01		E200.8	04/18/12 13:41 / sld		ICPMS204-B_120418A	41	R79333
METALS, TOTAL											
Mercury	ND	mg/L		0.00001		E245.1	04/17/12 16:01 / sbk	04/16/12 08:39	HGCV201-H_120417A	12	16271
METALS, TOTAL RECOVERABLE											
Arsenic	ND	mg/L		0.005		E200.8	04/16/12 20:56 / sld		ICPMS204-B_120416A	81	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 20:56 / sld		ICPMS204-B_120416A	81	R79294
Calcium	ND	mg/L		1		E200.7	04/16/12 18:42 / sld		ICP2-HE_120416C	83	R79271

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 Field Blank 1
Lab ID: H12040177-010
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 12:00
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	ND	mg/L		0.001		E200.8	04/16/12 20:56 / sld		ICPMS204-B_120416A	81	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 20:56 / sld		ICPMS204-B_120416A	81	R79294
Magnesium	ND	mg/L		1		E200.7	04/16/12 18:42 / sld		ICP2-HE_120416C	83	R79271
Zinc	ND	mg/L		0.01		E200.8	04/18/12 13:46 / sld		ICPMS204-B_120418A	42	R79333

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 RTC-1
Lab ID: H12040177-011
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 12:30
DateReceived: 04/11/12
Report Date: 04/24/12

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	04/12/12 15:10 / cmm	04/12/12 14:17	-124 (14410200)_120412A	15	16258
INORGANICS											
Alkalinity, Total as CaCO3	72	mg/L		4		A2320 B	04/13/12 15:51 / cmm		MAN-TECH_120416A	22	R79266
Bicarbonate as HCO3	88	mg/L		4		A2320 B	04/13/12 15:51 / cmm		MAN-TECH_120416A	22	R79266
Sulfate	7	mg/L		1		E300.0	04/17/12 20:09 / cmm		IC102-H_120417A	54	R79316
Hardness as CaCO3	72	mg/L		1		A2340 B	04/16/12 20:11 / abb		CALC_120418B	168	R79325
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	1.8	mg/L		0.1		A5310 C	04/13/12 21:53 / eli-c	04/13/12 09:51	SUB-C158451	29	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:35 / jaw		FIA203-HE_120412D	42	R79198
Nitrogen, Nitrate+Nitrite as N	0.14	mg/L		0.05		E353.2	04/12/12 14:34 / jaw		FIA203-HE_120412B	42	R79196
Nitrogen, Total	0.18	mg/L		0.05		A4500 N-C	04/23/12 13:07 / reh	04/12/12 10:51	NUTRIENTS_120423A	21	16253
Phosphorus, Total as P	0.008	mg/L		0.005		E365.1	04/16/12 15:33 / jaw	04/16/12 09:55	FIA202-HE_120416B	43	16278
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	04/16/12 21:32 / sld		ICPMS204-B_120416A	89	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 21:32 / sld		ICPMS204-B_120416A	89	R79294
Copper	ND	mg/L		0.001		E200.8	04/16/12 21:32 / sld		ICPMS204-B_120416A	89	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 21:32 / sld		ICPMS204-B_120416A	89	R79294
Zinc	0.02	mg/L		0.01		E200.8	04/18/12 14:23 / sld		ICPMS204-B_120418A	50	R79333
METALS, TOTAL											
Mercury	ND	mg/L		0.00001		E245.1	04/17/12 16:03 / sbk	04/16/12 08:39	HGCV201-H_120417A	13	16271
METALS, TOTAL RECOVERABLE											
Arsenic	ND	mg/L		0.005		E200.8	04/16/12 21:51 / sld	04/12/12 12:59	ICPMS204-B_120416A	93	16256
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 21:51 / sld	04/12/12 12:59	ICPMS204-B_120416A	93	16256
Calcium	22	mg/L		1		E200.7	04/16/12 20:11 / sld	04/12/12 12:59	ICP2-HE_120416C	107	16256

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 RTC-1
Lab ID: H12040177-011
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 12:30
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.002	mg/L		0.001		E200.8	04/16/12 21:51 / sld	04/12/12 12:59	ICPMS204-B_120416A	93	16256
Lead	ND	mg/L		0.0005		E200.8	04/16/12 21:51 / sld	04/12/12 12:59	ICPMS204-B_120416A	93	16256
Magnesium	4	mg/L		1		E200.7	04/16/12 20:11 / sld	04/12/12 12:59	ICP2-HE_120416C	107	16256
Zinc	ND	mg/L		0.01		E200.8	04/18/12 14:27 / sld	04/12/12 12:59	ICPMS204-B_120418A	51	16256

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 LC-7
Lab ID: H12040177-012
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 14:00
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	16	mg/L		1		A2540 D	04/12/12 15:10 / cmm	04/12/12 14:17	-124 (14410200)_120412A	16	16258
INORGANICS											
Alkalinity, Total as CaCO3	190	mg/L		4		A2320 B	04/13/12 16:05 / cmm		MAN-TECH_120416A	24	R79266
Bicarbonate as HCO3	230	mg/L		4		A2320 B	04/13/12 16:05 / cmm		MAN-TECH_120416A	24	R79266
Sulfate	140	mg/L		1		E300.0	04/17/12 20:23 / cmm		IC102-H_120417A	55	R79316
Hardness as CaCO3	302	mg/L		1		A2340 B	04/16/12 20:15 / abb		CALC_120418B	179	R79325
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	1.9	mg/L		0.1		A5310 C	04/13/12 22:03 / eli-c	04/13/12 09:51	SUB-C158451	30	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:36 / jaw		FIA203-HE_120412D	43	R79198
Nitrogen, Nitrate+Nitrite as N	0.48	mg/L		0.05		E353.2	04/12/12 14:37 / jaw		FIA203-HE_120412B	45	R79196
Nitrogen, Total	0.54	mg/L		0.05		A4500 N-C	04/23/12 13:09 / reh	04/12/12 10:51	NUTRIENTS_120423A	22	16253
Phosphorus, Total as P	0.015	mg/L		0.005		E365.1	04/16/12 15:34 / jaw	04/16/12 09:55	FIA202-HE_120416B	44	16278
METALS, DISSOLVED											
Arsenic	0.013	mg/L		0.005		E200.8	04/16/12 21:55 / sld		ICPMS204-B_120416A	94	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 21:55 / sld		ICPMS204-B_120416A	94	R79294
Copper	0.002	mg/L		0.001		E200.8	04/16/12 21:55 / sld		ICPMS204-B_120416A	94	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 21:55 / sld		ICPMS204-B_120416A	94	R79294
Zinc	ND	mg/L		0.01		E200.8	04/18/12 14:32 / sld		ICPMS204-B_120418A	52	R79333
METALS, TOTAL											
Mercury	ND	mg/L		0.00001		E245.1	04/17/12 16:06 / sbk	04/16/12 08:39	HGCV201-H_120417A	14	16271
METALS, TOTAL RECOVERABLE											
Arsenic	0.015	mg/L		0.005		E200.8	04/16/12 22:18 / sld	04/12/12 12:59	ICPMS204-B_120416A	99	16256
Cadmium	0.00009	mg/L		0.00008		E200.8	04/16/12 22:18 / sld	04/12/12 12:59	ICPMS204-B_120416A	99	16256
Calcium	88	mg/L		1		E200.7	04/16/12 20:15 / sld	04/12/12 12:59	ICP2-HE_120416C	108	16256

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 LC-7
Lab ID: H12040177-012
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 14:00
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.010	mg/L		0.001		E200.8	04/16/12 22:18 / sld	04/12/12 12:59	ICPMS204-B_120416A	99	16256
Lead	0.0013	mg/L		0.0005		E200.8	04/16/12 22:18 / sld	04/12/12 12:59	ICPMS204-B_120416A	99	16256
Magnesium	20	mg/L		1		E200.7	04/16/12 20:15 / sld	04/12/12 12:59	ICP2-HE_120416C	108	16256
Zinc	ND	mg/L		0.01		E200.8	04/18/12 14:37 / sld	04/12/12 12:59	ICPMS204-B_120418A	53	16256

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-03A
Lab ID: H12040177-013
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 14:45
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	14	mg/L		1		A2540 D	04/12/12 15:11 / cmm	04/12/12 14:17	-124 (14410200)_120412A	: 18	16258
INORGANICS											
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	04/13/12 16:12 / cmm		MAN-TECH_120416A	: 25	R79266
Bicarbonate as HCO3	150	mg/L		4		A2320 B	04/13/12 16:12 / cmm		MAN-TECH_120416A	: 25	R79266
Sulfate	84	mg/L		1		E300.0	04/17/12 20:36 / cmm		IC102-H_120417A	: 56	R79316
Hardness as CaCO3	185	mg/L		1		A2340 B	04/17/12 14:49 / sld		WATERCALC_120417B	: 7	R79300
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	3.1	mg/L		0.1		A5310 C	04/13/12 22:13 / eli-c	04/13/12 09:51	SUB-C158451	: 31	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:41 / jaw		FIA203-HE_120412D	: 47	R79198
Nitrogen, Nitrate+Nitrite as N	0.05	mg/L		0.05		E353.2	04/12/12 14:41 / jaw		FIA203-HE_120412B	: 48	R79196
Nitrogen, Total	0.29	mg/L		0.05		A4500 N-C	04/23/12 13:11 / reh	04/12/12 10:51	NUTRIENTS_120423A	: 23	16253
Phosphorus, Total as P	0.024	mg/L		0.005		E365.1	04/16/12 15:40 / jaw	04/16/12 09:56	FIA202-HE_120416B	: 50	16279
METALS, DISSOLVED											
Arsenic	0.011	mg/L		0.005		E200.8	04/16/12 22:23 / sld		ICPMS204-B_120416A	: 100	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 22:23 / sld		ICPMS204-B_120416A	: 100	R79294
Copper	0.004	mg/L		0.001		E200.8	04/16/12 22:23 / sld		ICPMS204-B_120416A	: 100	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 22:23 / sld		ICPMS204-B_120416A	: 100	R79294
Zinc	ND	mg/L		0.01		E200.8	04/16/12 22:23 / sld		ICPMS204-B_120416A	: 100	R79294
METALS, TOTAL											
Mercury	0.00001	mg/L		0.00001		E245.1	04/17/12 16:08 / sbk	04/16/12 08:39	HGCV201-H_120417A	: 15	16271
METALS, TOTAL RECOVERABLE											
Arsenic	0.013	mg/L		0.005		E200.8	04/16/12 22:27 / sld	04/12/12 12:59	ICPMS204-B_120416A	: 101	16256
Cadmium	0.00015	mg/L		0.00008		E200.8	04/16/12 22:27 / sld	04/12/12 12:59	ICPMS204-B_120416A	: 101	16256
Calcium	54	mg/L		1		E200.7	04/16/12 20:19 / sld	04/12/12 12:59	ICP2-HE_120416C	: 109	16256

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-03A
Lab ID: H12040177-013
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/10/12 14:45
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.015	mg/L		0.001		E200.8	04/16/12 22:27 / sld	04/12/12 12:59	ICPMS204-B_120416A	101	16256
Lead	0.0025	mg/L		0.0005		E200.8	04/16/12 22:27 / sld	04/12/12 12:59	ICPMS204-B_120416A	101	16256
Magnesium	12	mg/L		1		E200.7	04/16/12 20:19 / sld	04/12/12 12:59	ICP2-HE_120416C	109	16256
Zinc	0.02	mg/L		0.01		E200.8	04/16/12 22:27 / sld	04/12/12 12:59	ICPMS204-B_120416A	101	16256

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 WSC-SBC
Lab ID: H12040177-014
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/11/12 09:15
DateReceived: 04/11/12
Report Date: 04/24/12

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	04/12/12 15:11 / cmm	04/12/12 14:17	-124 (14410200)_120412A	19	16258
INORGANICS											
Alkalinity, Total as CaCO3	140	mg/L		4		A2320 B	04/13/12 16:20 / cmm		MAN-TECH_120416A	26	R79266
Bicarbonate as HCO3	170	mg/L		4		A2320 B	04/13/12 16:20 / cmm		MAN-TECH_120416A	26	R79266
Sulfate	39	mg/L		1		E300.0	04/17/12 20:50 / cmm		IC102-H_120417A	57	R79316
Hardness as CaCO3	171	mg/L		1		A2340 B	04/16/12 20:30 / abb		CALC_120418B	201	R79325
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	1.3	mg/L		0.1		A5310 C	04/13/12 22:22 / eli-c	04/13/12 09:51	SUB-C158451	32	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:42 / jaw		FIA203-HE_120412D	48	R79198
Nitrogen, Nitrate+Nitrite as N	0.07	mg/L		0.05		E353.2	04/12/12 14:42 / jaw		FIA203-HE_120412B	49	R79196
Nitrogen, Total	0.18	mg/L		0.05		A4500 N-C	04/23/12 13:13 / reh	04/12/12 10:51	NUTRIENTS_120423A	24	16253
Phosphorus, Total as P	0.008	mg/L		0.005		E365.1	04/16/12 15:41 / jaw	04/16/12 09:56	FIA202-HE_120416B	51	16279
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	04/16/12 22:32 / sld		ICPMS204-B_120416A	102	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 22:32 / sld		ICPMS204-B_120416A	102	R79294
Copper	0.002	mg/L		0.001		E200.8	04/16/12 22:32 / sld		ICPMS204-B_120416A	102	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 22:32 / sld		ICPMS204-B_120416A	102	R79294
Zinc	0.01	mg/L		0.01		E200.8	04/18/12 14:41 / sld		ICPMS204-B_120418A	54	R79333
METALS, TOTAL											
Mercury	ND	mg/L		0.00001		E245.1	04/17/12 16:10 / sbk	04/16/12 08:39	HGCV201-H_120417A	16	16271
METALS, TOTAL RECOVERABLE											
Arsenic	ND	mg/L		0.005		E200.8	04/16/12 22:36 / sld	04/12/12 12:59	ICPMS204-B_120416A	103	16256
Cadmium	0.00009	mg/L		0.00008		E200.8	04/16/12 22:36 / sld	04/12/12 12:59	ICPMS204-B_120416A	103	16256
Calcium	51	mg/L		1		E200.7	04/16/12 20:30 / sld	04/12/12 12:59	ICP2-HE_120416C	112	16256

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 WSC-SBC
Lab ID: H12040177-014
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/11/12 09:15
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.007	mg/L		0.001		E200.8	04/16/12 22:36 / sld	04/12/12 12:59	ICPMS204-B_120416A	103	16256
Lead	ND	mg/L		0.0005		E200.8	04/16/12 22:36 / sld	04/12/12 12:59	ICPMS204-B_120416A	103	16256
Magnesium	10	mg/L		1		E200.7	04/16/12 20:30 / sld	04/12/12 12:59	ICP2-HE_120416C	112	16256
Zinc	ND	mg/L		0.01		E200.8	04/18/12 14:46 / sld	04/12/12 12:59	ICPMS204-B_120418A	55	16256

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 SS-25
Lab ID: H12040177-015
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/11/12 10:30
DateReceived: 04/11/12
Report Date: 04/24/12

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	04/12/12 15:11 / cmm	04/12/12 14:17	-124 (14410200)_120412A	: 20	16258
INORGANICS											
Alkalinity, Total as CaCO3	110	mg/L		4		A2320 B	04/13/12 16:26 / cmm		MAN-TECH_120416A	: 27	R79266
Bicarbonate as HCO3	130	mg/L		4		A2320 B	04/13/12 16:26 / cmm		MAN-TECH_120416A	: 27	R79266
Sulfate	96	mg/L		1		E300.0	04/17/12 19:42 / cmm		IC102-H_120417A	: 52	R79316
Hardness as CaCO3	181	mg/L		1		A2340 B	04/17/12 14:49 / sld		WATERCALC_120417B	: 8	R79300
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	4.1	mg/L		0.1		A5310 C	04/13/12 22:33 / eli-c	04/13/12 09:51	SUB-C158451	: 33	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:43 / jaw		FIA203-HE_120412D	: 49	R79198
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	04/12/12 14:43 / jaw		FIA203-HE_120412B	: 50	R79196
Nitrogen, Total	0.41	mg/L		0.05		A4500 N-C	04/23/12 13:15 / reh	04/12/12 10:51	NUTRIENTS_120423A	: 25	16253
Phosphorus, Total as P	0.024	mg/L		0.005		E365.1	04/16/12 15:42 / jaw	04/16/12 09:56	FIA202-HE_120416B	: 52	16279
METALS, DISSOLVED											
Arsenic	0.013	mg/L		0.005		E200.8	04/16/12 22:41 / sld		ICPMS204-B_120416A	: 104	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 22:41 / sld		ICPMS204-B_120416A	: 104	R79294
Copper	0.004	mg/L		0.001		E200.8	04/16/12 22:41 / sld		ICPMS204-B_120416A	: 104	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 22:41 / sld		ICPMS204-B_120416A	: 104	R79294
Zinc	ND	mg/L		0.01		E200.8	04/16/12 22:41 / sld		ICPMS204-B_120416A	: 104	R79294
METALS, TOTAL											
Mercury	0.00001	mg/L		0.00001		E245.1	04/17/12 16:13 / sbk	04/16/12 08:39	HGCV201-H_120417A	: 17	16271
METALS, TOTAL RECOVERABLE											
Arsenic	0.015	mg/L		0.005		E200.8	04/16/12 22:45 / sld	04/12/12 12:59	ICPMS204-B_120416A	: 105	16256
Cadmium	0.00012	mg/L		0.00008		E200.8	04/16/12 22:45 / sld	04/12/12 12:59	ICPMS204-B_120416A	: 105	16256
Calcium	53	mg/L		1		E200.7	04/16/12 20:34 / sld	04/12/12 12:59	ICP2-HE_120416C	: 113	16256

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 SS-25
Lab ID: H12040177-015
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/11/12 10:30
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.010	mg/L		0.001		E200.8	04/16/12 22:45 / sld	04/12/12 12:59	ICPMS204-B_120416A	105	16256
Lead	0.0024	mg/L		0.0005		E200.8	04/16/12 22:45 / sld	04/12/12 12:59	ICPMS204-B_120416A	105	16256
Magnesium	12	mg/L		1		E200.7	04/16/12 20:34 / sld	04/12/12 12:59	ICP2-HE_120416C	113	16256
Zinc	0.02	mg/L		0.01		E200.8	04/16/12 22:45 / sld	04/12/12 12:59	ICPMS204-B_120416A	105	16256

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 MWB-SBC
Lab ID: H12040177-016
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/11/12 11:15
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	8	mg/L		1		A2540 D	04/12/12 15:13 / cmm	04/12/12 14:17	-124 (14410200)_120412A	21	16258
INORGANICS											
Alkalinity, Total as CaCO3	100	mg/L		4		A2320 B	04/13/12 16:33 / cmm		MAN-TECH_120416A	28	R79266
Bicarbonate as HCO3	120	mg/L		4		A2320 B	04/13/12 16:33 / cmm		MAN-TECH_120416A	28	R79266
Sulfate	91	mg/L		1		E300.0	04/17/12 19:55 / cmm		IC102-H_120417A	53	R79316
Hardness as CaCO3	169	mg/L		1		A2340 B	04/16/12 20:38 / abb		CALC_120418B	223	R79325
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	3.0	mg/L		0.1		A5310 C	04/13/12 22:43 / eli-c	04/13/12 09:51	SUB-C158451	34	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:45 / jaw		FIA203-HE_120412D	50	R79198
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	04/12/12 14:44 / jaw		FIA203-HE_120412B	51	R79196
Nitrogen, Total	0.37	mg/L		0.05		A4500 N-C	04/23/12 13:17 / reh	04/12/12 10:51	NUTRIENTS_120423A	26	16253
Phosphorus, Total as P	0.019	mg/L		0.005		E365.1	04/16/12 15:43 / jaw	04/16/12 09:56	FIA202-HE_120416B	53	16279
METALS, DISSOLVED											
Arsenic	0.017	mg/L		0.005		E200.8	04/16/12 22:50 / sld		ICPMS204-B_120416A	106	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 22:50 / sld		ICPMS204-B_120416A	106	R79294
Copper	0.003	mg/L		0.001		E200.8	04/16/12 22:50 / sld		ICPMS204-B_120416A	106	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 22:50 / sld		ICPMS204-B_120416A	106	R79294
Zinc	0.02	mg/L		0.01		E200.8	04/18/12 14:50 / sld		ICPMS204-B_120418A	56	R79333
METALS, TOTAL											
Mercury	ND	mg/L		0.00001		E245.1	04/17/12 16:15 / sbk	04/16/12 08:39	HGCV201-H_120417A	18	16271
METALS, TOTAL RECOVERABLE											
Arsenic	0.019	mg/L		0.005		E200.8	04/16/12 22:54 / sld	04/12/12 12:59	ICPMS204-B_120416A	107	16256
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 22:54 / sld	04/12/12 12:59	ICPMS204-B_120416A	107	16256
Calcium	49	mg/L		1		E200.7	04/16/12 20:38 / sld	04/12/12 12:59	ICP2-HE_120416C	114	16256

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 MWB-SBC
Lab ID: H12040177-016
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/11/12 11:15
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.006	mg/L		0.001		E200.8	04/16/12 22:54 / sld	04/12/12 12:59	ICPMS204-B_120416A	107	16256
Lead	0.0011	mg/L		0.0005		E200.8	04/16/12 22:54 / sld	04/12/12 12:59	ICPMS204-B_120416A	107	16256
Magnesium	11	mg/L		1		E200.7	04/16/12 20:38 / sld	04/12/12 12:59	ICP2-HE_120416C	114	16256
Zinc	0.01	mg/L		0.01		E200.8	04/16/12 22:54 / sld	04/12/12 12:59	ICPMS204-B_120416A	107	16256

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 Field Blank 2
Lab ID: H12040177-017
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/11/12 12:00
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	2	mg/L		1		A2540 D	04/12/12 15:13 / cmm	04/12/12 14:17	-124 (14410200)_120412A	22	16258
INORGANICS											
Alkalinity, Total as CaCO3	ND	mg/L		4		A2320 B	04/13/12 16:38 / cmm		MAN-TECH_120416A	29	R79266
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	04/13/12 16:38 / cmm		MAN-TECH_120416A	29	R79266
Sulfate	ND	mg/L		1		E300.0	04/17/12 21:03 / cmm		IC102-H_120417A	58	R79316
Hardness as CaCO3	ND	mg/L		1		A2340 B	04/19/12 13:35 / sld		WATERCALC_120419A	2	R79348
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	0.4	mg/L		0.1		A5310 C	04/13/12 22:52 / eli-c	04/13/12 09:51	SUB-C158451	35	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:46 / jaw		FIA203-HE_120412D	51	R79198
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	04/12/12 14:46 / jaw		FIA203-HE_120412B	52	R79196
Nitrogen, Total	0.06	mg/L		0.05		A4500 N-C	04/23/12 13:19 / reh	04/12/12 10:51	NUTRIENTS_120423A	27	16253
Phosphorus, Total as P	ND	mg/L		0.005		E365.1	04/16/12 15:44 / jaw	04/16/12 09:56	FIA202-HE_120416B	54	16279
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	04/16/12 23:17 / sld		ICPMS204-B_120416A	112	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 23:17 / sld		ICPMS204-B_120416A	112	R79294
Copper	ND	mg/L		0.001		E200.8	04/18/12 15:18 / sld		ICPMS204-B_120418A	62	R79333
Lead	ND	mg/L		0.0005		E200.8	04/16/12 23:17 / sld		ICPMS204-B_120416A	112	R79294
Zinc	0.03	mg/L		0.01		E200.8	04/18/12 15:18 / sld		ICPMS204-B_120418A	62	R79333
METALS, TOTAL											
Mercury	ND	mg/L		0.00001		E245.1	04/17/12 16:17 / sbk	04/16/12 08:39	HGCV201-H_120417A	19	16271
METALS, TOTAL RECOVERABLE											
Arsenic	ND	mg/L		0.005		E200.8	04/16/12 23:22 / sld		ICPMS204-B_120416A	113	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 23:22 / sld		ICPMS204-B_120416A	113	R79294
Calcium	ND	mg/L		1		E200.7	04/16/12 18:46 / sld		ICP2-HE_120416C	84	R79271

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 Field Blank 2
Lab ID: H12040177-017
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/11/12 12:00
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	ND	mg/L		0.001		E200.8	04/16/12 23:22 / sld		ICPMS204-B_120416A	113	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 23:22 / sld		ICPMS204-B_120416A	113	R79294
Magnesium	ND	mg/L		1		E200.7	04/16/12 18:46 / sld		ICP2-HE_120416C	84	R79271
Zinc	ND	mg/L		0.01		E200.8	04/18/12 15:22 / sld		ICPMS204-B_120418A	63	R79333

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 MCWC-MWB
Lab ID: H12040177-018
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/11/12 12:15
DateReceived: 04/11/12
Report Date: 04/24/12

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	04/12/12 15:13 / cmm	04/12/12 14:17	-124 (14410200)_120412A	23	16258
INORGANICS											
Alkalinity, Total as CaCO3	89	mg/L		4		A2320 B	04/13/12 16:45 / cmm		MAN-TECH_120416A	30	R79266
Bicarbonate as HCO3	110	mg/L		4		A2320 B	04/13/12 16:45 / cmm		MAN-TECH_120416A	30	R79266
Sulfate	25	mg/L		1		E300.0	04/19/12 12:36 / cmm		IC102-H_120419A	20	R79357
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	3.0	mg/L		0.1		A5310 C	04/13/12 23:02 / eli-c	04/13/12 09:51	SUB-C158451	36	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:49 / jaw		FIA203-HE_120412D	54	R79198
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	04/12/12 14:47 / jaw		FIA203-HE_120412B	53	R79196
Nitrogen, Total	0.07	mg/L		0.05		A4500 N-C	04/23/12 13:21 / reh	04/12/12 10:51	NUTRIENTS_120423A	28	16253
Phosphorus, Total as P	0.024	mg/L		0.005		E365.1	04/16/12 15:47 / jaw	04/16/12 09:56	FIA202-HE_120416B	57	16279
METALS, DISSOLVED											
Arsenic	0.016	mg/L		0.005		E200.8	04/16/12 23:27 / sld		ICPMS204-B_120416A	114	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 23:27 / sld		ICPMS204-B_120416A	114	R79294
Copper	0.003	mg/L		0.001		E200.8	04/16/12 23:27 / sld		ICPMS204-B_120416A	114	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 23:27 / sld		ICPMS204-B_120416A	114	R79294
Zinc	ND	mg/L		0.01		E200.8	04/16/12 23:27 / sld		ICPMS204-B_120416A	114	R79294
METALS, TOTAL											
Mercury	0.00001	mg/L		0.00001		E245.1	04/17/12 16:20 / sbk	04/16/12 08:39	HGCV201-H_120417A	20	16271
METALS, TOTAL RECOVERABLE											
Arsenic	0.020	mg/L		0.005		E200.8	04/16/12 23:31 / sld	04/12/12 12:59	ICPMS204-B_120416A	115	16256
Cadmium	0.00010	mg/L		0.00008		E200.8	04/16/12 23:31 / sld	04/12/12 12:59	ICPMS204-B_120416A	115	16256
Calcium	28	mg/L		1		E200.7	04/16/12 20:41 / sld	04/12/12 12:59	ICP2-HE_120416C	115	16256
Copper	0.008	mg/L		0.001		E200.8	04/16/12 23:31 / sld	04/12/12 12:59	ICPMS204-B_120416A	115	16256

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 MCWC-MWB
Lab ID: H12040177-018
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/11/12 12:15
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Lead	0.0017	mg/L		0.0005		E200.8	04/16/12 23:31 / sld	04/12/12 12:59	ICPMS204-B_120416A	115	16256
Magnesium	7	mg/L		1		E200.7	04/16/12 20:41 / sld	04/12/12 12:59	ICP2-HE_120416C	115	16256
Zinc	0.01	mg/L		0.01		E200.8	04/16/12 23:31 / sld	04/12/12 12:59	ICPMS204-B_120416A	115	16256

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 MCWC-MWB Dupe
Lab ID: H12040177-019
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/11/12 12:45
DateReceived: 04/11/12
Report Date: 04/24/12

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	04/12/12 15:13 / cmm	04/12/12 14:17	-124 (14410200)_120412A	24	16258
INORGANICS											
Alkalinity, Total as CaCO3	89	mg/L		4		A2320 B	04/17/12 15:00 / cmm		MAN-TECH_120417B	12	R79308
Bicarbonate as HCO3	110	mg/L		4		A2320 B	04/17/12 15:00 / cmm		MAN-TECH_120417B	12	R79308
Sulfate	26	mg/L		1		E300.0	04/18/12 13:58 / cmm		IC102-H_120418A	21	R79342
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	3.0	mg/L		0.1		A5310 C	04/13/12 23:12 / eli-c	04/13/12 09:51	SUB-C158451	37	C_33336
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	04/12/12 16:51 / jaw		FIA203-HE_120412D	55	R79198
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	04/12/12 14:48 / jaw		FIA203-HE_120412B	54	R79196
Nitrogen, Total	0.08	mg/L		0.05		A4500 N-C	04/23/12 13:23 / reh	04/12/12 10:51	NUTRIENTS_120423A	29	16253
Phosphorus, Total as P	0.023	mg/L		0.005		E365.1	04/16/12 15:48 / jaw	04/16/12 09:56	FIA202-HE_120416B	58	16279
METALS, DISSOLVED											
Arsenic	0.017	mg/L		0.005		E200.8	04/16/12 23:36 / sld		ICPMS204-B_120416A	116	R79294
Cadmium	ND	mg/L		0.00008		E200.8	04/16/12 23:36 / sld		ICPMS204-B_120416A	116	R79294
Copper	0.003	mg/L		0.001		E200.8	04/16/12 23:36 / sld		ICPMS204-B_120416A	116	R79294
Lead	ND	mg/L		0.0005		E200.8	04/16/12 23:36 / sld		ICPMS204-B_120416A	116	R79294
Zinc	0.02	mg/L		0.01		E200.8	04/18/12 15:27 / sld		ICPMS204-B_120418A	64	R79333
METALS, TOTAL											
Mercury	0.00001	mg/L		0.00001		E245.1	04/17/12 16:27 / sbk	04/16/12 08:39	HGCV201-H_120417A	23	16271
METALS, TOTAL RECOVERABLE											
Arsenic	0.019	mg/L		0.005		E200.8	04/16/12 23:40 / sld	04/12/12 12:59	ICPMS204-B_120416A	117	16256
Cadmium	0.00009	mg/L		0.00008		E200.8	04/16/12 23:40 / sld	04/12/12 12:59	ICPMS204-B_120416A	117	16256
Calcium	27	mg/L		1		E200.7	04/16/12 20:45 / sld	04/12/12 12:59	ICP2-HE_120416C	116	16256
Copper	0.007	mg/L		0.001		E200.8	04/16/12 23:40 / sld	04/12/12 12:59	ICPMS204-B_120416A	117	16256

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 MCWC-MWB Dupe
Lab ID: H12040177-019
Matrix: Aqueous

Project: CFR OU Monitoring
Collection Date: 04/11/12 12:45
DateReceived: 04/11/12
Report Date: 04/24/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Lead	0.0014	mg/L		0.0005		E200.8	04/16/12 23:40 / sld	04/12/12 12:59	ICPMS204-B_120416A	117	16256
Magnesium	7	mg/L		1		E200.7	04/16/12 20:45 / sld	04/12/12 12:59	ICP2-HE_120416C	116	16256
Zinc	0.01	mg/L		0.01		E200.8	04/18/12 15:32 / sld	04/12/12 12:59	ICPMS204-B_120418A	65	16256

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

Client: MT DEQ-Federal Superfund
Work Order: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: 120416wa

Date: *24-Apr-12*

Run ID :Run Order: **HGCV201-H_120416A: 1** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E245.1**

Analysis Date: **04/16/12 14:37** 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
Mercury	0.00018	0.00010	0.0002		91	90	110				

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D**

Run ID :Run Order: **HGCV201-H_120416A: 18** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E245.1**

Analysis Date: **04/16/12 15:18** 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
Mercury	0.00019	0.00010	0.0002		96	90	110				

Associated samples:

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: 120417wa

Date: *24-Apr-12*

Run ID :Run Order: **HGCV201-H_120417A: 7** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E245.1**

Analysis Date: **04/17/12 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
Mercury	0.00019	0.00010	0.0002		97	90	110				

Associated samples: **H12040177-010D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-017D; H12040177-018D; H12040177-019D**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: 16252

Run ID :Run Order: **NUTRIENTS_120423A: 2** SampType: **Laboratory Control Sample** Sample ID: **LCS-2** Method: **A4500 N-C**

Analysis Date: **04/23/12 12:25** 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, Total	21.6	0.20	22.6		96	90	110				

Associated samples: **H12040177-001A; H12040177-002A; H12040177-003A; H12040177-004A; H12040177-005A; H12040177-006A; H12040177-007A; H12040177-008A; H12040177-009A**

Run ID :Run Order: **NUTRIENTS_120423A: 6** SampType: **Method Blank** Sample ID: **MBLK-6** Method: **A4500 N-C**

Analysis Date: **04/23/12 12:33** 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: **H12040177-001A; H12040177-002A; H12040177-003A; H12040177-004A; H12040177-005A; H12040177-006A; H12040177-007A; H12040177-008A; H12040177-009A**

Run ID :Run Order: **NUTRIENTS_120423A: 17** SampType: **Sample Matrix Spike** Sample ID: **H12040177-002AMS** Method: **A4500 N-C**

Analysis Date: **04/23/12 12:59** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** 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	0.980	0.10	1	0.07	91	90	110				

Associated samples: **H12040177-001A; H12040177-002A; H12040177-003A; H12040177-004A; H12040177-005A; H12040177-006A; H12040177-007A; H12040177-008A; H12040177-009A**

Run ID :Run Order: **NUTRIENTS_120423A: 18** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-002AMSD** Method: **A4500 N-C**

Analysis Date: **04/23/12 13:01** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** 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	0.990	0.10	1	0.07	92	90	110	0.98	1.0	20	

Associated samples: **H12040177-001A; H12040177-002A; H12040177-003A; H12040177-004A; H12040177-005A; H12040177-006A; H12040177-007A; H12040177-008A; H12040177-009A**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: 16253

Run ID :Run Order: **NUTRIENTS_120423A: 30** SampType: **Sample Matrix Spike** Sample ID: **H12040177-019AMS** Method: **A4500 N-C**
Analysis Date: **04/23/12 13:25** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** 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	1.04	0.10	1	0.08	96	90	110				

Associated samples: **H12040177-010A; H12040177-011A; H12040177-012A; H12040177-013A; H12040177-014A; H12040177-015A; H12040177-016A; H12040177-017A; H12040177-018A; H12040177-019A**

Run ID :Run Order: **NUTRIENTS_120423A: 31** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-019AMSD** Method: **A4500 N-C**
Analysis Date: **04/23/12 13:27** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** 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	1.07	0.10	1	0.08	99	90	110	1.04	2.8	20	

Associated samples: **H12040177-010A; H12040177-011A; H12040177-012A; H12040177-013A; H12040177-014A; H12040177-015A; H12040177-016A; H12040177-017A; H12040177-018A; H12040177-019A**

Run ID :Run Order: **NUTRIENTS_120423A: 34** SampType: **Laboratory Control Sample** Sample ID: **LCS-36** Method: **A4500 N-C**
Analysis Date: **04/23/12 13:33** 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	20.8	0.20	22.6		92	90	110				

Associated samples: **H12040177-010A; H12040177-011A; H12040177-012A; H12040177-013A; H12040177-014A; H12040177-015A; H12040177-016A; H12040177-017A; H12040177-018A; H12040177-019A**

Run ID :Run Order: **NUTRIENTS_120423A: 35** SampType: **Method Blank** Sample ID: **MBLK-37** Method: **A4500 N-C**
Analysis Date: **04/23/12 13:35** 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
Nitrogen, Total	ND	0.02									

Associated samples: **H12040177-010A; H12040177-011A; H12040177-012A; H12040177-013A; H12040177-014A; H12040177-015A; H12040177-016A; H12040177-017A; H12040177-018A; H12040177-019A**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: 16256

Run ID :Run Order: **ICP2-HE_120416C: 90** SampType: **Method Blank** Sample ID: **MB-16256** Method: **E200.7**
Analysis Date: **04/16/12 19:08** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** Prep Method: **E200.2**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	0.02	0.02									
Magnesium	ND	0.006									

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **ICP2-HE_120416C: 91** SampType: **Laboratory Control Sample** Sample ID: **LCS-16256** Method: **E200.7**
Analysis Date: **04/16/12 19:12** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** Prep Method: **E200.2**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	24.9	1.0	25	0.02425	99	85	115				
Magnesium	24.5	1.0	25		98	85	115				

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **ICP2-HE_120416C: 93** SampType: **Serial Dilution** Sample ID: **H12040177-001DDIL** Method: **E200.7**
Analysis Date: **04/16/12 19:19** 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
Calcium	40.3	1.0				0	0	39.25	2.7	10	
Magnesium	9.99	1.0				0	0	9.818	1.7	10	

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **ICP2-HE_120416C: 95** SampType: **Sample Matrix Spike** Sample ID: **H12040177-001DMS3** Method: **E200.7**
Analysis Date: **04/16/12 19:27** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** Prep Method: **E200.2**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	64.6	1.0	25	39.25	101	70	130				
Magnesium	34.5	1.0	25	9.818	99	70	130				

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-018D; H12040177-019D**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: 16256

Run ID :Run Order: **ICP2-HE_120416C: 96** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-001DMSD3** Method: **E200.7**

Analysis Date: **04/16/12 19:30** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** Prep Method: **E200.2**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	65.1	1.0	25	39.25	104	70	130	64.62	0.8	20	
Magnesium	35.0	1.0	25	9.818	101	70	130	34.5	1.3	20	

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-018D; H12040177-019D**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: 16256

Run ID :Run Order: **ICPMS204-B_120416A: 49** SampType: **Method Blank** Sample ID: **MB-16256** Method: **E200.8**
Analysis Date: **04/16/12 18:30** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** Prep Method: **E200.2**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.00010	5E-05									
Cadmium	ND	2E-05									
Copper	ND	0.0004									
Lead	ND	2E-05									
Zinc	0.002	0.0003									

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **ICPMS204-B_120416A: 50** SampType: **Laboratory Control Sample** Sample ID: **LCS-16256** Method: **E200.8**
Analysis Date: **04/16/12 18:34** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** Prep Method: **E200.2**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.481	0.0010	0.5	0.0000973	96	85	115				
Cadmium	0.253	0.0010	0.25		101	85	115				
Copper	0.487	0.0050	0.5		97	85	115				
Lead	0.509	0.0010	0.5		102	85	115				
Zinc	0.489	0.010	0.5	0.002055	97	85	115				

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **ICPMS204-B_120416A: 53** SampType: **Sample Matrix Spike** Sample ID: **H12040177-001DMS3** Method: **E200.8**
Analysis Date: **04/16/12 18:48** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** Prep Method: **E200.2**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.482	0.0010	0.5	0.006811	95	70	130				
Cadmium	0.249	0.0010	0.25	0.0001238	100	70	130				
Copper	0.487	0.0050	0.5	0.01709	94	70	130				
Lead	0.516	0.0010	0.5	0.002693	103	70	130				
Zinc	0.493	0.010	0.5	0.02553	93	70	130				

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-018D; H12040177-019D**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: 16256

Run ID :Run Order: **ICPMS204-B_120416A: 54** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-001DMSD3** Method: **E200.8**

Analysis Date: **04/16/12 18:52** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** Prep Method: **E200.2**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.481	0.0010	0.5	0.006811	95	70	130	0.4817	0.0	20	
Cadmium	0.245	0.0010	0.25	0.0001238	98	70	130	0.249	1.5	20	
Copper	0.487	0.0050	0.5	0.01709	94	70	130	0.4866	0.1	20	
Lead	0.508	0.0010	0.5	0.002693	101	70	130	0.5165	1.7	20	
Zinc	0.494	0.010	0.5	0.02553	94	70	130	0.4927	0.4	20	

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **ICPMS204-B_120418A: 35** SampType: **Method Blank** Sample ID: **MB-16256** Method: **E200.8**

Analysis Date: **04/18/12 13:14** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** Prep Method: **E200.2**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0001	5E-05									
Cadmium	ND	2E-05									
Copper	ND	0.0004									
Lead	ND	2E-05									
Zinc	0.001	0.0003									

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-018D; H12040177-019D**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: 16258

Run ID :Run Order: **ACCU-124 (14410200)_120412A: 1** SampType: **Method Blank** Sample ID: **MB-16258** Method: **A2540 D**

Analysis Date: **04/12/12 15:08** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** 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	2									

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B; H12040177-018B; H12040177-019B**

Run ID :Run Order: **ACCU-124 (14410200)_120412A: 2** SampType: **Laboratory Control Sample** Sample ID: **LCS-16258** Method: **A2540 D**

Analysis Date: **04/12/12 15:08** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** 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	1830	10	2000		92	70	130				

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B; H12040177-018B; H12040177-019B**

Run ID :Run Order: **ACCU-124 (14410200)_120412A: 7** SampType: **Sample Duplicate** Sample ID: **H12040177-003BDUP** Method: **A2540 D**

Analysis Date: **04/12/12 15:09** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** 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	32.0	10						32	0.0	5	

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B; H12040177-018B; H12040177-019B**

Run ID :Run Order: **ACCU-124 (14410200)_120412A: 17** SampType: **Sample Duplicate** Sample ID: **H12040177-012BDUP** Method: **A2540 D**

Analysis Date: **04/12/12 15:11** Units: **mg/L** **Prep Info:** Prep Date: **4/12/2012** 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	16.0	10						16	0.0	5	

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B; H12040177-018B; H12040177-019B**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: 16271

Run ID :Run Order: **HGCV201-H_120416A: 4** SampType: **Method Blank** Sample ID: **MB-16271** Method: **E245.1**
Analysis Date: **04/16/12 14:45** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** Prep Method: **E245.1**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	9E-06									

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-010D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-017D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **HGCV201-H_120416A: 5** SampType: **Laboratory Control Sample** Sample ID: **LCS-16271** Method: **E245.1**
Analysis Date: **04/16/12 14:47** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** Prep Method: **E245.1**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00019	0.00010	0.0002		93	90	110				

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-010D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-017D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **HGCV201-H_120416A: 11** SampType: **Sample Matrix Spike** Sample ID: **H12040177-004DMS** Method: **E245.1**
Analysis Date: **04/16/12 15:01** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** Prep Method: **E245.1**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00032	0.00010	0.0002	0.0001022	108	70	130				

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-010D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-017D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **HGCV201-H_120416A: 12** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-004DMSD** Method: **E245.1**
Analysis Date: **04/16/12 15:04** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** Prep Method: **E245.1**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00032	0.00010	0.0002	0.0001022	108	70	130	0.0003187	0.1	30	

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-010D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-017D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **HGCV201-H_120417A: 10** SampType: **Method Blank** Sample ID: **MB-16271** Method: **E245.1**
Analysis Date: **04/17/12 15:56** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** Prep Method: **E245.1**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	9E-06									

Qualifiers:
ND - Not Detected at the Reporting Limit
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A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: 16271

Run ID :Run Order: **HGCV201-H_120417A: 10** SampType: **Method Blank** Sample ID: **MB-16271** Method: **E245.1**
Analysis Date: **04/17/12 15:56** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** Prep Method: **E245.1**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-010D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-017D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **HGCV201-H_120417A: 11** SampType: **Laboratory Control Sample** Sample ID: **LCS-16271** Method: **E245.1**
Analysis Date: **04/17/12 15:58** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** Prep Method: **E245.1**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00019	0.00010	0.0002		96	90	110				

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-010D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-017D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **HGCV201-H_120417A: 21** SampType: **Sample Matrix Spike** Sample ID: **H12040177-018DMS** Method: **E245.1**
Analysis Date: **04/17/12 16:22** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** Prep Method: **E245.1**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00023	0.00010	0.0002	0.00001406	110	70	130				

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-010D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-017D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **HGCV201-H_120417A: 22** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-018DMSD** Method: **E245.1**
Analysis Date: **04/17/12 16:25** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** Prep Method: **E245.1**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00023	0.00010	0.0002	0.00001406	108	70	130	0.0002333	1.5	30	

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-010D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-017D; H12040177-018D; H12040177-019D**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: 16278

Run ID :Run Order: **FIA202-HE_120416B: 15** SampType: **Method Blank** Sample ID: **MB-16278** Method: **E365.1**
Analysis Date: **04/16/12 15:04** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** 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: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E**

Run ID :Run Order: **FIA202-HE_120416B: 16** SampType: **Laboratory Control Sample** Sample ID: **LCS-16278** Method: **E365.1**
Analysis Date: **04/16/12 15:05** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** 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	41.8	0.10	41.6		101	90	110				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E**

Run ID :Run Order: **FIA202-HE_120416B: 22** SampType: **Sample Matrix Spike** Sample ID: **H12040167-002FMS** Method: **E365.1**
Analysis Date: **04/16/12 15:11** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** 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	0.229	0.010	0.2	0.03613	97	90	110				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E**

Run ID :Run Order: **FIA202-HE_120416B: 23** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040167-002FMSD** Method: **E365.1**
Analysis Date: **04/16/12 15:12** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** 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	0.235	0.010	0.2	0.03613	100	90	110	0.2292	2.6	20	

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E**

Run ID :Run Order: **FIA202-HE_120416B: 41** SampType: **Sample Matrix Spike** Sample ID: **H12040177-010EMS** Method: **E365.1**
Analysis Date: **04/16/12 15:31** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** 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	0.181	0.010	0.2		91	90	110				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: 16278

Date: *24-Apr-12*

Run ID :Run Order: **FIA202-HE_120416B: 42** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-010EMSD** Method: **E365.1**

Analysis Date: **04/16/12 15:32** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** 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	0.186	0.010	0.2		93	90	110	0.181	2.7	20	

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: 16279

Run ID :Run Order: **FIA202-HE_120416B: 48** SampType: **Method Blank** Sample ID: **MB-16279** Method: **E365.1**
Analysis Date: **04/16/12 15:38** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** 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: **H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA202-HE_120416B: 49** SampType: **Laboratory Control Sample** Sample ID: **LCS-16279** Method: **E365.1**
Analysis Date: **04/16/12 15:39** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** 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	41.9	0.10	41.6		101	90	110				

Associated samples: **H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA202-HE_120416B: 55** SampType: **Sample Matrix Spike** Sample ID: **H12040177-017EMS** Method: **E365.1**
Analysis Date: **04/16/12 15:45** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** 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	0.182	0.010	0.2		91	90	110				

Associated samples: **H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA202-HE_120416B: 56** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-017EMSD** Method: **E365.1**
Analysis Date: **04/16/12 15:46** Units: **mg/L** **Prep Info:** Prep Date: **4/16/2012** 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	0.188	0.010	0.2		94	90	110	0.1824	2.8	20	

Associated samples: **H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: A2012-04-23_5_TOT_01

Run ID :Run Order: **NUTRIENTS_120423A: 1** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV-1** Method: **A4500 N-C**

Analysis Date: **04/23/12 12:23** 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	0.960	0.10	1		96	90	110				

Associated samples: **H12040177-001A; H12040177-002A; H12040177-003A; H12040177-004A; H12040177-005A; H12040177-006A; H12040177-007A; H12040177-008A; H12040177-009A; H12040177-010A; H12040177-011A; H12040177-012A; H12040177-013A; H12040177-014A; H12040177-015A; H12040177-016A; H12040177-017A; H12040177-018A; H12040177-019A**

Run ID :Run Order: **NUTRIENTS_120423A: 4** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV-4** Method: **A4500 N-C**

Analysis Date: **04/23/12 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
Nitrogen, Total	0.480	0.10	0.5		96	90	110				

Associated samples: **H12040177-001A; H12040177-002A; H12040177-003A; H12040177-004A; H12040177-005A; H12040177-006A; H12040177-007A; H12040177-008A; H12040177-009A; H12040177-010A**

Run ID :Run Order: **NUTRIENTS_120423A: 5** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **A4500 N-C**

Analysis Date: **04/23/12 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, Total	-0.0500	0.10				0	0				

Associated samples: **H12040177-001A; H12040177-002A; H12040177-003A; H12040177-004A; H12040177-005A; H12040177-006A; H12040177-007A; H12040177-008A; H12040177-009A; H12040177-010A; H12040177-011A; H12040177-012A; H12040177-013A; H12040177-014A; H12040177-015A; H12040177-016A; H12040177-017A; H12040177-018A; H12040177-019A**

Run ID :Run Order: **NUTRIENTS_120423A: 20** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV-22** Method: **A4500 N-C**

Analysis Date: **04/23/12 13:05** 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
Nitrogen, Total	0.470	0.10	0.5		94	90	110				

Associated samples: **H12040177-011A; H12040177-012A; H12040177-013A; H12040177-014A; H12040177-015A; H12040177-016A; H12040177-017A; H12040177-018A; H12040177-019A**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: C_33336

Date: *24-Apr-12*

Run ID :Run Order: **SUB-C158451: 15** SampType: **Method Blank** Sample ID: **MB-33336** Method: **A5310 C**
Analysis Date: **04/13/12 18:47** Units: **mg/L** **Prep Info:** Prep Date: **4/13/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	ND	0.1									

Associated samples: **H12040177-001F; H12040177-002F; H12040177-003F; H12040177-004F;** H12040177-005F; H12040177-006F; H12040177-007F; **H12040177-008F; H12040177-009F; H12040177-010F; H12040177-011F; H12040177-012F;** H12040177-013F; H12040177-014F; H12040177-015F; **H12040177-016F;** H12040177-017F; H12040177-018F; **H12040177-019F**

Run ID :Run Order: **SUB-C158451: 16** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV-33336** Method: **A5310 C**
Analysis Date: **04/13/12 19:01** Units: **mg/L** **Prep Info:** Prep Date: **4/13/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	9.84	0.10	10		98	90	110				

Associated samples: **H12040177-001F; H12040177-002F; H12040177-003F; H12040177-004F;** H12040177-005F; H12040177-006F; H12040177-007F; **H12040177-008F; H12040177-009F;** H12040177-010F; **H12040177-011F; H12040177-012F;** H12040177-013F; H12040177-014F; H12040177-015F; **H12040177-016F; H12040177-017F;** H12040177-018F; **H12040177-019F**

Run ID :Run Order: **SUB-C158451: 27** SampType: **Sample Matrix Spike** Sample ID: **H12040177-001F** Method: **A5310 C**
Analysis Date: **04/13/12 20:51** Units: **mg/L** **Prep Info:** Prep Date: **4/13/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	7.72	0.50	5	2.691	101	85	115				

Associated samples: **H12040177-001F; H12040177-002F; H12040177-003F; H12040177-004F;** H12040177-005F; H12040177-006F; H12040177-007F; **H12040177-008F; H12040177-009F;** H12040177-010F; **H12040177-011F; H12040177-012F;** H12040177-013F; H12040177-014F; H12040177-015F; **H12040177-016F; H12040177-017F;** H12040177-018F; **H12040177-019F**

Run ID :Run Order: **SUB-C158451: 28** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-001F** Method: **A5310 C**
Analysis Date: **04/13/12 21:02** Units: **mg/L** **Prep Info:** Prep Date: **4/13/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	7.82	0.50	5	2.691	103	85	115	7.718	1.3	10	

Associated samples: **H12040177-001F; H12040177-002F; H12040177-003F; H12040177-004F;** H12040177-005F; H12040177-006F; H12040177-007F; **H12040177-008F; H12040177-009F; H12040177-010F; H12040177-011F; H12040177-012F;** H12040177-013F; H12040177-014F; H12040177-015F; **H12040177-016F; H12040177-017F;** H12040177-018F; **H12040177-019F**

Run ID :Run Order: **SUB-C158451: 38** SampType: **Sample Matrix Spike** Sample ID: **H12040177-011F** Method: **A5310 C**
Analysis Date: **04/13/12 23:33** Units: **mg/L** **Prep Info:** Prep Date: **4/13/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	6.80	0.50	5	1.823	100	85	115				

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: C_33336

Date: *24-Apr-12*

Run ID :Run Order: **SUB-C158451: 38** SampType: **Sample Matrix Spike** Sample ID: **H12040177-011F** Method: **A5310 C**
Analysis Date: **04/13/12 23:33** Units: **mg/L** **Prep Info:** Prep Date: **4/13/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Associated samples: **H12040177-001F; H12040177-002F; H12040177-003F; H12040177-004F; H12040177-005F; H12040177-006F; H12040177-007F; H12040177-008F; H12040177-009F; H12040177-010F; H12040177-011F; H12040177-012F; H12040177-013F; H12040177-014F; H12040177-015F; H12040177-016F; H12040177-017F; H12040177-018F; H12040177-019F**

Run ID :Run Order: **SUB-C158451: 39** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-011F** Method: **A5310 C**
Analysis Date: **04/13/12 23:43** Units: **mg/L** **Prep Info:** Prep Date: **4/13/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	6.94	0.50	5	1.823	102	85	115	6.803	2.0	10	

Associated samples: **H12040177-001F; H12040177-002F; H12040177-003F; H12040177-004F; H12040177-005F; H12040177-006F; H12040177-007F; H12040177-008F; H12040177-009F; H12040177-010F; H12040177-011F; H12040177-012F; H12040177-013F; H12040177-014F; H12040177-015F; H12040177-016F; H12040177-017F; H12040177-018F; H12040177-019F**

Run ID :Run Order: **SUB-C158451: 40** SampType: **Laboratory Control Sample** Sample ID: **LCS-33336** Method: **A5310 C**
Analysis Date: **04/13/12 23:54** Units: **mg/L** **Prep Info:** Prep Date: **4/13/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	10.1	0.10	10		101	90	110				

Associated samples: **H12040177-001F; H12040177-002F; H12040177-003F; H12040177-004F; H12040177-005F; H12040177-006F; H12040177-007F; H12040177-008F; H12040177-009F; H12040177-010F; H12040177-011F; H12040177-012F; H12040177-013F; H12040177-014F; H12040177-015F; H12040177-016F; H12040177-017F; H12040177-018F; H12040177-019F**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79196

Run ID :Run Order: **FIA203-HE_120412B: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E353.2**

Analysis Date: **04/12/12 13:53** 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	1.02	0.010	1		102	90	110				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412B: 9** SampType: **Laboratory Control Sample** Sample ID: **LCS** Method: **E353.2**

Analysis Date: **04/12/12 13:54** 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	6.80	0.050	6.45		105	90	110				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412B: 10** SampType: **Laboratory Fortified Blank** Sample ID: **LFB** Method: **E353.2**

Analysis Date: **04/12/12 13:56** 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
Nitrogen, Nitrate+Nitrite as N	0.964	0.010	1		96	90	110				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412B: 11** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E353.2**

Analysis Date: **04/12/12 13:57** 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	0.494	0.010	0.5		99	90	110				

Associated samples: **H12040177-001E**

Run ID :Run Order: **FIA203-HE_120412B: 13** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **E353.2**

Analysis Date: **04/12/12 13:59** 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
Nitrogen, Nitrate+Nitrite as N	-0.00636	0.010				0	0				

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79196

Run ID :Run Order: **FIA203-HE_120412B: 13** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **E353.2**
Analysis Date: **04/12/12 13:59** 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

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412B: 14** SampType: **Method Blank** Sample ID: **MBLK** Method: **E353.2**
Analysis Date: **04/12/12 14:00** 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	0.002									

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412B: 30** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E353.2**
Analysis Date: **04/12/12 14:19** 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	0.496	0.010	0.5		99	90	110				

Associated samples: **H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E**

Run ID :Run Order: **FIA203-HE_120412B: 32** SampType: **Sample Matrix Spike** Sample ID: **H12040177-002EMS** Method: **E353.2**
Analysis Date: **04/12/12 14:22** 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, Nitrate+Nitrite as N	0.966	0.010	1		97	90	110				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412B: 33** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-002EMSD** Method: **E353.2**
Analysis Date: **04/12/12 14:23** 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	0.960	0.010	1		96	90	110	0.9662	0.7	20	

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79196

Run ID :Run Order: **FIA203-HE_120412B: 44** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E353.2**
Analysis Date: **04/12/12 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
Nitrogen, Nitrate+Nitrite as N	0.490	0.010	0.5		98	90	110				

Associated samples: **H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412B: 46** SampType: **Sample Matrix Spike** Sample ID: **H12040177-012EMS** Method: **E353.2**
Analysis Date: **04/12/12 14:39** 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	1.38	0.010	1	0.4754	91	90	110				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412B: 47** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-012EMSD** Method: **E353.2**
Analysis Date: **04/12/12 14:40** 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
Nitrogen, Nitrate+Nitrite as N	1.39	0.010	1	0.4754	91	90	110	1.381	0.6	20	

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412B: 60** SampType: **Sample Matrix Spike** Sample ID: **H12040179-003FMS** Method: **E353.2**
Analysis Date: **04/12/12 14:55** 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
Nitrogen, Nitrate+Nitrite as N	1.17	0.010	1	0.2072	96	90	110				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412B: 61** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040179-003FMSD** Method: **E353.2**
Analysis Date: **04/12/12 14:56** 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
Nitrogen, Nitrate+Nitrite as N	1.14	0.010	1	0.2072	94	90	110	1.166	2.0	20	

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: R79196

Date: *24-Apr-12*

Run ID :Run Order: **FIA203-HE_120412B: 61** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040179-003FMSD** Method: **E353.2**

Analysis Date: **04/12/12 14:56** 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

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79198

Run ID :Run Order: **FIA203-HE_120412D: 7** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E350.1**
Analysis Date: **04/12/12 15:53** 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, Ammonia as N	1.01	0.050	1		101	90	110				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412D: 8** SampType: **Laboratory Control Sample** Sample ID: **LCS** Method: **E350.1**
Analysis Date: **04/12/12 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
Nitrogen, Ammonia as N	10.6	0.50	10.2		104	90	110				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412D: 9** SampType: **Laboratory Fortified Blank** Sample ID: **LFB** Method: **E350.1**
Analysis Date: **04/12/12 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
Nitrogen, Ammonia as N	0.952	0.050	1		95	90	110				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412D: 10** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E350.1**
Analysis Date: **04/12/12 15:57** 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	0.493	0.050	0.5		99	90	110				

Associated samples: **H12040177-001E; H12040177-002E**

Run ID :Run Order: **FIA203-HE_120412D: 11** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **E350.1**
Analysis Date: **04/12/12 15:58** 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, Ammonia as N	-0.0285	0.050				0	0				

Qualifiers:
ND - Not Detected at the Reporting Limit
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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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: R79198

Date: *24-Apr-12*

Run ID :Run Order: **FIA203-HE_120412D: 11** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **E350.1**
Analysis Date: **04/12/12 15:58** 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

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412D: 12** SampType: **Method Blank** Sample ID: **MBLK** Method: **E350.1**
Analysis Date: **04/12/12 15:59** 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
Nitrogen, Ammonia as N	ND	0.02									

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412D: 20** SampType: **Sample Matrix Spike** Sample ID: **H12040143-001CMS** Method: **E350.1**
Analysis Date: **04/12/12 16:09** 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	0.965	0.050	1	0.04438	92	80	120				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412D: 21** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040143-001CMSD** Method: **E350.1**
Analysis Date: **04/12/12 16:10** 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	0.963	0.050	1	0.04438	92	80	120	0.9647	0.2	10	

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412D: 31** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E350.1**
Analysis Date: **04/12/12 16:22** 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, Ammonia as N	0.500	0.050	0.5		100	90	110				

Associated samples: **H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E**

Qualifiers:
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A - Analyte concentration greater than three times the spike amount

Client: MT DEQ-Federal Superfund
Work Order: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79198

Run ID :Run Order: **FIA203-HE_120412D: 40** SampType: **Sample Matrix Spike** Sample ID: **H12040177-010EMS** Method: **E350.1**
Analysis Date: **04/12/12 16:33** 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	0.050	1		97	80	120				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412D: 41** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-010EMSD** Method: **E350.1**
Analysis Date: **04/12/12 16:34** 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	0.974	0.050	1		97	80	120	0.9749	0.1	10	

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412D: 45** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E350.1**
Analysis Date: **04/12/12 16:39** 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	0.492	0.050	0.5		98	90	110				

Associated samples: **H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412D: 52** SampType: **Sample Matrix Spike** Sample ID: **H12040177-017EMS** Method: **E350.1**
Analysis Date: **04/12/12 16:47** 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, Ammonia as N	0.975	0.050	1		98	80	120				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA203-HE_120412D: 53** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-017EMSD** Method: **E350.1**
Analysis Date: **04/12/12 16:48** 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	0.970	0.050	1		97	80	120	0.9752	0.5	10	

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79198

Run ID :Run Order: **FIA203-HE_120412D: 53** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-017EMSD** Method: **E350.1**

Analysis Date: **04/12/12 16:48** 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

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79266

Run ID :Run Order: **MAN-TECH_120416A: 6** SampType: **Method Blank** Sample ID: **MBLK** Method: **A2320 B**
Analysis Date: **04/13/12 14:00** 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	1									

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B; H12040177-018B**

Run ID :Run Order: **MAN-TECH_120416A: 7** SampType: **Laboratory Control Sample** Sample ID: **LCS-03013012** Method: **A2320 B**
Analysis Date: **04/13/12 14:08** 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
Alkalinity, Total as CaCO3	610	4.0	600		102	90	110				

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B; H12040177-018B**

Run ID :Run Order: **MAN-TECH_120416A: 12** SampType: **Sample Duplicate** Sample ID: **H12040177-002BDUP** Method: **A2320 B**
Analysis Date: **04/13/12 14:41** 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	51	4.0						51.54	1.8	10	
Bicarbonate as HCO3	62	4.0						62.88	1.8	10	

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B; H12040177-018B**

Run ID :Run Order: **MAN-TECH_120416A: 18** SampType: **Sample Matrix Spike** Sample ID: **H12040177-007BMS** Method: **A2320 B**
Analysis Date: **04/13/12 15:26** 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
Alkalinity, Total as CaCO3	680	4.0	600	105.6	95	80	120				

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B; H12040177-018B**

Run ID :Run Order: **MAN-TECH_120416A: 23** SampType: **Sample Duplicate** Sample ID: **H12040177-011BDUP** Method: **A2320 B**
Analysis Date: **04/13/12 15:57** 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	72	4.0						72.45	0.1	10	

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79266

Run ID :Run Order: **MAN-TECH_120416A: 23** SampType: **Sample Duplicate** Sample ID: **H12040177-011BDUP** Method: **A2320 B**

Analysis Date: **04/13/12 15:57** 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
Bicarbonate as HCO3	88	4.0						88.39	0.1	10	

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B; H12040177-018B**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: R79267

Date: *24-Apr-12*

Run ID :Run Order: **FIA202-HE_120416B: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E365.1**
Analysis Date: **04/16/12 14:57** 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	0.237	0.010	0.25		95	90	110				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA202-HE_120416B: 11** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E365.1**
Analysis Date: **04/16/12 15:00** 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	0.248	0.010	0.25		99	90	110				

Associated samples: **H12040177-001E; H12040177-002E**

Run ID :Run Order: **FIA202-HE_120416B: 13** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **E365.1**
Analysis Date: **04/16/12 15:02** 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	-0.000890	0.010				0	0				

Associated samples: **H12040177-001E; H12040177-002E; H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E; H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

Run ID :Run Order: **FIA202-HE_120416B: 31** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E365.1**
Analysis Date: **04/16/12 15:21** 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	0.240	0.010	0.25		96	90	110				

Associated samples: **H12040177-003E; H12040177-004E; H12040177-005E; H12040177-006E; H12040177-007E; H12040177-008E; H12040177-009E; H12040177-010E; H12040177-011E; H12040177-012E**

Run ID :Run Order: **FIA202-HE_120416B: 46** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E365.1**
Analysis Date: **04/16/12 15:36** 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
Phosphorus, Total as P	0.240	0.010	0.25		96	90	110				

Associated samples: **H12040177-013E; H12040177-014E; H12040177-015E; H12040177-016E; H12040177-017E; H12040177-018E; H12040177-019E**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79271

Run ID :Run Order: **ICP2-HE_120416C: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**

Analysis Date: **04/16/12 13:51** 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
Calcium	39.6	1.0	40		99	95	105				
Magnesium	39.6	1.0	40		99	95	105				

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-010D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-017D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **ICP2-HE_120416C: 7** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV-1** Method: **E200.7**

Analysis Date: **04/16/12 13:55** 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
Calcium	25.3	1.0	25		101	95	105				
Magnesium	24.9	1.0	25		100	95	105				

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-010D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-017D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **ICP2-HE_120416C: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**

Analysis Date: **04/16/12 14:06** 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
Calcium	493	1.0	500		99	80	120				
Magnesium	528	1.0	500		106	80	120				

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-010D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-017D; H12040177-018D; H12040177-019D**

Run ID :Run Order: **ICP2-HE_120416C: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**

Analysis Date: **04/16/12 14:10** 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
Calcium	477	1.0	500		95	80	120				
Magnesium	507	1.0	500		101	80	120				

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-010D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-017D; H12040177-018D; H12040177-019D**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79271

Run ID :Run Order: **ICP2-HE_120416C: 13** SampType: **Method Blank** Sample ID: **ICB** Method: **E200.7**
Analysis Date: **04/16/12 14:18** 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
Calcium	0.02	0.008									
Magnesium	ND	0.003									

Associated samples: **H12040177-010D; H12040177-017D**

Run ID :Run Order: **ICP2-HE_120416C: 14** SampType: **Laboratory Fortified Blank** Sample ID: **LFB** Method: **E200.7**
Analysis Date: **04/16/12 14:21** 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
Calcium	47.2	1.0	50	0.02273	94	85	115				
Magnesium	46.9	1.0	50		94	85	115				

Associated samples: **H12040177-010D; H12040177-017D**

Run ID :Run Order: **ICP2-HE_120416C: 74** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E200.7**
Analysis Date: **04/16/12 18:08** 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
Calcium	25.0	1.0	25		100	90	110				
Magnesium	24.6	1.0	25		98	90	110				

Associated samples: **H12040177-010D; H12040177-017D**

Run ID :Run Order: **ICP2-HE_120416C: 85** SampType: **Serial Dilution** Sample ID: **H12040177-017DDIL** Method: **E200.7**
Analysis Date: **04/16/12 18:50** 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
Calcium	0.135	1.0				0	0	0.03349		10	N
Magnesium	ND	1.0				0	0			10	

Associated samples: **H12040177-010D; H12040177-017D**

Run ID :Run Order: **ICP2-HE_120416C: 86** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E200.7**
Analysis Date: **04/16/12 18:53** 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
Calcium	25.0	1.0	25		100	90	110				
Magnesium	24.5	1.0	25		98	90	110				

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79271

Run ID :Run Order: **ICP2-HE_120416C: 86** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E200.7**
Analysis Date: **04/16/12 18:53** 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

Associated samples: **H12040177-001D; H12040177-002D**

Run ID :Run Order: **ICP2-HE_120416C: 88** SampType: **Sample Matrix Spike** Sample ID: **H12040177-017DMS2** Method: **E200.7**
Analysis Date: **04/16/12 19:01** 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
Calcium	48.1	1.0	50	0.03349	96	70	130				
Magnesium	48.1	1.0	50		96	70	130				

Associated samples: **H12040177-010D; H12040177-017D**

Run ID :Run Order: **ICP2-HE_120416C: 89** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-017DMSD2** Method: **E200.7**
Analysis Date: **04/16/12 19:04** 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
Calcium	48.4	1.0	50	0.03349	97	70	130	48.12	0.6	20	
Magnesium	48.1	1.0	50		96	70	130	48.15	0.2	20	

Associated samples: **H12040177-010D; H12040177-017D**

Run ID :Run Order: **ICP2-HE_120416C: 98** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E200.7**
Analysis Date: **04/16/12 19:38** 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
Calcium	24.8	1.0	25		99	90	110				
Magnesium	24.2	1.0	25		97	90	110				

Associated samples: **H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D; H12040177-011D; H12040177-012D; H12040177-013D**

Run ID :Run Order: **ICP2-HE_120416C: 110** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E200.7**
Analysis Date: **04/16/12 20:23** 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
Calcium	25.3	1.0	25		101	90	110				
Magnesium	25.0	1.0	25		100	90	110				

Associated samples: **H12040177-014D; H12040177-015D; H12040177-016D; H12040177-018D; H12040177-019D**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79294

Run ID :Run Order: **ICPMS204-B_120416A: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **E200.8**

Analysis Date: **04/16/12 15:20** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0484	0.0050	0.05		97	90	110				
Cadmium	0.0260	0.0010	0.025		104	90	110				
Copper	0.0504	0.010	0.05		101	90	110				
Lead	0.0496	0.010	0.05		99	90	110				
Zinc	0.0502	0.010	0.05		100	90	110				

Associated samples: **H12040177-001C; H12040177-001D; H12040177-002C; H12040177-002D; H12040177-003C; H12040177-003D; H12040177-004C; H12040177-004D; H12040177-005C; H12040177-005D; H12040177-006C; H12040177-006D; H12040177-007C; H12040177-007D; H12040177-008C; H12040177-008D; H12040177-009C; H12040177-009D; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-011D; H12040177-012C; H12040177-012D; H12040177-013C; H12040177-013D; H12040177-014C; H12040177-014D; H12040177-015C; H12040177-015D; H12040177-016C; H12040177-016D; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-018D; H12040177-019C; H12040177-019D**

Run ID :Run Order: **ICPMS204-B_120416A: 9** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.8**

Analysis Date: **04/16/12 15:24** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.000131	0.0050									
Cadmium	0.00111	0.0010									
Copper	0.000164	0.010									
Lead	0.000132	0.010									
Zinc	0.00110	0.010									

Associated samples: **H12040177-001C; H12040177-001D; H12040177-002C; H12040177-002D; H12040177-003C; H12040177-003D; H12040177-004C; H12040177-004D; H12040177-005C; H12040177-005D; H12040177-006C; H12040177-006D; H12040177-007C; H12040177-007D; H12040177-008C; H12040177-008D; H12040177-009C; H12040177-009D; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-011D; H12040177-012C; H12040177-012D; H12040177-013C; H12040177-013D; H12040177-014C; H12040177-014D; H12040177-015C; H12040177-015D; H12040177-016C; H12040177-016D; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-018D; H12040177-019C; H12040177-019D**

Run ID :Run Order: **ICPMS204-B_120416A: 10** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**

Analysis Date: **04/16/12 15:29** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.00972	0.0050	0.01		97	70	130				
Cadmium	0.0104	0.0010	0.01		104	70	130				
Copper	0.0189	0.010	0.02		94	70	130				
Lead	0.000118	0.010				0	0				
Zinc	0.0107	0.010	0.01		107	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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79294

Run ID :Run Order: **ICPMS204-B_120416A: 10** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**

Analysis Date: **04/16/12 15:29** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Associated samples: **H12040177-001C; H12040177-001D; H12040177-002C; H12040177-002D; H12040177-003C; H12040177-003D; H12040177-004C; H12040177-004D; H12040177-005C; H12040177-005D; H12040177-006C; H12040177-006D; H12040177-007C; H12040177-007D; H12040177-008C; H12040177-008D; H12040177-009C; H12040177-009D; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-011D; H12040177-012C; H12040177-012D; H12040177-013C; H12040177-013D; H12040177-014C; H12040177-014D; H12040177-015C; H12040177-015D; H12040177-016C; H12040177-016D; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-018D; H12040177-019C; H12040177-019D**

Run ID :Run Order: **ICPMS204-B_120416A: 22** SampType: **Method Blank** Sample ID: **ICB** Method: **E200.8**

Analysis Date: **04/16/12 16:24** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	3E-05									
Cadmium	ND	1E-05									
Copper	ND	3E-05									
Lead	ND	1.0E-05									
Zinc	ND	0.0003									

Associated samples: **H12040177-001C; H12040177-002C; H12040177-003C; H12040177-004C; H12040177-005C; H12040177-006C; H12040177-007C; H12040177-008C; H12040177-009C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-013C; H12040177-014C; H12040177-015C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-019C**

Run ID :Run Order: **ICPMS204-B_120416A: 23** SampType: **Laboratory Fortified Blank** Sample ID: **LFB** Method: **E200.8**

Analysis Date: **04/16/12 16:31** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0458	0.0050	0.05		92	85	115				
Cadmium	0.0463	0.0010	0.05		93	85	115				
Copper	0.0441	0.010	0.05		88	85	115				
Lead	0.0478	0.010	0.05		96	85	115				
Zinc	0.0462	0.010	0.05		92	85	115				

Associated samples: **H12040177-001C; H12040177-002C; H12040177-003C; H12040177-004C; H12040177-005C; H12040177-006C; H12040177-007C; H12040177-008C; H12040177-009C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-013C; H12040177-014C; H12040177-015C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-019C**

Run ID :Run Order: **ICPMS204-B_120416A: 41** SampType: **Sample Matrix Spike** Sample ID: **H12040177-001CMS** Method: **E200.8**

Analysis Date: **04/16/12 17:53** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0512	0.0010	0.05	0.004881	93	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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79294

Run ID :Run Order: **ICPMS204-B_120416A: 41** SampType: **Sample Matrix Spike** Sample ID: **H12040177-001CMS** Method: **E200.8**

Analysis Date: **04/16/12 17:53** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	0.0463	0.0010	0.05	0.0000291	93	70	130				
Copper	0.0477	0.0050	0.05	0.003717	88	70	130				
Lead	0.0466	0.0010	0.05	0.0000695	93	70	130				
Zinc	0.0578	0.010	0.05	0.01379	88	70	130				

Associated samples: **H12040177-001C; H12040177-002C; H12040177-003C; H12040177-004C; H12040177-005C; H12040177-006C; H12040177-007C; H12040177-008C; H12040177-009C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-013C; H12040177-014C; H12040177-015C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-019C**

Run ID :Run Order: **ICPMS204-B_120416A: 42** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-001CMSD** Method: **E200.8**

Analysis Date: **04/16/12 17:57** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0521	0.0010	0.05	0.004881	94	70	130	0.05124	1.7	20	
Cadmium	0.0463	0.0010	0.05	0.0000291	93	70	130	0.04631	0.0	20	
Copper	0.0481	0.0050	0.05	0.003717	89	70	130	0.04772	0.8	20	
Lead	0.0472	0.0010	0.05	0.0000695	94	70	130	0.04661	1.2	20	
Zinc	0.0587	0.010	0.05	0.01379	90	70	130	0.05783	1.5	20	

Associated samples: **H12040177-001C; H12040177-002C; H12040177-003C; H12040177-004C; H12040177-005C; H12040177-006C; H12040177-007C; H12040177-008C; H12040177-009C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-013C; H12040177-014C; H12040177-015C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-019C**

Run ID :Run Order: **ICPMS204-B_120416A: 86** SampType: **Sample Matrix Spike** Sample ID: **H12040177-010DMS** Method: **E200.8**

Analysis Date: **04/16/12 21:19** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0458	0.0010	0.05		92	70	130				
Cadmium	0.0464	0.0010	0.05		93	70	130				
Copper	0.0456	0.0050	0.05		91	70	130				
Lead	0.0474	0.0010	0.05		95	70	130				
Zinc	0.0468	0.010	0.05	0.001041	92	70	130				

Associated samples: **H12040177-001C; H12040177-002C; H12040177-003C; H12040177-004C; H12040177-005C; H12040177-006C; H12040177-007C; H12040177-008C; H12040177-009C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-013C; H12040177-014C; H12040177-015C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-019C**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79294

Run ID :Run Order: **ICPMS204-B_120416A: 87** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-010DMSD** Method: **E200.8**

Analysis Date: **04/16/12 21:23** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0468	0.0010	0.05		94	70	130	0.04578	2.3	20	
Cadmium	0.0456	0.0010	0.05		91	70	130	0.04636	1.8	20	
Copper	0.0460	0.0050	0.05		92	70	130	0.04562	0.8	20	
Lead	0.0471	0.0010	0.05		94	70	130	0.0474	0.7	20	
Zinc	0.0475	0.010	0.05	0.001041	93	70	130	0.04684	1.5	20	

Associated samples: **H12040177-001C; H12040177-002C; H12040177-003C; H12040177-004C; H12040177-005C; H12040177-006C; H12040177-007C; H12040177-008C; H12040177-009C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-013C; H12040177-014C; H12040177-015C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-019C**

Run ID :Run Order: **ICPMS204-B_120416A: 90** SampType: **Sample Matrix Spike** Sample ID: **H12040177-011CMS** Method: **E200.8**

Analysis Date: **04/16/12 21:37** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0473	0.0010	0.05	0.001471	92	70	130				
Cadmium	0.0456	0.0010	0.05	0.0000195	91	70	130				
Copper	0.0452	0.0050	0.05	0.0007284	89	70	130				
Lead	0.0472	0.0010	0.05	0.0000347	94	70	130				
Zinc	0.0626	0.010	0.05	0.01863	88	70	130				

Associated samples: **H12040177-001C; H12040177-002C; H12040177-003C; H12040177-004C; H12040177-005C; H12040177-006C; H12040177-007C; H12040177-008C; H12040177-009C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-013C; H12040177-014C; H12040177-015C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-019C**

Run ID :Run Order: **ICPMS204-B_120416A: 91** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-011CMSD** Method: **E200.8**

Analysis Date: **04/16/12 21:41** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0479	0.0010	0.05	0.001471	93	70	130	0.0473	1.2	20	
Cadmium	0.0453	0.0010	0.05	0.0000195	91	70	130	0.04564	0.8	20	
Copper	0.0459	0.0050	0.05	0.0007284	90	70	130	0.04515	1.7	20	
Lead	0.0474	0.0010	0.05	0.0000347	95	70	130	0.0472	0.3	20	
Zinc	0.0641	0.010	0.05	0.01863	91	70	130	0.06261	2.3	20	

Associated samples: **H12040177-001C; H12040177-002C; H12040177-003C; H12040177-004C; H12040177-005C; H12040177-006C; H12040177-007C; H12040177-008C; H12040177-009C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-013C; H12040177-014C; H12040177-015C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-019C**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79294

Run ID :Run Order: **ICPMS204-B_120416A: 143** SampType: **Sample Matrix Spike** Sample ID: **H12040207-003AMS** Method: **E200.8**

Analysis Date: **04/17/12 01:40** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.479	0.0010	0.5	0.001127	96	70	130				
Cadmium	0.419	0.0010	0.5		84	70	130				
Copper	0.454	0.0050	0.5	0.002087	90	70	130				
Lead	0.474	0.0010	0.5	0.000302	95	70	130				
Zinc	0.482	0.010	0.5	0.02759	91	70	130				

Associated samples: **H12040177-001C; H12040177-002C; H12040177-003C; H12040177-004C; H12040177-005C; H12040177-006C; H12040177-007C; H12040177-008C; H12040177-009C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-013C; H12040177-014C; H12040177-015C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-019C**

Run ID :Run Order: **ICPMS204-B_120416A: 144** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040207-003AMSD** Method: **E200.8**

Analysis Date: **04/17/12 01:44** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.474	0.0010	0.5	0.001127	95	70	130	0.4793	1.2	20	
Cadmium	0.435	0.0010	0.5		87	70	130	0.4195	3.7	20	
Copper	0.454	0.0050	0.5	0.002087	90	70	130	0.4542	0.1	20	
Lead	0.510	0.0010	0.5	0.000302	102	70	130	0.4743	7.3	20	
Zinc	0.475	0.010	0.5	0.02759	90	70	130	0.4817	1.4	20	

Associated samples: **H12040177-001C; H12040177-002C; H12040177-003C; H12040177-004C; H12040177-005C; H12040177-006C; H12040177-007C; H12040177-008C; H12040177-009C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-013C; H12040177-014C; H12040177-015C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-019C**

Run ID :Run Order: **ICPMS204-B_120416A: 177** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **E200.8**

Analysis Date: **04/17/12 04:18** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0498	0.0050	0.05		100	90	110				
Cadmium	0.0262	0.0010	0.025		105	90	110				
Copper	0.0515	0.010	0.05		103	90	110				
Lead	0.0501	0.010	0.05		100	90	110				
Zinc	0.0512	0.010	0.05		102	90	110				

Associated samples: **H12040177-001C; H12040177-001D; H12040177-002C; H12040177-002D; H12040177-003C; H12040177-003D; H12040177-004C; H12040177-004D; H12040177-005C; H12040177-005D; H12040177-006C; H12040177-006D; H12040177-007C; H12040177-007D; H12040177-008C; H12040177-008D; H12040177-009C; H12040177-009D; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-011D; H12040177-012C; H12040177-012D; H12040177-013C; H12040177-013D; H12040177-014C; H12040177-014D; H12040177-015C; H12040177-015D; H12040177-016C; H12040177-016D; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-018D; H12040177-019C; H12040177-019D**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79294

Run ID :Run Order: **ICPMS204-B_120416A: 178** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.8**

Analysis Date: **04/17/12 04:23** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.000189	0.0050									
Cadmium	0.000904	0.0010									
Copper	0.000144	0.010									
Lead	0.000133	0.010									
Zinc	0.00129	0.010									

Associated samples: **H12040177-001C; H12040177-001D; H12040177-002C; H12040177-002D; H12040177-003C; H12040177-003D; H12040177-004C; H12040177-004D; H12040177-005C; H12040177-005D; H12040177-006C; H12040177-006D; H12040177-007C; H12040177-007D; H12040177-008C; H12040177-008D; H12040177-009C; H12040177-009D; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-011D; H12040177-012C; H12040177-012D; H12040177-013C; H12040177-013D; H12040177-014C; H12040177-014D; H12040177-015C; H12040177-015D; H12040177-016C; H12040177-016D; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-018D; H12040177-019C; H12040177-019D**

Run ID :Run Order: **ICPMS204-B_120416A: 179** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**

Analysis Date: **04/17/12 04:28** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.00994	0.0050	0.01		99	70	130				
Cadmium	0.0102	0.0010	0.01		102	70	130				
Copper	0.0192	0.010	0.02		96	70	130				
Lead	0.000128	0.010				0	0				
Zinc	0.0109	0.010	0.01		109	70	130				

Associated samples: **H12040177-001C; H12040177-001D; H12040177-002C; H12040177-002D; H12040177-003C; H12040177-003D; H12040177-004C; H12040177-004D; H12040177-005C; H12040177-005D; H12040177-006C; H12040177-006D; H12040177-007C; H12040177-007D; H12040177-008C; H12040177-008D; H12040177-009C; H12040177-009D; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-011D; H12040177-012C; H12040177-012D; H12040177-013C; H12040177-013D; H12040177-014C; H12040177-014D; H12040177-015C; H12040177-015D; H12040177-016C; H12040177-016D; H12040177-017C; H12040177-017D; H12040177-018C; H12040177-018D; H12040177-019C; H12040177-019D**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79304

Run ID :Run Order: **HGCV201-H_120416A: 2** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E245.1**

Analysis Date: **04/16/12 14:40** 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
Mercury	0.00019	0.00010	0.0002		95	95	105				

Associated samples: **H12040177-001D; H12040177-002D; H12040177-003D; H12040177-004D; H12040177-005D; H12040177-006D; H12040177-007D; H12040177-008D; H12040177-009D**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79308

Run ID :Run Order: **MAN-TECH_120417B: 8** SampType: **Method Blank** Sample ID: **MBLK** Method: **A2320 B**
Analysis Date: **04/17/12 14:45** 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	1	1									

Associated samples: **H12040177-019B**

Run ID :Run Order: **MAN-TECH_120417B: 10** SampType: **Laboratory Control Sample** Sample ID: **LCS-04162012** Method: **A2320 B**
Analysis Date: **04/17/12 14:53** 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
Alkalinity, Total as CaCO3	620	4.0	600	1.31	102	90	110				

Associated samples: **H12040177-019B**

Run ID :Run Order: **MAN-TECH_120417B: 25** SampType: **Sample Duplicate** Sample ID: **H12040181-016ADUP** Method: **A2320 B**
Analysis Date: **04/17/12 15:57** 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	47	4.0						46.53	1.3	10	
Bicarbonate as HCO3	58	4.0						56.77	1.3	10	

Associated samples: **H12040177-019B**

Run ID :Run Order: **MAN-TECH_120417B: 29** SampType: **Sample Matrix Spike** Sample ID: **H12040208-001AMS** Method: **A2320 B**
Analysis Date: **04/17/12 16:13** 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	830	4.0	600	282.6	92	80	120				

Associated samples: **H12040177-019B**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: R79309

Date: *24-Apr-12*

Run ID :Run Order: **HGCV201-H_120417A: 8** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E245.1**

Analysis Date: **04/17/12 15:49** 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
Mercury	0.00020	0.00010	0.0002		99	95	105				

Associated samples: **H12040177-010D; H12040177-011D; H12040177-012D; H12040177-013D; H12040177-014D; H12040177-015D; H12040177-016D; H12040177-017D; H12040177-018D; H12040177-019D**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79316

Run ID :Run Order: **IC102-H_120417A: 15** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV041712-12** Method: **E300.0**

Analysis Date: **04/17/12 11:19** 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		102	90	110				

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B**

Run ID :Run Order: **IC102-H_120417A: 16** SampType: **Method Blank** Sample ID: **ICB041712-13** Method: **E300.0**

Analysis Date: **04/17/12 11:32** 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
Sulfate	ND	0.02									

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B**

Run ID :Run Order: **IC102-H_120417A: 17** SampType: **Laboratory Fortified Blank** Sample ID: **LFB041712-14** Method: **E300.0**

Analysis Date: **04/17/12 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
Sulfate	210	1.1	200		103	90	110				

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B**

Run ID :Run Order: **IC102-H_120417A: 32** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV041712-17** Method: **E300.0**

Analysis Date: **04/17/12 15:10** 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		102	90	110				

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B**

Run ID :Run Order: **IC102-H_120417A: 38** SampType: **Sample Matrix Spike** Sample ID: **H12040177-002BMS** Method: **E300.0**

Analysis Date: **04/17/12 16:31** 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
Sulfate	200	1.1	200	4.084	98	90	110				

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79316

Run ID :Run Order: **IC102-H_120417A: 38** SampType: **Sample Matrix Spike** Sample ID: **H12040177-002BMS** Method: **E300.0**

Analysis Date: **04/17/12 16:31** 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

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B**

Run ID :Run Order: **IC102-H_120417A: 39** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-002BMSD** Method: **E300.0**

Analysis Date: **04/17/12 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
Sulfate	210	1.1	200	4.084	101	90	110	200.8	2.9	20	

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B**

Run ID :Run Order: **IC102-H_120417A: 46** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV041712-19** Method: **E300.0**

Analysis Date: **04/17/12 18:20** 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
Sulfate	410	1.0	400		103	90	110				

Associated samples: **H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B**

Run ID :Run Order: **IC102-H_120417A: 49** SampType: **Sample Matrix Spike** Sample ID: **H12040177-009BMS** Method: **E300.0**

Analysis Date: **04/17/12 19:01** 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
Sulfate	280	1.1	200	82.8	100	90	110				

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B**

Run ID :Run Order: **IC102-H_120417A: 50** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-009BMSD** Method: **E300.0**

Analysis Date: **04/17/12 19:15** 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	290	1.1	200	82.8	102	90	110	282.7	1.2	20	

Associated samples: **H12040177-001B; H12040177-002B; H12040177-003B; H12040177-004B; H12040177-005B; H12040177-006B; H12040177-007B; H12040177-008B; H12040177-009B; H12040177-010B; H12040177-011B; H12040177-012B; H12040177-013B; H12040177-014B; H12040177-015B; H12040177-016B; H12040177-017B**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79333

Run ID :Run Order: **ICPMS204-B_120418A: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **E200.8**

Analysis Date: **04/18/12 11:09** 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
Copper	0.0517	0.010	0.05		103	90	110				
Zinc	0.0509	0.010	0.05		102	90	110				

Associated samples: **H12040177-002C; H12040177-002D; H12040177-004C; H12040177-004D; H12040177-007C; H12040177-007D; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-011D; H12040177-012C; H12040177-012D; H12040177-014C; H12040177-014D; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-019C; H12040177-019D**

Run ID :Run Order: **ICPMS204-B_120418A: 9** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.8**

Analysis Date: **04/18/12 11:14** 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
Copper	0.000267	0.010									
Zinc	0.00122	0.010									

Associated samples: **H12040177-002C; H12040177-002D; H12040177-004C; H12040177-004D; H12040177-007C; H12040177-007D; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-011D; H12040177-012C; H12040177-012D; H12040177-014C; H12040177-014D; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-019C; H12040177-019D**

Run ID :Run Order: **ICPMS204-B_120418A: 10** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**

Analysis Date: **04/18/12 11:19** 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
Copper	0.0200	0.010	0.02		100	70	130				
Zinc	0.0110	0.010	0.01		110	70	130				

Associated samples: **H12040177-002C; H12040177-002D; H12040177-004C; H12040177-004D; H12040177-007C; H12040177-007D; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-011D; H12040177-012C; H12040177-012D; H12040177-014C; H12040177-014D; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-019C; H12040177-019D**

Run ID :Run Order: **ICPMS204-B_120418A: 23** SampType: **Method Blank** Sample ID: **ICB** Method: **E200.8**

Analysis Date: **04/18/12 12:19** 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
Copper	ND	0.001									
Zinc	ND	0.01									

Associated samples: **H12040177-002C; H12040177-004C; H12040177-007C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-014C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-019C**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79333

Run ID :Run Order: **ICPMS204-B_120418A: 24** SampType: **Laboratory Fortified Blank** Sample ID: **LFB** Method: **E200.8**
Analysis Date: **04/18/12 12:23** 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
Copper	0.0453	0.010	0.05		91	85	115				
Zinc	0.0465	0.010	0.05		93	85	115				

Associated samples: **H12040177-002C; H12040177-004C; H12040177-007C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-014C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-019C**

Run ID :Run Order: **ICPMS204-B_120418A: 27** SampType: **Sample Matrix Spike** Sample ID: **H12040177-002CMS** Method: **E200.8**
Analysis Date: **04/18/12 12:37** 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
Copper	0.0456	0.0050	0.05	0.0004496	90	70	130				
Zinc	0.0628	0.010	0.05	0.0174	91	70	130				

Associated samples: **H12040177-002C; H12040177-004C; H12040177-007C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-014C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-019C**

Run ID :Run Order: **ICPMS204-B_120418A: 28** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-002CMSD** Method: **E200.8**
Analysis Date: **04/18/12 12:42** 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
Copper	0.0448	0.0050	0.05	0.0004496	89	70	130	0.04559	1.8	20	
Zinc	0.0611	0.010	0.05	0.0174	87	70	130	0.06276	2.7	20	

Associated samples: **H12040177-002C; H12040177-004C; H12040177-007C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-014C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-019C**

Run ID :Run Order: **ICPMS204-B_120418A: 43** SampType: **Sample Matrix Spike** Sample ID: **H12040177-010DMS** Method: **E200.8**
Analysis Date: **04/18/12 13:51** 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
Copper	0.0451	0.0050	0.05		90	70	130				
Zinc	0.0458	0.010	0.05		92	70	130				

Associated samples: **H12040177-002C; H12040177-004C; H12040177-007C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-014C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-019C**

Run ID :Run Order: **ICPMS204-B_120418A: 48** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-010DMSD** Method: **E200.8**
Analysis Date: **04/18/12 14:14** 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
Copper	0.0451	0.0050	0.05		90	70	130	0.04514	0.1	20	

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79333

Run ID :Run Order: **ICPMS204-B_120418A: 48** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-010DMSD** Method: **E200.8**

Analysis Date: **04/18/12 14:14** 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
Zinc	0.0467	0.010	0.05		93	70	130	0.0458	1.9	20	

Associated samples: **H12040177-002C; H12040177-004C; H12040177-007C; H12040177-010C; H12040177-010D; H12040177-011C; H12040177-012C; H12040177-014C; H12040177-016C; H12040177-017C; H12040177-017D; H12040177-019C**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79342

Run ID :Run Order: **IC102-H_120418A: 15** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV041812-12** Method: **E300.0**
Analysis Date: **04/18/12 12:37** 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
Sulfate	410	1.0	400		101	90	110				

Associated samples: **H12040177-019B**

Run ID :Run Order: **IC102-H_120418A: 16** SampType: **Method Blank** Sample ID: **ICB041812-13** Method: **E300.0**
Analysis Date: **04/18/12 12:50** 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
Sulfate	ND	0.02									

Associated samples: **H12040177-019B**

Run ID :Run Order: **IC102-H_120418A: 17** SampType: **Laboratory Fortified Blank** Sample ID: **LFB041812-14** Method: **E300.0**
Analysis Date: **04/18/12 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	210	1.1	200		103	90	110				

Associated samples: **H12040177-019B**

Run ID :Run Order: **IC102-H_120418A: 18** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV041812-15** Method: **E300.0**
Analysis Date: **04/18/12 13:17** 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		102	90	110				

Associated samples: **H12040177-019B**

Run ID :Run Order: **IC102-H_120418A: 22** SampType: **Sample Matrix Spike** Sample ID: **H12040177-019BMS** Method: **E300.0**
Analysis Date: **04/18/12 14:12** 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	230	1.1	200	25.62	104	90	110				

Associated samples: **H12040177-019B**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79342

Run ID :Run Order: **IC102-H_120418A: 23** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040177-019BMSD** Method: **E300.0**

Analysis Date: **04/18/12 14:25** 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
Sulfate	230	1.1	200	25.62	**104**	90	110	234.1	**0.0**	20	

Associated samples: **H12040177-019B**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *24-Apr-12*

BatchID: R79357

Run ID :Run Order: **IC102-H_120419A: 15** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV041912-12** Method: **E300.0**
Analysis Date: **04/19/12 11:28** 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
Sulfate	410	1.0	400		102	90	110				

Associated samples: **H12040177-018B**

Run ID :Run Order: **IC102-H_120419A: 16** SampType: **Method Blank** Sample ID: **ICB041912-13** Method: **E300.0**
Analysis Date: **04/19/12 11:41** 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	0.05	0.02									

Associated samples: **H12040177-018B**

Run ID :Run Order: **IC102-H_120419A: 17** SampType: **Laboratory Fortified Blank** Sample ID: **LFB041912-14** Method: **E300.0**
Analysis Date: **04/19/12 11:55** 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
Sulfate	210	1.1	200	0.05	104	90	110				

Associated samples: **H12040177-018B**

Run ID :Run Order: **IC102-H_120419A: 18** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV041912-15** Method: **E300.0**
Analysis Date: **04/19/12 12:08** 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
Sulfate	410	1.0	400		103	90	110				

Associated samples: **H12040177-018B**

Run ID :Run Order: **IC102-H_120419A: 28** SampType: **Sample Matrix Spike** Sample ID: **H12040262-001BMS** Method: **E300.0**
Analysis Date: **04/19/12 14:24** 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
Sulfate	280	1.1	200	72.08	105	90	110				

Associated samples: **H12040177-018B**

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: H12040177
Project: CFR OU Monitoring

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: R79357

Date: *24-Apr-12*

Run ID :Run Order: **IC102-H_120419A: 29** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12040262-001BMSD** Method: **E300.0**

Analysis Date: **04/19/12 14:38** 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
Sulfate	280	1.1	200	72.08	**106**	90	110	282.3	**0.7**	20	

Associated samples: **H12040177-018B**

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

H12040177

Login completed by: Tracy L. Lorash
Date Received: 4/11/2012

Reviewed by: BL2000\sdull
Received by: wjj

Reviewed Date: 4/23/2012
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:	℃ See Comments		
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 samples received on ice with Cooler #1 at a temperature of 1.5C, Cooler #2 at 0.4C and Cooler #3 at 1.1C. Sample ID on COC is WSC-SBC - ID on sample containers is WS-SBC. Per Erich, we are to use the ID from the COC. DOC samples not filtered before 48 hour hold time. Client put time of 17:50 on COC when samples were relinquished - samples were received in lab at 16:48. TI 4/12/12.

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:
MT DEQ	CFR OU Monitoring	State: MT	Yes ☐ No ☐
Report Mail Address:	**Contact Name: Phone/Fax:**	**Email:**	**Sampler: (Please Print)**
	Joe Griffin 560-6060 (DEQ) Erich Weber 439-0563 erich.weber@atkinsglobal.com		G. Ingman E. Weber
Invoice Address:	**Invoice Contact & Phone:**	**Purchase Order:**	**Quote/Bottle Order:**
			624 / 9541

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

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	TRA Cd, Cu, Pb, Zn	Diss. As, Cd, Cu, Pb, Zn	TPN	NO_{3+2}, NH_3, TP	TSS, Total Alk., SO_4^{-}	Total Hg (low level)	DOC	Hardness (TRCa + Mg)	SEE ATTACHED	
2	1 CFR-116A	4/9/2012	0945	GW										
2	2 RC-CFR	4/9/2012	12:00	GW										
2	3 CFR-84F	4/9/2012	13:30	GW										
2	4 FC-CFR	4/9/2012	15:15	GW										
2	5 CFR-53C	4/9/2012	17:15	GW										
1	6 CFR-42G	4/10/2012	08:30	GW										
1	7 LBR-CFR	4/10/2012	09:45	GW										
1	8 CFR-27H	4/10/2012	11:00	GW										
1	9 CFR-27H dupe	4/10/2012	11:30	GW										
1	10 Field Blank 1	4/10/2012	12:00	GW										

Standard Turnaround (TAT)

R U S H

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

Comments:
DOC samples unfiltered & unpreserved
cooler 1 = 1.5
cooler 2 = 0.4
cooler 3 = 1.1

Shipped by: hand del
Cooler ID(s): Y
Receipt Temp: see comments
On Ice: Y N
Custody Seal: On Bottle Y N; On Cooler Y N
Intact Y N
Signature Match Y N

LABORATORY USE ONLY H12040177

Custody Record MUST be Signed

	Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
	Erich Weber	4/11/2012 17:50				
	Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
				Received by Laboratory: Wanda Johnson	Date/Time: 4-11-12 16:46	Signature:

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.

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 OU Monitoring	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address:	Contact Name: Phone/Fax: Joe Griffin 560-6060 (DEQ) Erich Weber 439-0523 erich.weber@atkinsglobal.com	Email:	Sampler: (Please Print) G. Ingman E. Weber
Invoice Address:	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order: 624/9541

Special Report/Formats:

☐ DW ☐ POTW/WWTP ☐ State: _____ ☐ Other: _____

☒ EDD/EDT (Electronic Data) Format: _____ ☐ LEVEL IV ☐ NELAC

ANALYSIS REQUESTED

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Number of Containers	TR As, Cd, Cu, Pb, Zn	Diss. As, Cd, Cu, Pb, Zn	TPN	NO_{3+2}, NH_3, TP	TSS, Total Alk., SO_4	Total Hg (low level)	DOC	Hardness (TR Ca & Mg)	SEE ATTACHED
1 RTC-1	4/10/2012	12:30	GW	1									
3 LC-7	4/10/2012	14:00	GW	3									
1 CFR-03A	4/10/2012	14:45	GW	1									
3 WSC-SBC	4/11/202	09:15	GW	3									
3 SS-25	4/11/2012	10:30	GW	3									
3 MWB-SBC	4/11/202	11:15	GW	3									
3 Field Blank 2	4/11/2012	12:00	GW	3									
3 MCWC-MWB	4/11/2012	12:15	GW	3									
3 MCWC-MWB dupe	4/11/2012	12:45	GW	3									
10													

Standard Turnaround (TAT)

R U S H

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

Comments: DOC samples unfiltered & unpreserved

Shipped by: hand deli

Cooler ID(s): Y

Receipt Temp: See comments page 1

On Ice: Y N

Custody Seal: On Bottle Y N; On Cooler Y N

Intact Y N

Signature Match Y N

LABORATORY USE ONLY H12040177

Custody Record MUST be Signed

Relinquished by (print): Erich Weber	Date/Time: 4/11/2012 17:50	Signature:	Received by (print):
Relinquished by (print):	Date/Time:	Signature:	Received by (print):
Sample Disposal: Return to Client: _____ Lab Disposal: _____			Received by Laboratory: Wanda John

Date/Time: 4-11-12 16:46 Signature:

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 B2

SURFACE WATER AND INSTREAM SEDIMENT: ANALYTICAL LABORATORY RESULTS, SECOND QUARTER

ANALYTICAL SUMMARY REPORT

July 16, 2012

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

Workorder No.: H12060167 Quote ID: H624

Project Name: CFR Monitoring-474374

Energy Laboratories Inc Helena MT received the following 19 samples for MT DEQ-Federal Superfund on 6/7/2012 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H12060167-001	CFR-116A	06/05/12 9:30	06/07/12	Aqueous	Metals by ICP/ICPMS, Dissolved Metals by ICP/ICPMS, Tot. Rec. Alkalinity Carbon, Dissolved Organic Conductivity Mercury, Total Hardness as CaCO3 Anions by Ion Chromatography Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite Nitrogen, Total Persulfate Metals Digestion by EPA 200.2 Digestion, Mercury by CVAA Digestion, Total P Water Nitrogen, Total Persulfate Preparation for TSS Phosphorus, Total Solids, Total Suspended Subcontracted, Analytics
H12060167-002	RC-CFR	06/05/12 11:30	06/07/12	Aqueous	Same As Above
H12060167-003	CFR-84F	06/05/12 13:15	06/07/12	Aqueous	Same As Above
H12060167-004	CFR-53C	06/05/12 14:45	06/07/12	Aqueous	Same As Above
H12060167-005	Field Blank	06/05/12 16:00	06/07/12	Aqueous	Same As Above
H12060167-006	FC-CFR	06/05/12 16:30	06/07/12	Aqueous	Same As Above
H12060167-007	FC-CFR dupe	06/05/12 16:30	06/07/12	Aqueous	Same As Above
H12060167-008	CFR-42G	06/06/12 9:00	06/07/12	Aqueous	Same As Above
H12060167-009	LBR-CFR	06/06/12 10:45	06/07/12	Aqueous	Same As Above
H12060167-010	CFR-27H	06/06/12 12:15	06/07/12	Aqueous	Same As Above
H12060167-011	RTC-1	06/06/12 13:45	06/07/12	Aqueous	Same As Above
H12060167-012	LC-7	06/06/12 15:00	06/07/12	Aqueous	Same As Above
H12060167-013	CFR-03A	06/06/12 16:15	06/07/12	Aqueous	Same As Above
H12060167-014	WSC-SBC	06/07/12 8:45	06/07/12	Aqueous	Same As Above
H12060167-015	SS-25	06/07/12 9:45	06/07/12	Aqueous	Same As Above
H12060167-016	MWB-SBC	06/07/12 10:30	06/07/12	Aqueous	Same As Above
H12060167-017	Field Blank	06/07/12 11:30	06/07/12	Aqueous	Same As Above

ANALYTICAL SUMMARY REPORT

H12060167-018	MCWC-MWB	06/07/12 12:30 06/07/12	Aqueous	Same As Above
H12060167-019	MCWC-MWB Dupe	06/07/12 12:30 06/07/12	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 noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified if analyzed outside of the recommended holding time.

Solid/soil samples are reported on an as received basis unless specifically indicated. If moisture corrected, data units are typically noted as -dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

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: H12060167

Report Date: 07/16/12

CASE NARRATIVE

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002 and WY00937.

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.
Comments imported for SUBBED Workorder: C12060390
Prep Comments for Sample H12060167-001F, Test PRP-FILT-W: The prep hold time was exceeded by 4.05 days.
Prep Comments for Sample H12060167-002F, Test PRP-FILT-W: The prep hold time was exceeded by 3.97 days.
Prep Comments for Sample H12060167-003F, Test PRP-FILT-W: The prep hold time was exceeded by 3.89 days.
Prep Comments for Sample H12060167-004F, Test PRP-FILT-W: The prep hold time was exceeded by 3.83 days.
Prep Comments for Sample H12060167-005F, Test PRP-FILT-W: The prep hold time was exceeded by 3.78 days.
Prep Comments for Sample H12060167-006F, Test PRP-FILT-W: The prep hold time was exceeded by 3.76 days.
Prep Comments for Sample H12060167-007F, Test PRP-FILT-W: The prep hold time was exceeded by 3.76 days.
Prep Comments for Sample H12060167-008F, Test PRP-FILT-W: The prep hold time was exceeded by 3.07 days.
Prep Comments for Sample H12060167-009F, Test PRP-FILT-W: The prep hold time was exceeded by 3.00 days.
Prep Comments for Sample H12060167-010F, Test PRP-FILT-W: The prep hold time was exceeded by 2.94 days.
Prep Comments for Sample H12060167-011F, Test PRP-FILT-W: The prep hold time was exceeded by 2.87 days.
Prep Comments for Sample H12060167-012F, Test PRP-FILT-W: The prep hold time was exceeded by 2.82 days.
Prep Comments for Sample H12060167-013F, Test PRP-FILT-W: The prep hold time was exceeded by 2.77 days.
Prep Comments for Sample H12060167-014F, Test PRP-FILT-W: The prep hold time was exceeded by 2.08 days.
Prep Comments for Sample H12060167-015F, Test PRP-FILT-W: The prep hold time was exceeded by 2.04 days.
Prep Comments for Sample H12060167-016F, Test PRP-FILT-W: The prep hold time was exceeded by 2.01 days.
Prep Comments for Sample H12060167-017F, Test PRP-FILT-W: The prep hold time was exceeded by 1.97 days.
Prep Comments for Sample H12060167-018F, Test PRP-FILT-W: The prep hold time was exceeded by 1.93 days.
Prep Comments for Sample H12060167-019F, Test PRP-FILT-W: The prep hold time was exceeded by 1.93 days.
End of comments imported for SUBBED Workorder: C12060390

Sample for Methyl Mercury were submitted to Brooks Rand Laboratorys. Attached is the final report for this analysis. Wj 7/16/12

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H12060167-001
Client Sample ID CFR-116A

Report Date: 07/16/12
Collection Date: 06/05/12 09:30
DateReceived: 06/07/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	44	mg/L		1		A2540 D	06/11/12 11:56 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	90	mg/L		4		A2320 B	06/08/12 18:25 / cmm
Bicarbonate as HCO3	110	mg/L		4		A2320 B	06/08/12 18:25 / cmm
Sulfate	15	mg/L		1		E300.0	06/11/12 13:00 / cmm
Hardness as CaCO3	90	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	3.2	mg/L		0.1		A5310 C	06/11/12 15:25 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:31 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 14:44 / stp
Nitrogen, Total	0.21	mg/L		0.05		A4500 N-C	06/13/12 17:10 / reh
Phosphorus, Total as P	0.048	mg/L		0.005		E365.1	06/12/12 16:33 / jaw
METALS, DISSOLVED							
Arsenic	0.005	mg/L		0.005		E200.8	06/14/12 00:25 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 00:25 / dck
Copper	0.005	mg/L		0.001		E200.8	06/14/12 00:25 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 00:25 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/14/12 00:25 / dck
METALS, TOTAL							
Mercury	0.00002	mg/L		0.00001		E245.1	06/18/12 13:05 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	0.009	mg/L		0.005		E200.8	06/14/12 00:20 / dck
Cadmium	0.00022	mg/L		0.00008		E200.8	06/14/12 00:20 / dck
Calcium	25	mg/L		1		E200.7	06/13/12 16:07 / sld
Copper	0.037	mg/L		0.001		E200.8	06/14/12 00:20 / dck
Lead	0.0055	mg/L		0.0005		E200.8	06/14/12 00:20 / dck
Magnesium	7	mg/L		1		E200.7	06/13/12 16:07 / sld
Zinc	0.05	mg/L		0.01		E200.8	06/14/12 00:20 / 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: H12060167-002
Client Sample ID RC-CFR

Report Date: 07/16/12
Collection Date: 06/05/12 11:30
DateReceived: 06/07/12
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	06/11/12 11:56 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	36	mg/L		4		A2320 B	06/11/12 15:51 / cmm
Bicarbonate as HCO3	43	mg/L		4		A2320 B	06/11/12 15:51 / cmm
Sulfate	1	mg/L		1		E300.0	06/11/12 13:13 / cmm
Hardness as CaCO3	32	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	3.5	mg/L		0.1		A5310 C	06/11/12 15:35 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:32 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 14:45 / stp
Nitrogen, Total	0.10	mg/L		0.05		A4500 N-C	06/13/12 17:11 / reh
Phosphorus, Total as P	0.017	mg/L		0.005		E365.1	06/12/12 16:34 / jaw
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	06/14/12 00:35 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 00:35 / dck
Copper	ND	mg/L		0.001		E200.8	06/14/12 00:35 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 00:35 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/14/12 00:35 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.00001		E245.1	06/18/12 13:13 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	ND	mg/L		0.005		E200.8	06/14/12 00:30 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 00:30 / dck
Calcium	8	mg/L		1		E200.7	06/13/12 16:10 / sld
Copper	0.001	mg/L		0.001		E200.8	06/14/12 00:30 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 00:30 / dck
Magnesium	3	mg/L		1		E200.7	06/13/12 16:10 / sld
Zinc	ND	mg/L		0.01		E200.8	06/14/12 00:30 / 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: H12060167-003
Client Sample ID CFR-84F

Report Date: 07/16/12
Collection Date: 06/05/12 13:15
DateReceived: 06/07/12
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	06/11/12 11:56 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	06/11/12 15:58 / cmm
Bicarbonate as HCO3	150	mg/L		4		A2320 B	06/11/12 15:58 / cmm
Sulfate	30	mg/L		1		E300.0	06/11/12 13:26 / cmm
Hardness as CaCO3	139	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	4.0	mg/L		0.1		A5310 C	06/11/12 15:45 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:34 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 14:48 / stp
Nitrogen, Total	0.31	mg/L		0.05		A4500 N-C	06/13/12 17:14 / reh
Phosphorus, Total as P	0.098	mg/L		0.005		E365.1	06/12/12 16:35 / jaw
METALS, DISSOLVED							
Arsenic	0.010	mg/L		0.005		E200.8	06/14/12 00:44 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 00:44 / dck
Copper	0.009	mg/L		0.001		E200.8	06/14/12 00:44 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 00:44 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/14/12 00:44 / dck
METALS, TOTAL							
Mercury	0.00012	mg/L		0.00001		E245.1	06/18/12 13:16 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	0.020	mg/L		0.005		E200.8	06/14/12 00:39 / dck
Cadmium	0.00037	mg/L		0.00008		E200.8	06/14/12 00:39 / dck
Calcium	40	mg/L		1		E200.7	06/13/12 16:14 / sld
Copper	0.072	mg/L		0.001		E200.8	06/14/12 00:39 / dck
Lead	0.0126	mg/L		0.0005		E200.8	06/14/12 00:39 / dck
Magnesium	9	mg/L		1		E200.7	06/13/12 16:14 / sld
Zinc	0.09	mg/L		0.01		E200.8	06/14/12 00:39 / 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: H12060167-004
Client Sample ID CFR-53C

Report Date: 07/16/12
Collection Date: 06/05/12 14:45
DateReceived: 06/07/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	68	mg/L		1		A2540 D	06/11/12 11:57 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	130	mg/L		4		A2320 B	06/11/12 16:05 / cmm
Bicarbonate as HCO3	160	mg/L		4		A2320 B	06/11/12 16:05 / cmm
Sulfate	24	mg/L		1		E300.0	06/11/12 14:03 / cmm
Hardness as CaCO3	123	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	4.1	mg/L		0.1		A5310 C	06/11/12 15:56 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:35 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 14:50 / stp
Nitrogen, Total	0.23	mg/L		0.05		A4500 N-C	06/13/12 17:16 / reh
Phosphorus, Total as P	0.085	mg/L		0.005		E365.1	06/12/12 16:41 / jaw
METALS, DISSOLVED							
Arsenic	0.010	mg/L		0.005		E200.8	06/14/12 00:53 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 00:53 / dck
Copper	0.009	mg/L		0.001		E200.8	06/14/12 00:53 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 00:53 / dck
Zinc	0.01	mg/L		0.01		E200.8	06/14/12 00:53 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.00001		E245.1	06/18/12 13:18 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	0.018	mg/L		0.005		E200.8	06/14/12 00:49 / dck
Cadmium	0.00030	mg/L		0.00008		E200.8	06/14/12 00:49 / dck
Calcium	36	mg/L		1		E200.7	06/13/12 16:25 / sld
Copper	0.069	mg/L		0.001		E200.8	06/14/12 00:49 / dck
Lead	0.0098	mg/L		0.0005		E200.8	06/14/12 00:49 / dck
Magnesium	8	mg/L		1		E200.7	06/13/12 16:25 / sld
Zinc	0.06	mg/L		0.01		E200.8	06/14/12 00:49 / 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: H12060167-005
Client Sample ID Field Blank

Report Date: 07/16/12
Collection Date: 06/05/12 16:00
DateReceived: 06/07/12
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	06/11/12 11:57 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	5	mg/L		4		A2320 B	06/11/12 16:09 / cmm
Bicarbonate as HCO3	6	mg/L		4		A2320 B	06/11/12 16:09 / cmm
Sulfate	ND	mg/L		1		E300.0	06/11/12 14:16 / cmm
Hardness as CaCO3	ND	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	0.4	mg/L		0.1		A5310 C	06/11/12 16:05 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:38 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 14:51 / stp
Nitrogen, Total	0.16	mg/L		0.05		A4500 N-C	06/13/12 17:17 / reh
Phosphorus, Total as P	ND	mg/L		0.005		E365.1	06/12/12 16:42 / jaw
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	06/14/12 01:36 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 01:36 / dck
Copper	ND	mg/L		0.001		E200.8	06/14/12 01:36 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 01:36 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/14/12 01:36 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.00001		E245.1	06/18/12 13:20 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	ND	mg/L		0.005		E200.8	06/14/12 00:58 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 00:58 / dck
Calcium	ND	mg/L		1		E200.7	06/13/12 16:29 / sld
Copper	ND	mg/L		0.001		E200.8	06/14/12 00:58 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 00:58 / dck
Magnesium	ND	mg/L		1		E200.7	06/13/12 16:29 / sld
Zinc	ND	mg/L		0.01		E200.8	06/14/12 00:58 / 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: H12060167-006
Client Sample ID FC-CFR

Report Date: 07/16/12
Collection Date: 06/05/12 16:30
DateReceived: 06/07/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	146	mg/L		1		A2540 D	06/11/12 11:57 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	99	mg/L		4		A2320 B	06/11/12 16:16 / cmm
Bicarbonate as HCO3	120	mg/L		4		A2320 B	06/11/12 16:16 / cmm
Sulfate	6	mg/L		1		E300.0	06/11/12 14:29 / cmm
Hardness as CaCO3	97	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	4.8	mg/L		0.1		A5310 C	06/11/12 16:16 / eli-ca1
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:40 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 14:52 / stp
Nitrogen, Total	0.34	mg/L		0.05		A4500 N-C	06/13/12 17:20 / reh
Phosphorus, Total as P	0.114	mg/L		0.005		E365.1	06/12/12 16:45 / jaw
METALS, DISSOLVED							
Arsenic	0.009	mg/L		0.005		E200.8	06/14/12 01:46 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 01:46 / dck
Copper	0.002	mg/L		0.001		E200.8	06/14/12 01:46 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 01:46 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/14/12 01:46 / dck
METALS, TOTAL							
Mercury	0.0015	mg/L	DL	0.00005		E245.1	06/21/12 12:30 / eli-b3
METALS, TOTAL RECOVERABLE							
Arsenic	0.044	mg/L		0.005		E200.8	06/14/12 01:41 / dck
Cadmium	0.00039	mg/L		0.00008		E200.8	06/14/12 01:41 / dck
Calcium	27	mg/L		1		E200.7	06/13/12 16:44 / sld
Copper	0.016	mg/L		0.001		E200.8	06/14/12 01:41 / dck
Lead	0.0416	mg/L		0.0005		E200.8	06/14/12 01:41 / dck
Magnesium	7	mg/L		1		E200.7	06/13/12 16:44 / sld
Zinc	0.12	mg/L		0.01		E200.8	06/14/12 01:41 / 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.
L - Lowest available reporting limit for the analytical method us

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H12060167-007
Client Sample ID FC-CFR dupe

Report Date: 07/16/12
Collection Date: 06/05/12 16:30
DateReceived: 06/07/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	174	mg/L		1		A2540 D	06/11/12 11:58 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	99	mg/L		4		A2320 B	06/11/12 16:23 / cmm
Bicarbonate as HCO3	120	mg/L		4		A2320 B	06/11/12 16:23 / cmm
Sulfate	6	mg/L		1		E300.0	06/11/12 14:41 / cmm
Hardness as CaCO3	96	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	4.8	mg/L		0.1		A5310 C	06/11/12 16:26 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:41 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 14:53 / stp
Nitrogen, Total	0.29	mg/L		0.05		A4500 N-C	06/13/12 17:22 / reh
Phosphorus, Total as P	0.121	mg/L		0.005		E365.1	06/12/12 16:46 / jaw
METALS, DISSOLVED							
Arsenic	0.009	mg/L		0.005		E200.8	06/14/12 01:55 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 01:55 / dck
Copper	0.002	mg/L		0.001		E200.8	06/14/12 01:55 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 01:55 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/14/12 01:55 / dck
METALS, TOTAL							
Mercury	0.0015	mg/L	DL	0.00005		E245.1	06/21/12 12:32 / eli-b3
METALS, TOTAL RECOVERABLE							
Arsenic	0.042	mg/L		0.005		E200.8	06/14/12 01:50 / dck
Cadmium	0.00039	mg/L		0.00008		E200.8	06/14/12 01:50 / dck
Calcium	26	mg/L		1		E200.7	06/13/12 16:48 / sld
Copper	0.015	mg/L		0.001		E200.8	06/14/12 01:50 / dck
Lead	0.0405	mg/L		0.0005		E200.8	06/14/12 01:50 / dck
Magnesium	7	mg/L		1		E200.7	06/13/12 16:48 / sld
Zinc	0.12	mg/L		0.01		E200.8	06/14/12 01:50 / 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.
L - Lowest available reporting limit for the analytical method us

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H12060167-008
Client Sample ID CFR-42G

Report Date: 07/16/12
Collection Date: 06/06/12 09:00
DateReceived: 06/07/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	184	mg/L		1		A2540 D	06/11/12 11:58 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	110	mg/L		4		A2320 B	06/11/12 16:37 / cmm
Bicarbonate as HCO3	140	mg/L		4		A2320 B	06/11/12 16:37 / cmm
Sulfate	28	mg/L		1		E300.0	06/11/12 14:54 / cmm
Hardness as CaCO3	135	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	5.1	mg/L		0.1		A5310 C	06/11/12 16:36 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:42 / stp
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L		0.05		E353.2	06/11/12 14:57 / stp
Nitrogen, Total	0.39	mg/L		0.05		A4500 N-C	06/13/12 17:23 / reh
Phosphorus, Total as P	0.177	mg/L		0.005		E365.1	06/12/12 16:47 / jaw
METALS, DISSOLVED							
Arsenic	0.016	mg/L		0.005		E200.8	06/14/12 02:42 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 02:42 / dck
Copper	0.018	mg/L		0.001		E200.8	06/14/12 02:42 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 02:42 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/14/12 02:42 / dck
METALS, TOTAL							
Mercury	0.00015	mg/L		0.00001		E245.1	06/18/12 13:32 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	0.048	mg/L		0.005		E200.8	06/14/12 02:00 / dck
Cadmium	0.00095	mg/L		0.00008		E200.8	06/14/12 02:00 / dck
Calcium	38	mg/L		1		E200.7	06/13/12 16:51 / sld
Copper	0.272	mg/L		0.001		E200.8	06/14/12 02:00 / dck
Lead	0.0366	mg/L		0.0005		E200.8	06/14/12 02:00 / dck
Magnesium	10	mg/L		1		E200.7	06/13/12 16:51 / sld
Zinc	0.22	mg/L		0.01		E200.8	06/14/12 02:00 / 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: H12060167-009
Client Sample ID LBR-CFR

Report Date: 07/16/12
Collection Date: 06/06/12 10:45
DateReceived: 06/07/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	74	mg/L		1		A2540 D	06/11/12 11:58 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	110	mg/L		4		A2320 B	06/11/12 16:45 / cmm
Bicarbonate as HCO3	140	mg/L		4		A2320 B	06/11/12 16:45 / cmm
Sulfate	9	mg/L		1		E300.0	06/11/12 15:06 / cmm
Hardness as CaCO3	106	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	5.3	mg/L		0.1		A5310 C	06/11/12 16:46 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:46 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 14:58 / stp
Nitrogen, Total	0.27	mg/L		0.05		A4500 N-C	06/13/12 17:24 / reh
Phosphorus, Total as P	0.112	mg/L		0.005		E365.1	06/12/12 16:48 / jaw
METALS, DISSOLVED							
Arsenic	0.005	mg/L		0.005		E200.8	06/14/12 03:25 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 03:25 / dck
Copper	0.001	mg/L		0.001		E200.8	06/14/12 03:25 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 03:25 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/14/12 03:25 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.00001		E245.1	06/18/12 13:36 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	0.008	mg/L		0.005		E200.8	06/14/12 03:01 / dck
Cadmium	0.00012	mg/L		0.00008		E200.8	06/14/12 03:01 / dck
Calcium	30	mg/L		1		E200.7	06/13/12 17:14 / sld
Copper	0.005	mg/L		0.001		E200.8	06/14/12 03:01 / dck
Lead	0.0036	mg/L		0.0005		E200.8	06/14/12 03:01 / dck
Magnesium	7	mg/L		1		E200.7	06/13/12 17:14 / sld
Zinc	0.02	mg/L		0.01		E200.8	06/14/12 03:01 / 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: H12060167-010
Client Sample ID CFR-27H

Report Date: 07/16/12
Collection Date: 06/06/12 12:15
DateReceived: 06/07/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	146	mg/L		1		A2540 D	06/11/12 11:59 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	91	mg/L		4		A2320 B	06/11/12 17:00 / cmm
Bicarbonate as HCO3	110	mg/L		4		A2320 B	06/11/12 17:00 / cmm
Sulfate	31	mg/L		1		E300.0	06/11/12 15:19 / cmm
Hardness as CaCO3	120	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	3.9	mg/L		0.1		A5310 C	06/11/12 16:57 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:47 / stp
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L		0.05		E353.2	06/11/12 14:59 / stp
Nitrogen, Total	0.25	mg/L		0.05		A4500 N-C	06/13/12 17:25 / reh
Phosphorus, Total as P	0.172	mg/L		0.005		E365.1	06/12/12 16:49 / jaw
METALS, DISSOLVED							
Arsenic	0.014	mg/L		0.005		E200.8	06/14/12 03:35 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 03:35 / dck
Copper	0.015	mg/L		0.001		E200.8	06/14/12 03:35 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 03:35 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/14/12 03:35 / dck
METALS, TOTAL							
Mercury	0.00010	mg/L		0.00001		E245.1	06/18/12 13:39 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	0.044	mg/L		0.005		E200.8	06/14/12 03:30 / dck
Cadmium	0.00081	mg/L		0.00008		E200.8	06/14/12 03:30 / dck
Calcium	35	mg/L		1		E200.7	06/13/12 17:17 / sld
Copper	0.252	mg/L		0.001		E200.8	06/14/12 03:30 / dck
Lead	0.0332	mg/L		0.0005		E200.8	06/14/12 03:30 / dck
Magnesium	8	mg/L		1		E200.7	06/13/12 17:17 / sld
Zinc	0.18	mg/L		0.01		E200.8	06/14/12 03:30 / 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: H12060167-011
Client Sample ID RTC-1

Report Date: 07/16/12
Collection Date: 06/06/12 13:45
DateReceived: 06/07/12
Matrix: Aqueous

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	06/11/12 11:59 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	43	mg/L		4		A2320 B	06/11/12 17:07 / cmm
Bicarbonate as HCO3	53	mg/L		4		A2320 B	06/11/12 17:07 / cmm
Sulfate	3	mg/L		1		E300.0	06/11/12 15:32 / cmm
Hardness as CaCO3	34	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	4.4	mg/L		0.1		A5310 C	06/11/12 18:12 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:48 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 15:00 / stp
Nitrogen, Total	0.18	mg/L		0.05		A4500 N-C	06/13/12 17:26 / reh
Phosphorus, Total as P	0.031	mg/L		0.005		E365.1	06/12/12 16:50 / jaw
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	06/14/12 03:44 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 03:44 / dck
Copper	0.002	mg/L		0.001		E200.8	06/14/12 03:44 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 03:44 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/14/12 03:44 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.00001		E245.1	06/18/12 13:41 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	ND	mg/L		0.005		E200.8	06/14/12 03:39 / dck
Cadmium	0.00009	mg/L		0.00008		E200.8	06/14/12 03:39 / dck
Calcium	10	mg/L		1		E200.7	06/13/12 17:25 / sld
Copper	0.007	mg/L		0.001		E200.8	06/14/12 03:39 / dck
Lead	0.0015	mg/L		0.0005		E200.8	06/14/12 03:39 / dck
Magnesium	2	mg/L		1		E200.7	06/13/12 17:25 / sld
Zinc	ND	mg/L		0.01		E200.8	06/14/12 03:39 / 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: H12060167-012
Client Sample ID LC-7

Report Date: 07/16/12
Collection Date: 06/06/12 15:00
DateReceived: 06/07/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	14	mg/L		1		A2540 D	06/11/12 11:59 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	190	mg/L		4		A2320 B	06/11/12 17:14 / cmm
Bicarbonate as HCO3	200	mg/L		4		A2320 B	06/11/12 17:14 / cmm
Sulfate	150	mg/L		1		E300.0	06/11/12 16:09 / cmm
Hardness as CaCO3	321	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	2.8	mg/L		0.1		A5310 C	06/11/12 18:22 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:49 / stp
Nitrogen, Nitrate+Nitrite as N	0.18	mg/L		0.05		E353.2	06/11/12 15:01 / stp
Nitrogen, Total	0.35	mg/L		0.05		A4500 N-C	06/13/12 17:28 / reh
Phosphorus, Total as P	0.013	mg/L		0.005		E365.1	06/12/12 16:51 / jaw
METALS, DISSOLVED							
Arsenic	0.015	mg/L		0.005		E200.8	06/14/12 03:54 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 03:54 / dck
Copper	0.003	mg/L		0.001		E200.8	06/14/12 03:54 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 03:54 / dck
Zinc	ND	mg/L		0.01		E200.8	06/14/12 03:54 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.00001		E245.1	06/18/12 13:48 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	0.017	mg/L		0.005		E200.8	06/14/12 03:49 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 03:49 / dck
Calcium	93	mg/L		1		E200.7	06/13/12 17:29 / sld
Copper	0.011	mg/L		0.001		E200.8	06/14/12 03:49 / dck
Lead	0.0012	mg/L		0.0005		E200.8	06/14/12 03:49 / dck
Magnesium	22	mg/L		1		E200.7	06/13/12 17:29 / sld
Zinc	ND	mg/L		0.01		E200.8	06/14/12 03:49 / 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: H12060167-013
Client Sample ID CFR-03A

Report Date: 07/16/12
Collection Date: 06/06/12 16:15
DateReceived: 06/07/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	40	mg/L		1		A2540 D	06/11/12 11:59 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	84	mg/L		4		A2320 B	06/11/12 17:21 / cmm
Bicarbonate as HCO3	100	mg/L		4		A2320 B	06/11/12 17:21 / cmm
Sulfate	37	mg/L		1		E300.0	06/11/12 16:22 / cmm
Hardness as CaCO3	111	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	4.1	mg/L		0.1		A5310 C	06/11/12 18:32 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:50 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 15:05 / stp
Nitrogen, Total	0.26	mg/L		0.05		A4500 N-C	06/13/12 17:31 / reh
Phosphorus, Total as P	0.068	mg/L		0.005		E365.1	06/12/12 16:52 / jaw
METALS, DISSOLVED							
Arsenic	0.016	mg/L		0.005		E200.8	06/14/12 04:03 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 04:03 / dck
Copper	0.007	mg/L		0.001		E200.8	06/14/12 04:03 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 04:03 / dck
Zinc	0.01	mg/L		0.01		E200.8	06/14/12 04:03 / dck
METALS, TOTAL							
Mercury	0.00001	mg/L		0.00001		E245.1	06/18/12 13:51 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	0.025	mg/L		0.005		E200.8	06/14/12 03:58 / dck
Cadmium	0.00028	mg/L		0.00008		E200.8	06/14/12 03:58 / dck
Calcium	33	mg/L		1		E200.7	06/13/12 17:32 / sld
Copper	0.063	mg/L		0.001		E200.8	06/14/12 03:58 / dck
Lead	0.0080	mg/L		0.0005		E200.8	06/14/12 03:58 / dck
Magnesium	7	mg/L		1		E200.7	06/13/12 17:32 / sld
Zinc	0.05	mg/L		0.01		E200.8	06/14/12 03:58 / 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: H12060167-014
Client Sample ID WSC-SBC

Report Date: 07/16/12
Collection Date: 06/07/12 08:45
DateReceived: 06/07/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	30	mg/L		1		A2540 D	06/11/12 12:04 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	81	mg/L		4		A2320 B	06/11/12 17:28 / cmm
Bicarbonate as HCO3	98	mg/L		4		A2320 B	06/11/12 17:28 / cmm
Sulfate	11	mg/L		1		E300.0	06/11/12 16:35 / cmm
Hardness as CaCO3	83	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	2.2	mg/L		0.1		A5310 C	06/11/12 18:42 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:51 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 15:06 / stp
Nitrogen, Total	0.09	mg/L		0.05		A4500 N-C	06/13/12 17:32 / reh
Phosphorus, Total as P	0.021	mg/L		0.005		E365.1	06/12/12 17:00 / jaw
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	06/14/12 04:32 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 04:32 / dck
Copper	0.003	mg/L		0.001		E200.8	06/14/12 04:32 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 04:32 / dck
Zinc	0.01	mg/L		0.01		E200.8	06/14/12 04:32 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.00001		E245.1	06/18/12 13:53 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	0.006	mg/L		0.005		E200.8	06/14/12 04:27 / dck
Cadmium	0.00012	mg/L		0.00008		E200.8	06/14/12 04:27 / dck
Calcium	25	mg/L		1		E200.7	06/13/12 17:36 / sld
Copper	0.025	mg/L		0.001		E200.8	06/14/12 04:27 / dck
Lead	0.0025	mg/L		0.0005		E200.8	06/14/12 04:27 / dck
Magnesium	5	mg/L		1		E200.7	06/13/12 17:36 / sld
Zinc	0.01	mg/L		0.01		E200.8	06/14/12 04:27 / 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: H12060167-015
Client Sample ID SS-25

Report Date: 07/16/12
Collection Date: 06/07/12 09:45
DateReceived: 06/07/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	14	mg/L		1		A2540 D	06/11/12 12:05 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	86	mg/L		4		A2320 B	06/11/12 17:35 / cmm
Bicarbonate as HCO3	83	mg/L		4		A2320 B	06/11/12 17:35 / cmm
Sulfate	43	mg/L		1		E300.0	06/11/12 17:12 / cmm
Hardness as CaCO3	113	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	4.9	mg/L		0.1		A5310 C	06/11/12 18:52 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:55 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 15:07 / stp
Nitrogen, Total	0.25	mg/L		0.05		A4500 N-C	06/13/12 17:33 / reh
Phosphorus, Total as P	0.067	mg/L		0.005		E365.1	06/12/12 17:01 / jaw
METALS, DISSOLVED							
Arsenic	0.024	mg/L		0.005		E200.8	06/14/12 04:41 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 04:41 / dck
Copper	0.005	mg/L		0.001		E200.8	06/14/12 04:41 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 04:41 / dck
Zinc	ND	mg/L		0.01		E200.8	06/14/12 04:41 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.00001		E245.1	06/18/12 15:14 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	0.027	mg/L		0.005		E200.8	06/14/12 04:37 / dck
Cadmium	0.00011	mg/L		0.00008		E200.8	06/14/12 04:37 / dck
Calcium	33	mg/L		1		E200.7	06/13/12 17:40 / sld
Copper	0.010	mg/L		0.001		E200.8	06/14/12 04:37 / dck
Lead	0.0017	mg/L		0.0005		E200.8	06/14/12 04:37 / dck
Magnesium	8	mg/L		1		E200.7	06/13/12 17:40 / sld
Zinc	0.01	mg/L		0.01		E200.8	06/14/12 04:37 / 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: H12060167-016
Client Sample ID MWB-SBC

Report Date: 07/16/12
Collection Date: 06/07/12 10:30
DateReceived: 06/07/12
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	06/11/12 12:05 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	67	mg/L		4		A2320 B	06/11/12 17:42 / cmm
Bicarbonate as HCO3	82	mg/L		4		A2320 B	06/11/12 17:42 / cmm
Sulfate	28	mg/L		1		E300.0	06/11/12 17:25 / cmm
Hardness as CaCO3	84	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	3.7	mg/L		0.1		A5310 C	06/11/12 19:02 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:56 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 15:09 / stp
Nitrogen, Total	0.16	mg/L		0.05		A4500 N-C	06/13/12 17:35 / reh
Phosphorus, Total as P	0.028	mg/L		0.005		E365.1	06/12/12 17:02 / jaw
METALS, DISSOLVED							
Arsenic	0.022	mg/L		0.005		E200.8	06/14/12 04:51 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 04:51 / dck
Copper	0.004	mg/L		0.001		E200.8	06/14/12 04:51 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 04:51 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/14/12 04:51 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.00001		E245.1	06/18/12 15:17 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	0.026	mg/L		0.005		E200.8	06/14/12 04:46 / dck
Cadmium	0.00012	mg/L		0.00008		E200.8	06/14/12 04:46 / dck
Calcium	24	mg/L		1		E200.7	06/13/12 17:44 / sld
Copper	0.010	mg/L		0.001		E200.8	06/14/12 04:46 / dck
Lead	0.0018	mg/L		0.0005		E200.8	06/14/12 04:46 / dck
Magnesium	6	mg/L		1		E200.7	06/13/12 17:44 / sld
Zinc	0.01	mg/L		0.01		E200.8	06/14/12 04:46 / 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: H12060167-017
Client Sample ID Field Blank

Report Date: 07/16/12
Collection Date: 06/07/12 11:30
DateReceived: 06/07/12
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	06/11/12 12:05 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	ND	mg/L	H	4		A2320 B	06/22/12 16:42 / cmm
Bicarbonate as HCO3	ND	mg/L	H	4		A2320 B	06/22/12 16:42 / cmm
Sulfate	ND	mg/L		1		E300.0	06/11/12 17:38 / cmm
Hardness as CaCO3	ND	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	0.6	mg/L		0.1		A5310 C	06/11/12 19:12 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:57 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 15:10 / stp
Nitrogen, Total	ND	mg/L		0.05		A4500 N-C	06/13/12 17:36 / reh
Phosphorus, Total as P	ND	mg/L		0.005		E365.1	06/12/12 17:03 / jaw
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	06/14/12 05:00 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 05:00 / dck
Copper	ND	mg/L		0.001		E200.8	06/14/12 05:00 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 05:00 / dck
Zinc	ND	mg/L		0.01		E200.8	06/14/12 05:00 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.00001		E245.1	06/18/12 15:19 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	ND	mg/L		0.005		E200.8	06/14/12 04:56 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 04:56 / dck
Calcium	ND	mg/L		1		E200.7	06/13/12 18:21 / sld
Copper	ND	mg/L		0.001		E200.8	06/14/12 04:56 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 04:56 / dck
Magnesium	ND	mg/L		1		E200.7	06/13/12 18:21 / sld
Zinc	ND	mg/L		0.01		E200.8	06/14/12 04:56 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
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: H12060167-018
Client Sample ID MCWC-MWB

Report Date: 07/16/12
Collection Date: 06/07/12 12:30
DateReceived: 06/07/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	20	mg/L		1		A2540 D	06/11/12 12:06 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	62	mg/L		4		A2320 B	06/11/12 17:57 / cmm
Bicarbonate as HCO3	75	mg/L		4		A2320 B	06/11/12 17:57 / cmm
Sulfate	7	mg/L		1		E300.0	06/11/12 17:50 / cmm
Hardness as CaCO3	50	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	3.5	mg/L		0.1		A5310 C	06/11/12 19:22 / eli-ca1
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 15:59 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 15:13 / stp
Nitrogen, Total	0.20	mg/L		0.05		A4500 N-C	06/13/12 17:39 / reh
Phosphorus, Total as P	0.029	mg/L		0.005		E365.1	06/12/12 17:04 / jaw
METALS, DISSOLVED							
Arsenic	0.023	mg/L		0.005		E200.8	06/14/12 05:29 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/14/12 05:29 / dck
Copper	0.004	mg/L		0.001		E200.8	06/14/12 05:29 / dck
Lead	ND	mg/L		0.0005		E200.8	06/14/12 05:29 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/14/12 05:29 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.00001		E245.1	06/18/12 15:21 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	0.027	mg/L		0.005		E200.8	06/14/12 05:05 / dck
Cadmium	0.00010	mg/L		0.00008		E200.8	06/14/12 05:05 / dck
Calcium	15	mg/L		1		E200.7	06/13/12 18:25 / sld
Copper	0.009	mg/L		0.001		E200.8	06/14/12 05:05 / dck
Lead	0.0019	mg/L		0.0005		E200.8	06/14/12 05:05 / dck
Magnesium	3	mg/L		1		E200.7	06/13/12 18:25 / sld
Zinc	0.01	mg/L		0.01		E200.8	06/14/12 05:05 / 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: H12060167-019
Client Sample ID MCWC-MWB Dupe

Report Date: 07/16/12
Collection Date: 06/07/12 12:30
DateReceived: 06/07/12
Matrix: Aqueous

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	06/11/12 12:06 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	61	mg/L		4		A2320 B	06/11/12 18:04 / cmm
Bicarbonate as HCO3	75	mg/L		4		A2320 B	06/11/12 18:04 / cmm
Sulfate	7	mg/L		1		E300.0	06/11/12 18:03 / cmm
Hardness as CaCO3	49	mg/L		1		A2340 B	06/18/12 07:43 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	3.6	mg/L		0.1		A5310 C	06/11/12 19:32 / eli-ca1
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/12/12 16:02 / stp
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	06/11/12 15:15 / stp
Nitrogen, Total	0.17	mg/L		0.05		A4500 N-C	06/13/12 17:41 / reh
Phosphorus, Total as P	0.027	mg/L		0.005		E365.1	06/12/12 17:05 / jaw
METALS, DISSOLVED							
Arsenic	0.022	mg/L		0.005		E200.8	06/15/12 22:38 / dck
Cadmium	ND	mg/L		0.00008		E200.8	06/15/12 22:38 / dck
Copper	0.004	mg/L		0.001		E200.8	06/15/12 22:38 / dck
Lead	ND	mg/L		0.0005		E200.8	06/15/12 22:38 / dck
Zinc	0.02	mg/L		0.01		E200.8	06/15/12 22:38 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.00001		E245.1	06/18/12 15:24 / eli-b
METALS, TOTAL RECOVERABLE							
Arsenic	0.026	mg/L		0.005		E200.8	06/15/12 22:15 / dck
Cadmium	0.00010	mg/L		0.00008		E200.8	06/15/12 22:15 / dck
Calcium	14	mg/L		1		E200.7	06/14/12 15:15 / sld
Copper	0.009	mg/L		0.001		E200.8	06/15/12 22:15 / dck
Lead	0.0018	mg/L		0.0005		E200.8	06/15/12 22:15 / dck
Magnesium	3	mg/L		1		E200.8	06/15/12 22:15 / dck
Zinc	ND	mg/L		0.01		E200.8	06/15/12 22:15 / dck

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

July 16, 2012

Energy Laboratories, Inc.
ATTN: Jonathan Dee Hager
PO Box 5688
Helena MT 59604
jhager@energylab.com

RE: Project ENL-HL1201

Dear Jonathan Dee Hager,

This report contains results for the 19 samples received by Brooks Rand Labs (BRL) on June 15, 2012. The samples were logged-in for the contracted analyses according to the chain-of-custody form(s). The samples were received, prepared, analyzed, and stored according to BRL SOPs and EPA methodology.

The results were method blank corrected as described in the calculations section of the relevant BRL SOP(s) and may have been evaluated using reporting limits that have been adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details. All data is reported without qualification (with the exception of concentration qualifiers), and all associated quality control sample results meet the acceptance criteria.

BRL, an accredited laboratory, certifies that the reported results of all analyses for which BRL is NELAP accredited meet all NELAP requirements. For more details, please see the *Report Information* page in your report. Please feel free to contact me if you have any questions regarding this report.

Sincerely,

Lydia Greaves

Lydia Greaves
Project Manager
Lydia@brooksrand.com

Report Information

Laboratory Accreditation

BRL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BRL is also certified by many other states to perform environmental analyses. For a current list of our accreditations /certifications, please visit our website at <http://www.brooksrand.com/default.asp?contentID=586>. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

BLK	method blank	**MS**	matrix spike
BRL	Brooks Rand Labs	**MSD**	matrix spike duplicate
BS	laboratory fortified blank	**ND**	non-detect
CAL	calibration standard	**NR**	non-reportable
CCV	continuing calibration verification	**PS**	post preparation spike
COC	chain of custody record	**REC**	percent recovery
CRM	certified reference material	**RPD**	relative percent difference
D	dissolved fraction	**RSD**	relative standard deviation
DUP	duplicate	**SCV**	secondary calibration verification
ICV	initial calibration verification	**SOP**	standard operating procedure
MDL	method detection limit	**SRM**	standard reference material
MRL	method reporting limit	**T**	total recoverable fraction

Definition of Data Qualifiers

(Effective 9/23/09)

B Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
E An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H Holding time and/or preservation requirements not met. Result is estimated.
J Estimated value. A full explanation is presented in the narrative.
J-M Duplicate precision (RPD) for associated QC sample was not within acceptance criteria. Result is estimated.
J-N Spike recovery for associated QC sample was not within acceptance criteria. Result is estimated.
M Duplicate precision (RPD) was not within acceptance criteria. Result is estimated.
N Spike recovery was not within acceptance criteria. Result is estimated.
R Rejected, unusable value. A full explanation is presented in the narrative.
U Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.

These qualifiers are based on those previously utilized by Brooks Rand, Ltd., those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses; USEPA; July 2002. These supersede all previous qualifiers ever employed by BRL.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
H12060167-001G	1224037-01	Water	Sample	06/05/2012	06/15/2012
H12060167-002G	1224037-02	Water	Sample	06/05/2012	06/15/2012
H12060167-003G	1224037-03	Water	Sample	06/05/2012	06/15/2012
H12060167-004G	1224037-04	Water	Sample	06/05/2012	06/15/2012
H12060167-005G	1224037-05	Water	Sample	06/05/2012	06/15/2012
H12060167-006G	1224037-06	Water	Sample	06/05/2012	06/15/2012
H12060167-007G	1224037-07	Water	Sample	06/05/2012	06/15/2012
H12060167-008G	1224037-08	Water	Sample	06/06/2012	06/15/2012
H12060167-009G	1224037-09	Water	Sample	06/06/2012	06/15/2012
H12060167-010G	1224037-10	Water	Sample	06/06/2012	06/15/2012
H12060167-011G	1224037-11	Water	Sample	06/06/2012	06/15/2012
H12060167-012G	1224037-12	Water	Sample	06/06/2012	06/15/2012
H12060167-013G	1224037-13	Water	Sample	06/06/2012	06/15/2012
H12060167-014G	1224037-14	Water	Sample	06/07/2012	06/15/2012
H12060167-015G	1224037-15	Water	Sample	06/07/2012	06/15/2012
H12060167-016G	1224037-16	Water	Sample	06/07/2012	06/15/2012
H12060167-017G	1224037-17	Water	Sample	06/07/2012	06/15/2012
H12060167-018G	1224037-18	Water	Sample	06/07/2012	06/15/2012
H12060167-019G	1224037-19	Water	Sample	06/07/2012	06/15/2012

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
MeHg	Water	EPA 1630	06/27/2012	06/29/2012	B121054	1200485
MeHg	Water	EPA 1630	06/25/2012	06/27/2012	B121062	1200479
MeHg	Water	EPA 1630	07/03/2012	07/04/2012	B121129	1200500

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
H12060167-001G										
1224037-01	MeHg	Water	T	0.297		0.020	0.051	ng/L	B121062	1200479
H12060167-002G										
1224037-02	MeHg	Water	T	0.102		0.020	0.050	ng/L	B121062	1200479
H12060167-003G										
1224037-03	MeHg	Water	T	0.770		0.020	0.049	ng/L	B121062	1200479
H12060167-004G										
1224037-04	MeHg	Water	T	0.287		0.020	0.049	ng/L	B121062	1200479
H12060167-005G										
1224037-05	MeHg	Water	T	0.020	U	0.020	0.051	ng/L	B121062	1200479
H12060167-006G										
1224037-06	MeHg	Water	T	4.56		0.020	0.050	ng/L	B121062	1200479
H12060167-007G										
1224037-07	MeHg	Water	T	4.74		0.020	0.049	ng/L	B121062	1200479
H12060167-008G										
1224037-08	MeHg	Water	T	0.684		0.020	0.050	ng/L	B121062	1200479
H12060167-009G										
1224037-09	MeHg	Water	T	0.290		0.020	0.051	ng/L	B121054	1200485
H12060167-010G										
1224037-10	MeHg	Water	T	0.530		0.020	0.049	ng/L	B121054	1200485
H12060167-011G										
1224037-11	MeHg	Water	T	0.113		0.020	0.050	ng/L	B121054	1200485
H12060167-012G										
1224037-12	MeHg	Water	T	0.113		0.020	0.051	ng/L	B121129	1200500

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
H12060167-013G										
1224037-13	MeHg	Water	T	0.227		0.020	0.050	ng/L	B121129	1200500
H12060167-014G										
1224037-14	MeHg	Water	T	0.071		0.020	0.050	ng/L	B121129	1200500
H12060167-015G										
1224037-15	MeHg	Water	T	0.107		0.020	0.050	ng/L	B121129	1200500
H12060167-016G										
1224037-16	MeHg	Water	T	0.124		0.020	0.050	ng/L	B121129	1200500
H12060167-017G										
1224037-17	MeHg	Water	T	0.021	U	0.021	0.052	ng/L	B121129	1200500
H12060167-018G										
1224037-18	MeHg	Water	T	0.095		0.020	0.050	ng/L	B121129	1200500
H12060167-019G										
1224037-19	MeHg	Water	T	0.094		0.021	0.052	ng/L	B121129	1200500

Accuracy & Precision Summary

Batch: B121054
Lab Matrix: Water
Method: EPA 1630

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B121054-BS1	**Laboratory Fortified Blank (1225056)**						
	MeHg		1.006	1.067	ng/L	106% 67-133	
B121054-BS2	**Laboratory Fortified Blank (1225056)**						
	MeHg		1.011	1.135	ng/L	112% 67-133	
B121054-MS2	**Matrix Spike (1223046-35)**						
	MeHg	0.100	1.001	1.228	ng/L	113% 65-135	
B121054-MSD2	**Matrix Spike Duplicate (1223046-35)**						
	MeHg	0.100	0.9811	1.169	ng/L	109% 65-135	5% 35

Accuracy & Precision Summary

Batch: B121062
Lab Matrix: Water
Method: EPA 1630

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B121062-BS1	**Laboratory Fortified Blank (1223065)**						
	MeHg		0.9880	0.982	ng/L	99% 67-133	
B121062-BS2	**Laboratory Fortified Blank (1223065)**						
	MeHg		1.007	1.081	ng/L	107% 67-133	
B121062-MS4	**Matrix Spike (1224037-04)**						
	MeHg	0.287	1.007	1.406	ng/L	111% 65-135	
B121062-MSD4	**Matrix Spike Duplicate (1224037-04)**						
	MeHg	0.287	1.010	1.413	ng/L	111% 65-135	0.5% 35

Accuracy & Precision Summary

Batch: B121129
Lab Matrix: Water
Method: EPA 1630

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B121129-BS1	**Laboratory Fortified Blank (1225056)**						
	MeHg		0.9872	0.870	ng/L	88% 67-133	
B121129-BS2	**Laboratory Fortified Blank (1225056)**						
	MeHg		0.9903	0.826	ng/L	83% 67-133	
B121129-MS2	**Matrix Spike (1226007-07)**						
	MeHg	0.358	0.6027	0.843	ng/L	81% 65-135	
B121129-MSD2	**Matrix Spike Duplicate (1226007-07)**						
	MeHg	0.358	0.6073	0.845	ng/L	80% 65-135	0.2% 35

Method Blanks & Reporting Limits

Batch: B121054
Matrix: Water
Method: EPA 1630
Analyte: MeHg

Sample	Result	Units
B121054-BLK1	0.005	ng/L
B121054-BLK2	0.012	ng/L
B121054-BLK3	0.006	ng/L
B121054-BLK4	0.007	ng/L

Average: 0.008 **Standard Deviation:** 0.003 **MDL:** 0.020
Limit: 0.045 **Limit:** 0.015 **MRL:** 0.050

Method Blanks & Reporting Limits

Batch: B121062
Matrix: Water
Method: EPA 1630
Analyte: MeHg

Sample	Result	Units
B121062-BLK1	0.009	ng/L
B121062-BLK2	0.012	ng/L
B121062-BLK3	0.007	ng/L
B121062-BLK4	0.007	ng/L

Average: 0.009 **Standard Deviation:** 0.002 **MDL:** 0.020
Limit: 0.045 **Limit:** 0.015 **MRL:** 0.051

Method Blanks & Reporting Limits

Batch: B121129
Matrix: Water
Method: EPA 1630
Analyte: MeHg

Sample	Result	Units
B121129-BLK1	0.006	ng/L
B121129-BLK2	0.007	ng/L
B121129-BLK3	0.007	ng/L
B121129-BLK4	0.004	ng/L

Average: 0.006 **Standard Deviation:** 0.001 **MDL:** 0.021
Limit: 0.045 **Limit:** 0.015 **MRL:** 0.052

Sample Containers

Lab ID: 1224037-01 **Report Matrix:** Water **Collected:** 06/05/2012
Sample: H12060167-001G **Sample Type:** Sample **Received:** 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-02 **Report Matrix:** Water **Collected:** 06/05/2012
Sample: H12060167-002G **Sample Type:** Sample **Received:** 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-03 **Report Matrix:** Water **Collected:** 06/05/2012
Sample: H12060167-003G **Sample Type:** Sample **Received:** 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-04 **Report Matrix:** Water **Collected:** 06/05/2012
Sample: H12060167-004G **Sample Type:** Sample **Received:** 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-05 **Report Matrix:** Water **Collected:** 06/05/2012
Sample: H12060167-005G **Sample Type:** Sample **Received:** 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-06 **Report Matrix:** Water **Collected:** 06/05/2012
Sample: H12060167-006G **Sample Type:** Sample **Received:** 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Sample Containers

Lab ID: 1224037-07
Sample: H12060167-007G
Report Matrix: Water
Sample Type: Sample
Collected: 06/05/2012
Received: 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-08
Sample: H12060167-008G
Report Matrix: Water
Sample Type: Sample
Collected: 06/06/2012
Received: 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-09
Sample: H12060167-009G
Report Matrix: Water
Sample Type: Sample
Collected: 06/06/2012
Received: 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-10
Sample: H12060167-010G
Report Matrix: Water
Sample Type: Sample
Collected: 06/06/2012
Received: 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-11
Sample: H12060167-011G
Report Matrix: Water
Sample Type: Sample
Collected: 06/06/2012
Received: 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-12
Sample: H12060167-012G
Report Matrix: Water
Sample Type: Sample
Collected: 06/06/2012
Received: 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Sample Containers

Lab ID: 1224037-13
Sample: H12060167-013G
Report Matrix: Water
Sample Type: Sample
Collected: 06/06/2012
Received: 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-14
Sample: H12060167-014G
Report Matrix: Water
Sample Type: Sample
Collected: 06/07/2012
Received: 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-15
Sample: H12060167-015G
Report Matrix: Water
Sample Type: Sample
Collected: 06/07/2012
Received: 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-16
Sample: H12060167-016G
Report Matrix: Water
Sample Type: Sample
Collected: 06/07/2012
Received: 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-17
Sample: H12060167-017G
Report Matrix: Water
Sample Type: Sample
Collected: 06/07/2012
Received: 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Lab ID: 1224037-18
Sample: H12060167-018G
Report Matrix: Water
Sample Type: Sample
Collected: 06/07/2012
Received: 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	7152001010	2 mL 6N HCl (PP)	1209043	<2	Cooler

Sample Containers

Lab ID: 1224037-19
Sample: H12060167-019G

Report Matrix: Water
Sample Type: Sample

Collected: 06/07/2012
Received: 06/15/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71520010 10	2 mL 6N HCl (PP)	1209043	<2	Cooler

Shipping Containers

Cooler

Received: June 15, 2012 9:30
Tracking No: 1Z37EW970349036079 via UPS
Coolant Type: Ice
Temperature: 13.1 °C

Description: Cooler
Damaged in transit? No
Returned to client? No

Custody seals present? Yes
Custody seals intact? Yes
COC present? Yes

1224037

Energy Laboratories Inc
3161 East Lyndale Avenue
Helena, MT 59601
(406) 442-0711

H12060167

CHAIN-OF-CUSTODY RECORD

Custody Seal: Y N
Intacted: Y N
Signature Match: Y N

Shipped By: _____
Receipt Temp: _____

Subcontractor:
Brooks Rand Labs
3958 6th Ave NW
Seattle, WA 98106
TEL: (206) 632-6206 FAX: (206) 632-6017
Acct #:

Subcontractor's Client:

Shipped By: _____

Sample ID	Matrix	Collection Date	Bottle Type		SUB-BROOKSRAN
					Requested Tests
H12060167-001G	Aqueous	06/05/12 09:30 A	1-	1	
H12060167-002G	Aqueous	06/05/12 11:30 A	1-	1	
H12060167-003G	Aqueous	06/05/12 01:15 P	1-	1	
H12060167-004G	Aqueous	06/05/12 02:45 P	1-	1	
H12060167-005G	Aqueous	06/05/12 04:00 P	1-	1	
H12060167-006G	Aqueous	06/05/12 04:30 P	1-	1	
H12060167-007G	Aqueous	06/05/12 04:30 P	1-	1	
H12060167-008G	Aqueous	06/06/12 09:00 A	1-	1	
H12060167-009G	Aqueous	06/06/12 10:45 A	1-	1	
H12060167-010G	Aqueous	06/06/12 12:15 P	1-	1	
H12060167-011G	Aqueous	06/06/12 01:45 P	1-	1	
H12060167-012G	Aqueous	06/06/12 03:00 P	1-	1	
H12060167-013G	Aqueous	06/06/12 04:15 P	1-	1	
H12060167-014G	Aqueous	06/07/12 08:45 A	1-	1	
H12060167-015G	Aqueous	06/07/12 09:45 A	1-	1	
H12060167-016G	Aqueous	06/07/12 10:30 A	1-	1	

Comments: Analyze for Methyl Mercury. Energy Laboratories quote number ENL-HL001

QC Level:
STD

		Date/Time			Date/Time
Relinquished by:	Amanda Slaughter	6/8/12 11:58	**Received by:**		6/15/12 0930
Relinquished by:			**Received by:**		

Energy Laboratories Inc
3161 East Lyndale Avenue
Helena, MT 59601
(406) 442-0711

H12060167

CHAIN-OF-CUSTODY RECORD

Custody Seal: Y N
Intacted: Y N
Signature Match: Y N

Shipped By: _____
Receipt Temp: _____

Subcontractor:
Brooks Rand Labs
3958 6th Ave NW
Seattle, WA 98106
TEL: (206) 632-6206 FAX: (206) 632-6017
Acct #:

Subcontractor's Client:

Shipped By:

Sample ID	Matrix	Collection Date	Bottle Type	SUB-BROOKSRAN	Requested Tests
H12060167-017G	Aqueous	06/07/12 11:30 A	1-	1	
H12060167-018G	Aqueous	06/07/12 12:30 P	1-	1	
H12060167-019G	Aqueous	06/07/12 12:30 P	1-	1	

Comments: Analyze for Methyl Mercury. Energy Laboratories quote number ENL-HL001

QC Level:
STD

		Date/Time			Date/Time
Relinquished by:	Amanda Blackburn	6/8/12 11:58	**Received by:**		6/10/12 0930
Relinquished by:			**Received by:**		

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Report Date: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R80552
Sample ID: MBLK		Method Blank				Run: MAN-TECH_120608B				06/08/12 17:34
Alkalinity, Total as CaCO3		8.2	mg/L	4.0						
Sample ID: LCS-06052012		Laboratory Control Sample				Run: MAN-TECH_120608B				06/08/12 17:42
Alkalinity, Total as CaCO3		660	mg/L	4.0	109	90	110			
Sample ID: H12060166-008ADUP	2	Sample Duplicate				Run: MAN-TECH_120608B				06/08/12 18:03
Alkalinity, Total as CaCO3		84	mg/L	4.0				0.5	10	
Bicarbonate as HCO3		100	mg/L	4.0				0.5	10	
Sample ID: H12060166-009AMS		Sample Matrix Spike				Run: MAN-TECH_120608B				06/08/12 18:18
Alkalinity, Total as CaCO3		800	mg/L	4.0	98	80	120			
Method: A2320 B										Batch: R80583
Sample ID: MBLK		Method Blank				Run: MAN-TECH_120612B				06/11/12 15:29
Alkalinity, Total as CaCO3		ND	mg/L	1						
Sample ID: LCS-06052012		Laboratory Control Sample				Run: MAN-TECH_120612B				06/11/12 15:37
Alkalinity, Total as CaCO3		630	mg/L	4.0	105	90	110			
Sample ID: H12060167-007ADUP	2	Sample Duplicate				Run: MAN-TECH_120612B				06/11/12 16:30
Alkalinity, Total as CaCO3		99	mg/L	4.0				0.2	10	
Bicarbonate as HCO3		120	mg/L	4.0				0.1	10	
Sample ID: H12060167-009AMS		Sample Matrix Spike				Run: MAN-TECH_120612B				06/11/12 16:53
Alkalinity, Total as CaCO3		720	mg/L	4.0	101	80	120			
Sample ID: H12060167-017ADUP	2	Sample Duplicate				Run: MAN-TECH_120612B				06/11/12 17:50
Alkalinity, Total as CaCO3		6.3	mg/L	4.0				130	10	R
Bicarbonate as HCO3		7.6	mg/L	4.0				130	10	R
Method: A2320 B										Batch: R80932
Sample ID: MBLK		Method Blank				Run: MAN-TECH_120622B				06/22/12 12:50
Alkalinity, Total as CaCO3		ND	mg/L	1						
Sample ID: LCS-06222012		Laboratory Control Sample				Run: MAN-TECH_120622B				06/22/12 12:58
Alkalinity, Total as CaCO3		630	mg/L	4.0	105	90	110			
Sample ID: H12060252-004ADUP	2	Sample Duplicate				Run: MAN-TECH_120622B				06/22/12 17:10
Alkalinity, Total as CaCO3		120	mg/L	4.0				0.4	10	
Bicarbonate as HCO3		140	mg/L	4.0				0.4	10	
Sample ID: H12060292-002AMS		Sample Matrix Spike				Run: MAN-TECH_120622B				06/22/12 17:26
Alkalinity, Total as CaCO3		760	mg/L	4.0	95	80	120			

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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 D										Batch: 16877
Sample ID: MB-16877		Method Blank				Run: ACCU-124 (14410200)_120611				06/11/12 11:55
Solids, Total Suspended TSS @ 105 C		ND	mg/L	2						
Sample ID: LCS-16877		Laboratory Control Sample				Run: ACCU-124 (14410200)_120611				06/11/12 11:55
Solids, Total Suspended TSS @ 105 C		1730	mg/L	10	86	70	130			
Sample ID: H12060167-006ADUP		Sample Duplicate				Run: ACCU-124 (14410200)_120611				06/11/12 11:57
Solids, Total Suspended TSS @ 105 C		140	mg/L	10				4.2	5	
Sample ID: H12060167-009ADUP		Sample Duplicate				Run: ACCU-124 (14410200)_120611				06/11/12 11:59
Solids, Total Suspended TSS @ 105 C		72.0	mg/L	10				2.7	5	
Method: A2540 D										Batch: 16879
Sample ID: MB-16879		Method Blank				Run: ACCU-124 (14410200)_120611				06/11/12 12:05
Solids, Total Suspended TSS @ 105 C		ND	mg/L	2						
Sample ID: LCS-16879		Laboratory Control Sample				Run: ACCU-124 (14410200)_120611				06/11/12 12:05
Solids, Total Suspended TSS @ 105 C		1750	mg/L	10	88	70	130			
Sample ID: H12060169-002ADUP		Sample Duplicate				Run: ACCU-124 (14410200)_120611				06/11/12 12:06
Solids, Total Suspended TSS @ 105 C		9.00	mg/L	10					5	
Sample ID: H12060172-004CDUP		Sample Duplicate				Run: ACCU-124 (14410200)_120611				06/11/12 12:08
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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500 N-C									Analytical Run: FIA203-HE_120613A	
Sample ID: ICV		Initial Calibration Verification Standard							06/13/12 16:33	
Nitrogen, Total		1.04	mg/L	0.10	104	90	110			
Sample ID: ICB		Initial Calibration Blank, Instrument Blank							06/13/12 16:36	
Nitrogen, Total		0.000214	mg/L	0.10		0	0			
Sample ID: CCV		Continuing Calibration Verification Standard							06/13/12 16:57	
Nitrogen, Total		0.476	mg/L	0.10	95	90	110			
Sample ID: CCV		Continuing Calibration Verification Standard							06/13/12 17:13	
Nitrogen, Total		0.472	mg/L	0.10	94	90	110			
Sample ID: CCV		Continuing Calibration Verification Standard							06/13/12 17:30	
Nitrogen, Total		0.476	mg/L	0.10	95	90	110			
Method: A4500 N-C									Batch: 16900	
Sample ID: MB-16900		Method Blank				Run: FIA203-HE_120613A			06/13/12 16:37	
Nitrogen, Total		ND	mg/L	0.03						
Sample ID: LCS-16900		Laboratory Control Sample				Run: FIA203-HE_120613A			06/13/12 16:39	
Nitrogen, Total		21.5	mg/L	0.20	95	90	110			
Sample ID: H12060164-001BMS		Sample Matrix Spike				Run: FIA203-HE_120613A			06/13/12 16:42	
Nitrogen, Total		1.31	mg/L	0.10	96	90	110			
Sample ID: H12060164-001BMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_120613A			06/13/12 16:43	
Nitrogen, Total		1.32	mg/L	0.10	97	90	110	0.8	20	
Sample ID: H12060166-002BMS		Sample Matrix Spike				Run: FIA203-HE_120613A			06/13/12 16:59	
Nitrogen, Total		1.02	mg/L	0.10	92	90	110			
Sample ID: H12060166-002BMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_120613A			06/13/12 17:00	
Nitrogen, Total		1.02	mg/L	0.10	93	90	110	0.5	20	
Method: A4500 N-C									Batch: 16901	
Sample ID: MB-16901		Method Blank				Run: FIA203-HE_120613A			06/13/12 16:53	
Nitrogen, Total		ND	mg/L	0.03						
Sample ID: LCS-16901		Laboratory Control Sample				Run: FIA203-HE_120613A			06/13/12 16:54	
Nitrogen, Total		21.0	mg/L	0.20	93	90	110			
Sample ID: H12060167-005BMS		Sample Matrix Spike				Run: FIA203-HE_120613A			06/13/12 17:18	
Nitrogen, Total		0.926	mg/L	0.10	76	90	110			S
Sample ID: H12060167-005BMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_120613A			06/13/12 17:19	
Nitrogen, Total		0.943	mg/L	0.10	78	90	110	1.8	20	S
Sample ID: H12060167-017BMS		Sample Matrix Spike				Run: FIA203-HE_120613A			06/13/12 17:37	
Nitrogen, Total		0.939	mg/L	0.10	94	90	110			

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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500 N-C										Batch: 16901
Sample ID: H12060167-017BMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_120613A				06/13/12 17:38
Nitrogen, Total		0.935	mg/L	0.10	94	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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A5310 C									Analytical Run: SUB-C160602	
Sample ID: ICV-33930		Initial Calibration Verification Standard							06/11/12 15:15	
Organic Carbon, Dissolved (DOC)		9.97	mg/L	0.10	100	90	110			
Method: A5310 C									Batch: C_33930	
Sample ID: MB-33930		Method Blank				Run: SUB-C160602			06/11/12 15:04	
Organic Carbon, Dissolved (DOC)		ND	mg/L	0.1						
Sample ID: H12060167-001F		Sample Matrix Spike				Run: SUB-C160602			06/11/12 17:07	
Organic Carbon, Dissolved (DOC)		8.32	mg/L	0.50	103	85	115			
Sample ID: H12060167-001F		Sample Matrix Spike Duplicate				Run: SUB-C160602			06/11/12 17:19	
Organic Carbon, Dissolved (DOC)		8.42	mg/L	0.50	105	85	115	1.2	10	
Sample ID: H12060167-011F		Sample Matrix Spike				Run: SUB-C160602			06/11/12 19:44	
Organic Carbon, Dissolved (DOC)		9.40	mg/L	0.50	100	85	115			
Sample ID: H12060167-011F		Sample Matrix Spike Duplicate				Run: SUB-C160602			06/11/12 19:55	
Organic Carbon, Dissolved (DOC)		9.40	mg/L	0.50	100	85	115	0.0	10	
Sample ID: LCS-33930		Laboratory Control Sample				Run: SUB-C160602			06/11/12 20:05	
Organic Carbon, Dissolved (DOC)		9.85	mg/L	0.10	99	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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: ICP2-HE_120613C	
Sample ID: ICV	2	Initial Calibration Verification Standard							06/13/12 13:58	
Calcium		38.9	mg/L	1.0	97	95	105			
Magnesium		39.1	mg/L	1.0	98	95	105			
Sample ID: CCV-1	2	Continuing Calibration Verification Standard							06/13/12 14:02	
Calcium		24.5	mg/L	1.0	98	95	105			
Magnesium		24.4	mg/L	1.0	97	95	105			
Sample ID: ICSA	2	Interference Check Sample A							06/13/12 14:13	
Calcium		489	mg/L	1.0	98	80	120			
Magnesium		525	mg/L	1.0	105	80	120			
Sample ID: ICSAB	2	Interference Check Sample AB							06/13/12 14:17	
Calcium		493	mg/L	1.0	99	80	120			
Magnesium		532	mg/L	1.0	106	80	120			
Sample ID: CCV	2	Continuing Calibration Verification Standard							06/13/12 15:33	
Calcium		24.6	mg/L	1.0	98	90	110			
Magnesium		24.6	mg/L	1.0	99	90	110			
Sample ID: CCV	2	Continuing Calibration Verification Standard							06/13/12 16:18	
Calcium		24.4	mg/L	1.0	98	90	110			
Magnesium		24.5	mg/L	1.0	98	90	110			
Sample ID: CCV	2	Continuing Calibration Verification Standard							06/13/12 17:03	
Calcium		25.1	mg/L	1.0	100	90	110			
Magnesium		25.1	mg/L	1.0	101	90	110			
Sample ID: CCV	2	Continuing Calibration Verification Standard							06/13/12 18:14	
Calcium		25.5	mg/L	1.0	102	90	110			
Magnesium		25.1	mg/L	1.0	100	90	110			
Method: E200.7									Batch: 16888	
Sample ID: MB-16888	2	Method Blank				Run: ICP2-HE_120613C			06/13/12 15:59	
Calcium		0.05	mg/L	0.02						
Magnesium		ND	mg/L	0.006						
Sample ID: LCS-16888	2	Laboratory Control Sample				Run: ICP2-HE_120613C			06/13/12 16:03	
Calcium		25.4	mg/L	1.0	101	85	115			
Magnesium		25.4	mg/L	1.0	102	85	115			
Sample ID: H12060167-008CDIL	2	Serial Dilution				Run: ICP2-HE_120613C			06/13/12 16:55	
Calcium		38.5	mg/L	1.0		0	0	1.9	10	
Magnesium		10.5	mg/L	1.0		0	0	5.5	10	
Sample ID: H12060167-008CMS3	2	Sample Matrix Spike				Run: ICP2-HE_120613C			06/13/12 16:59	
Calcium		88.0	mg/L	1.0	100	70	130			
Magnesium		60.8	mg/L	1.0	102	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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7										Batch: 16888
Sample ID: H12060167-008CMSD3	2	Sample Matrix Spike Duplicate				Run: ICP2-HE_120613C				06/13/12 17:10
Calcium		85.6	mg/L	1.0	96	70	130	2.8	20	
Magnesium		60.1	mg/L	1.0	100	70	130	1.3	20	
Method: E200.7										Batch: R80658
Sample ID: ICB	2	Method Blank				Run: ICP2-HE_120613C				06/13/12 14:25
Calcium		0.04	mg/L	0.008						
Magnesium		ND	mg/L	0.003						
Sample ID: LFB	2	Laboratory Fortified Blank				Run: ICP2-HE_120613C				06/13/12 14:29
Calcium		46.5	mg/L	1.0	93	85	115			
Magnesium		46.9	mg/L	1.0	94	85	115			
Sample ID: H12060167-005CMS2	2	Sample Matrix Spike				Run: ICP2-HE_120613C				06/13/12 16:37
Calcium		49.3	mg/L	1.0	98	70	130			
Magnesium		50.4	mg/L	1.0	101	70	130			
Sample ID: H12060167-005CMSD2	2	Sample Matrix Spike Duplicate				Run: ICP2-HE_120613C				06/13/12 16:40
Calcium		48.8	mg/L	1.0	98	70	130	1.0	20	
Magnesium		49.8	mg/L	1.0	100	70	130	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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: ICP2-HE_120614B	
Sample ID: ICV		Initial Calibration Verification Standard							06/14/12 12:18	
Calcium		39.1	mg/L	1.0	98	95	105			
Sample ID: CCV-1		Continuing Calibration Verification Standard							06/14/12 12:22	
Calcium		24.7	mg/L	1.0	99	95	105			
Sample ID: ICSA		Interference Check Sample A							06/14/12 12:33	
Calcium		469	mg/L	1.0	94	80	120			
Sample ID: ICSAB		Interference Check Sample AB							06/14/12 12:37	
Calcium		488	mg/L	1.0	98	80	120			
Sample ID: CCV		Continuing Calibration Verification Standard							06/14/12 14:37	
Calcium		23.3	mg/L	1.0	93	90	110			
Method: E200.7									Batch: 16888	
Sample ID: MB-16888	2	Method Blank				Run: ICP2-HE_120614B			06/14/12 14:30	
Calcium		0.04	mg/L	0.02						
Magnesium		ND	mg/L	0.006						
Sample ID: LCS-16888	2	Laboratory Control Sample				Run: ICP2-HE_120614B			06/14/12 14:34	
Calcium		23.6	mg/L	1.0	94	85	115			
Magnesium		23.0	mg/L	1.0	92	85	115			
Sample ID: H12060165-001DDIL	2	Serial Dilution				Run: ICP2-HE_120614B			06/14/12 14:49	
Calcium		151	mg/L	1.0		0	0	1.7	10	
Magnesium		179	mg/L	1.0		0	0	4.0	10	
Sample ID: H12060165-001DMS3	2	Sample Matrix Spike				Run: ICP2-HE_120614B			06/14/12 14:52	
Calcium		174	mg/L	1.0		70	130			A
Magnesium		206	mg/L	1.0		70	130			A
Sample ID: H12060165-001DMSD3	2	Sample Matrix Spike Duplicate				Run: ICP2-HE_120614B			06/14/12 14:56	
Calcium		179	mg/L	1.0		70	130	2.7	20	A
Magnesium		212	mg/L	1.0		70	130	2.7	20	A
Method: E200.7									Batch: 16895	
Sample ID: MB-16895		Method Blank				Run: ICP2-HE_120614B			06/14/12 15:08	
Calcium		0.04	mg/L	0.02						
Sample ID: LCS-16895		Laboratory Control Sample				Run: ICP2-HE_120614B			06/14/12 15:12	
Calcium		23.0	mg/L	1.0	92	85	115			
Sample ID: H12060197-008CMS3		Sample Matrix Spike				Run: ICP2-HE_120614B			06/14/12 16:00	
Calcium		53.6	mg/L	1.0	81	70	130			
Sample ID: H12060197-008CMSD3		Sample Matrix Spike Duplicate				Run: ICP2-HE_120614B			06/14/12 16:04	
Calcium		55.9	mg/L	1.0	91	70	130	4.2	20	

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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_120612A		
Sample ID: ICV STD	5	Initial Calibration Verification Standard							06/12/12 13:24	
Arsenic		0.0502	mg/L	0.0050	100	90	110			
Cadmium		0.0268	mg/L	0.0010	107	90	110			
Copper		0.0527	mg/L	0.010	105	90	110			
Lead		0.0508	mg/L	0.010	102	90	110			
Zinc		0.0534	mg/L	0.010	107	90	110			
Sample ID: ICSA	5	Interference Check Sample A							06/12/12 13:28	
Arsenic		8.60E-05	mg/L	0.0050						
Cadmium		0.000938	mg/L	0.0010						
Copper		0.000187	mg/L	0.010						
Lead		0.000164	mg/L	0.010						
Zinc		0.00107	mg/L	0.010						
Sample ID: ICSAB	5	Interference Check Sample AB							06/12/12 13:33	
Arsenic		0.0109	mg/L	0.0050	109	70	130			
Cadmium		0.0109	mg/L	0.0010	109	70	130			
Copper		0.0210	mg/L	0.010	105	70	130			
Lead		0.000137	mg/L	0.010		0	0			
Zinc		0.0116	mg/L	0.010	116	70	130			
Sample ID: ICV STD	5	Initial Calibration Verification Standard							06/13/12 03:19	
Arsenic		0.0497	mg/L	0.0050	99	90	110			
Cadmium		0.0273	mg/L	0.0010	109	90	110			
Copper		0.0522	mg/L	0.010	104	90	110			
Lead		0.0519	mg/L	0.010	104	90	110			
Zinc		0.0522	mg/L	0.010	104	90	110			
Sample ID: ICSA	5	Interference Check Sample A							06/13/12 03:24	
Arsenic		8.10E-05	mg/L	0.0050						
Cadmium		0.000866	mg/L	0.0010						
Copper		0.000160	mg/L	0.010						
Lead		0.000144	mg/L	0.010						
Zinc		0.00102	mg/L	0.010						
Sample ID: ICSAB	5	Interference Check Sample AB							06/13/12 03:29	
Arsenic		0.0105	mg/L	0.0050	105	70	130			
Cadmium		0.0104	mg/L	0.0010	104	70	130			
Copper		0.0200	mg/L	0.010	100	70	130			
Lead		0.000125	mg/L	0.010		0	0			
Zinc		0.0109	mg/L	0.010	109	70	130			
Sample ID: ICSA	5	Interference Check Sample A							06/13/12 13:36	
Arsenic		8.10E-05	mg/L	0.0050						
Cadmium		0.000912	mg/L	0.0010						
Copper		0.000182	mg/L	0.010						
Lead		0.000148	mg/L	0.010						

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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_120612A		
Sample ID: ICSA	5	Interference Check Sample A								06/13/12 13:36
Zinc		0.00107	mg/L	0.010						
Sample ID: ICSAB	5	Interference Check Sample AB								06/13/12 13:41
Arsenic		0.0108	mg/L	0.0050	108	70	130			
Cadmium		0.0107	mg/L	0.0010	107	70	130			
Copper		0.0204	mg/L	0.010	102	70	130			
Lead		0.000131	mg/L	0.010		0	0			
Zinc		0.0115	mg/L	0.010	115	70	130			
Sample ID: ICV STD	5	Initial Calibration Verification Standard								06/13/12 15:48
Arsenic		0.0509	mg/L	0.0050	102	90	110			
Cadmium		0.0269	mg/L	0.0010	108	90	110			
Copper		0.0522	mg/L	0.010	104	90	110			
Lead		0.0505	mg/L	0.010	101	90	110			
Zinc		0.0533	mg/L	0.010	107	90	110			
Sample ID: ICV STD	5	Initial Calibration Verification Standard								06/13/12 23:09
Arsenic		0.0519	mg/L	0.0050	104	90	110			
Cadmium		0.0270	mg/L	0.0010	108	90	110			
Copper		0.0532	mg/L	0.010	106	90	110			
Lead		0.0508	mg/L	0.010	102	90	110			
Zinc		0.0538	mg/L	0.010	108	90	110			
Sample ID: ICSA	5	Interference Check Sample A								06/13/12 23:14
Arsenic		5.60E-05	mg/L	0.0050						
Cadmium		0.000871	mg/L	0.0010						
Copper		0.000207	mg/L	0.010						
Lead		0.000162	mg/L	0.010						
Zinc		0.00131	mg/L	0.010						
Sample ID: ICSAB	5	Interference Check Sample AB								06/13/12 23:18
Arsenic		0.0108	mg/L	0.0050	108	70	130			
Cadmium		0.0106	mg/L	0.0010	106	70	130			
Copper		0.0207	mg/L	0.010	104	70	130			
Lead		0.000128	mg/L	0.010		0	0			
Zinc		0.0116	mg/L	0.010	116	70	130			
Sample ID: ICSA	5	Interference Check Sample A								06/14/12 12:18
Arsenic		4.50E-05	mg/L	0.0050						
Cadmium		0.000730	mg/L	0.0010						
Copper		0.000174	mg/L	0.010						
Lead		0.000125	mg/L	0.010						
Zinc		0.00117	mg/L	0.010						
Sample ID: ICSAB	5	Interference Check Sample AB								06/14/12 12:22
Arsenic		0.0111	mg/L	0.0050	111	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:** 07/17/12

Project: CFR Monitoring-474374 **Work Order:** H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Analytical Run: ICPMS204-B_120612A	
Sample ID: ICSAB	5	Interference Check Sample AB							06/14/12 12:22	
Cadmium		0.0106	mg/L	0.0010	106	70	130			
Copper		0.0214	mg/L	0.010	107	70	130			
Lead		0.000114	mg/L	0.010		0	0			
Zinc		0.0113	mg/L	0.010	113	70	130			
Method: E200.8									Batch: 16888	
Sample ID: MB-16888	5	Method Blank				Run: ICPMS204-B_120612A			06/13/12 20:33	
Arsenic		0.0001	mg/L	5E-05						
Cadmium		3E-05	mg/L	2E-05						
Copper		ND	mg/L	0.0004						
Lead		2E-05	mg/L	2E-05						
Zinc		0.001	mg/L	0.0003						
Sample ID: LCS-16888	5	Laboratory Control Sample				Run: ICPMS204-B_120612A			06/13/12 20:37	
Arsenic		0.506	mg/L	0.0010	101	85	115			
Cadmium		0.256	mg/L	0.0010	102	85	115			
Copper		0.500	mg/L	0.0050	100	85	115			
Lead		0.525	mg/L	0.0010	105	85	115			
Zinc		0.505	mg/L	0.010	101	85	115			
Sample ID: H12060165-001DMS3	5	Sample Matrix Spike				Run: ICPMS204-B_120612A			06/13/12 21:15	
Arsenic		0.503	mg/L	0.0010	100	70	130			
Cadmium		0.243	mg/L	0.0010	97	70	130			
Copper		0.479	mg/L	0.0050	96	70	130			
Lead		0.489	mg/L	0.0010	98	70	130			
Zinc		0.478	mg/L	0.010	95	70	130			
Sample ID: H12060165-001DMSD3	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_120612A			06/13/12 21:20	
Arsenic		0.513	mg/L	0.0010	102	70	130	1.9	20	
Cadmium		0.251	mg/L	0.0010	100	70	130	3.2	20	
Copper		0.483	mg/L	0.0050	96	70	130	0.7	20	
Lead		0.504	mg/L	0.0010	101	70	130	3.0	20	
Zinc		0.496	mg/L	0.010	98	70	130	3.7	20	
Sample ID: H12060167-008CMS3	5	Sample Matrix Spike				Run: ICPMS204-B_120612A			06/14/12 02:24	
Arsenic		1.09	mg/L	0.0010	104	70	130			
Cadmium		0.508	mg/L	0.0010	101	70	130			
Copper		1.28	mg/L	0.0050	100	70	130			
Lead		1.09	mg/L	0.0010	105	70	130			
Zinc		1.22	mg/L	0.010	100	70	130			
Sample ID: H12060167-008CMSD3	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_120612A			06/14/12 02:28	
Arsenic		1.08	mg/L	0.0010	103	70	130	0.9	20	
Cadmium		0.497	mg/L	0.0010	99	70	130	2.2	20	
Copper		1.26	mg/L	0.0050	99	70	130	1.0	20	
Lead		1.07	mg/L	0.0010	103	70	130	1.8	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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: 16888
Sample ID: H12060167-008CMSD3	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_120612A				06/14/12 02:28
Zinc		1.21	mg/L	0.010	98	70	130	1.2	20	
Method: E200.8										Batch: R80640
Sample ID: ICB	5	Method Blank				Run: ICPMS204-B_120612A				06/12/12 14:59
Arsenic		ND	mg/L	0.0050						
Cadmium		ND	mg/L	8.0E-05						
Copper		ND	mg/L	0.0010						
Lead		ND	mg/L	0.00050						
Zinc		0.000491	mg/L	0.010						
Sample ID: LFB	5	Laboratory Fortified Blank				Run: ICPMS204-B_120612A				06/13/12 14:19
Arsenic		0.0504	mg/L	0.0050	101	85	115			
Cadmium		0.0483	mg/L	0.0010	97	85	115			
Copper		0.0484	mg/L	0.010	97	85	115			
Lead		0.0488	mg/L	0.010	98	85	115			
Zinc		0.0513	mg/L	0.010	102	85	115			
Sample ID: H12060167-005CMS	5	Sample Matrix Spike				Run: ICPMS204-B_120612A				06/14/12 01:22
Arsenic		0.0495	mg/L	0.0010	99	70	130			
Cadmium		0.0489	mg/L	0.0010	98	70	130			
Copper		0.0483	mg/L	0.0050	97	70	130			
Lead		0.0496	mg/L	0.0010	99	70	130			
Zinc		0.0496	mg/L	0.010	97	70	130			
Sample ID: H12060167-005CMSD	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_120612A				06/14/12 01:27
Arsenic		0.0508	mg/L	0.0010	102	70	130	2.7	20	
Cadmium		0.0495	mg/L	0.0010	99	70	130	1.2	20	
Copper		0.0493	mg/L	0.0050	99	70	130	2.0	20	
Lead		0.0505	mg/L	0.0010	101	70	130	1.7	20	
Zinc		0.0511	mg/L	0.010	100	70	130	3.0	20	
Sample ID: H12060167-008DMS	5	Sample Matrix Spike				Run: ICPMS204-B_120612A				06/14/12 02:47
Arsenic		0.0664	mg/L	0.0010	101	70	130			
Cadmium		0.0480	mg/L	0.0010	96	70	130			
Copper		0.0657	mg/L	0.0050	95	70	130			
Lead		0.0498	mg/L	0.0010	99	70	130			
Zinc		0.0678	mg/L	0.010	96	70	130			
Sample ID: H12060167-008DMSD	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_120612A				06/14/12 02:52
Arsenic		0.0667	mg/L	0.0010	101	70	130	0.4	20	
Cadmium		0.0483	mg/L	0.0010	96	70	130	0.7	20	
Copper		0.0660	mg/L	0.0050	96	70	130	0.5	20	
Lead		0.0500	mg/L	0.0010	99	70	130	0.5	20	
Zinc		0.0696	mg/L	0.010	99	70	130	2.8	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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R80640
Sample ID: H12060167-018DMS	5	Sample Matrix Spike				Run: ICPMS204-B_120612A				06/14/12 05:34
Arsenic		0.0735	mg/L	0.0010	100	70	130			
Cadmium		0.0497	mg/L	0.0010	99	70	130			
Copper		0.0534	mg/L	0.0050	98	70	130			
Lead		0.0515	mg/L	0.0010	103	70	130			
Zinc		0.0675	mg/L	0.010	99	70	130			
Sample ID: H12060167-018DMSD	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_120612A				06/14/12 05:38
Arsenic		0.0741	mg/L	0.0010	101	70	130	0.9	20	
Cadmium		0.0480	mg/L	0.0010	96	70	130	3.5	20	
Copper		0.0531	mg/L	0.0050	98	70	130	0.6	20	
Lead		0.0489	mg/L	0.0010	98	70	130	5.1	20	
Zinc		0.0673	mg/L	0.010	99	70	130	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:** 07/17/12

Project: CFR Monitoring-474374 **Work Order:** H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_120615A		
Sample ID: ICV STD	6	Initial Calibration Verification Standard								06/15/12 20:00
Arsenic		0.0505	mg/L	0.0050	101	90	110			
Cadmium		0.0269	mg/L	0.0010	108	90	110			
Copper		0.0532	mg/L	0.010	106	90	110			
Lead		0.0511	mg/L	0.010	102	90	110			
Magnesium		2.61	mg/L	0.50	104	90	110			
Zinc		0.0524	mg/L	0.010	105	90	110			
Sample ID: ICSA	6	Interference Check Sample A								06/15/12 20:05
Arsenic		9.00E-05	mg/L	0.0050						
Cadmium		0.000873	mg/L	0.0010						
Copper		0.000472	mg/L	0.010						
Lead		0.000136	mg/L	0.010						
Magnesium		40.7	mg/L	0.50	102	70	130			
Zinc		0.00113	mg/L	0.010						
Sample ID: ICSAB	6	Interference Check Sample AB								06/15/12 20:09
Arsenic		0.0107	mg/L	0.0050	107	70	130			
Cadmium		0.0107	mg/L	0.0010	107	70	130			
Copper		0.0206	mg/L	0.010	103	70	130			
Lead		0.000124	mg/L	0.010		0	0			
Magnesium		41.7	mg/L	0.50	104	70	130			
Zinc		0.0120	mg/L	0.010	120	70	130			
Method: E200.8										Batch: 16895
Sample ID: MB-16895	6	Method Blank				Run: ICPMS204-B_120615A				06/15/12 21:56
Arsenic		ND	mg/L	5E-05						
Cadmium		ND	mg/L	2E-05						
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-16895	6	Laboratory Control Sample				Run: ICPMS204-B_120615A				06/15/12 22:01
Arsenic		0.485	mg/L	0.0010	97	85	115			
Cadmium		0.258	mg/L	0.0010	103	85	115			
Copper		0.482	mg/L	0.0050	96	85	115			
Lead		0.498	mg/L	0.0010	100	85	115			
Magnesium		24.3	mg/L	1.0	97	85	115			
Zinc		0.487	mg/L	0.010	97	85	115			
Sample ID: H12060075-001DMS3	6	Sample Matrix Spike				Run: ICPMS204-B_120615A				06/16/12 00:13
Arsenic		9.68	mg/L	0.0010	97	70	130			
Cadmium		5.19	mg/L	0.0010	104	70	130			
Copper		9.50	mg/L	0.0077	95	70	130			
Lead		9.88	mg/L	0.0010	99	70	130			
Magnesium		481	mg/L	1.0	96	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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: 16895
Sample ID: H12060075-001DMS3	6	Sample Matrix Spike				Run: ICPMS204-B_120615A				06/16/12 00:13
Zinc		10.9	mg/L	0.010	95	70	130			
Sample ID: H12060075-001DMSD3	6	Sample Matrix Spike Duplicate				Run: ICPMS204-B_120615A				06/16/12 00:17
Arsenic		9.58	mg/L	0.0010	96	70	130	1.0	20	
Cadmium		5.09	mg/L	0.0010	102	70	130	2.0	20	
Copper		9.36	mg/L	0.0077	94	70	130	1.5	20	
Lead		9.88	mg/L	0.0010	99	70	130	0.0	20	
Magnesium		482	mg/L	1.0	96	70	130	0.3	20	
Zinc		10.7	mg/L	0.010	94	70	130	1.7	20	
Method: E200.8										Batch: R80735
Sample ID: ICB	5	Method Blank				Run: ICPMS204-B_120615A				06/15/12 20:37
Arsenic		ND	mg/L	5E-05						
Cadmium		ND	mg/L	5E-06						
Copper		3E-05	mg/L	2E-05						
Lead		ND	mg/L	1E-05						
Zinc		0.001	mg/L	0.0004						
Sample ID: LFB	5	Laboratory Fortified Blank				Run: ICPMS204-B_120615A				06/15/12 20:42
Arsenic		0.0505	mg/L	0.0050	101	85	115			
Cadmium		0.0485	mg/L	0.0010	97	85	115			
Copper		0.0482	mg/L	0.010	96	85	115			
Lead		0.0496	mg/L	0.010	99	85	115			
Zinc		0.0498	mg/L	0.010	97	85	115			
Sample ID: H12060164-001DMS	5	Sample Matrix Spike				Run: ICPMS204-B_120615A				06/15/12 20:56
Arsenic		0.0543	mg/L	0.0010	99	70	130			
Cadmium		0.0474	mg/L	0.0010	95	70	130			
Copper		0.0480	mg/L	0.0050	95	70	130			
Lead		0.0488	mg/L	0.0010	97	70	130			
Zinc		0.0495	mg/L	0.010	96	70	130			
Sample ID: H12060164-001DMSD	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_120615A				06/15/12 21:00
Arsenic		0.0540	mg/L	0.0010	98	70	130	0.5	20	
Cadmium		0.0479	mg/L	0.0010	96	70	130	1.1	20	
Copper		0.0481	mg/L	0.0050	95	70	130	0.2	20	
Lead		0.0484	mg/L	0.0010	97	70	130	0.7	20	
Zinc		0.0497	mg/L	0.010	96	70	130	0.4	20	
Sample ID: H12060247-004CMS	5	Sample Matrix Spike				Run: ICPMS204-B_120615A				06/15/12 23:49
Arsenic		0.240	mg/L	0.0010	96	70	130			
Cadmium		0.244	mg/L	0.0010	98	70	130			
Copper		0.234	mg/L	0.0050	93	70	130			
Lead		0.240	mg/L	0.0010	96	70	130			
Zinc		0.255	mg/L	0.010	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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R80735
Sample ID: H12060247-004CMSD	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_120615A				06/15/12 23:54
Arsenic		0.236	mg/L	0.0010	94	70	130	1.9	20	
Cadmium		0.241	mg/L	0.0010	96	70	130	1.1	20	
Copper		0.228	mg/L	0.0050	91	70	130	2.2	20	
Lead		0.237	mg/L	0.0010	95	70	130	1.4	20	
Zinc		0.238	mg/L	0.010	92	70	130	6.9	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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E245.1									Analytical Run: SUB-B186962	
Sample ID: QCS		Initial Calibration Verification Standard							06/18/12 11:46	
Mercury		9.4E-05	mg/L	0.00010	94	90	110			
Sample ID: QCS		Initial Calibration Verification Standard							06/18/12 14:50	
Mercury		0.00010	mg/L	0.00010	103	90	110			
Method: E245.1									Batch: B_63176	
Sample ID: MB-63176		Method Blank				Run: SUB-B186962			06/18/12 13:01	
Mercury		ND	mg/L							
Sample ID: LCS-63176		Laboratory Control Sample				Run: SUB-B186962			06/18/12 13:03	
Mercury		9.1E-05	mg/L	0.00010	91	85	115			
Sample ID: H12060167-001C		Sample Matrix Spike				Run: SUB-B186962			06/18/12 13:08	
Mercury		9.5E-05	mg/L	0.00010	78	70	130			
Sample ID: H12060167-001C		Sample Matrix Spike Duplicate				Run: SUB-B186962			06/18/12 13:11	
Mercury		9.3E-05	mg/L	0.00010	76	70	130		30	
Sample ID: H12060167-011C		Sample Matrix Spike				Run: SUB-B186962			06/18/12 13:44	
Mercury		9.4E-05	mg/L	0.00010	91	70	130			
Sample ID: H12060167-011C		Sample Matrix Spike Duplicate				Run: SUB-B186962			06/18/12 13:46	
Mercury		9.1E-05	mg/L	0.00010	89	70	130		30	
Method: E245.1									Analytical Run: SUB-B187198	
Sample ID: QCS		Initial Calibration Verification Standard							06/21/12 11:33	
Mercury		0.00010	mg/L	0.00010	105	90	110			
Method: E245.1									Batch: B_63209	
Sample ID: MB-63209		Method Blank				Run: SUB-B187198			06/21/12 11:41	
Mercury		ND	mg/L	5E-06						
Sample ID: LCS-63209		Laboratory Control Sample				Run: SUB-B187198			06/21/12 11:44	
Mercury		0.00021	mg/L	0.00010	107	85	115			
Sample ID: B12061465-007BMS		Sample Matrix Spike				Run: SUB-B187198			06/21/12 12:13	
Mercury		0.00022	mg/L	0.00010	109	70	130			
Sample ID: B12061465-007BMSD		Sample Matrix Spike Duplicate				Run: SUB-B187198			06/21/12 12:15	
Mercury		0.00022	mg/L	0.00010	110	70	130	0.9	30	

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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC102-H_120611A	
Sample ID: ICV061112-12		Initial Calibration Verification Standard							06/11/12 11:38	
Sulfate		400	mg/L	1.0	101	90	110			
Sample ID: CCV061112-15		Continuing Calibration Verification Standard							06/11/12 12:35	
Sulfate		410	mg/L	1.0	102	90	110			
Sample ID: CCV061112-30		Continuing Calibration Verification Standard							06/11/12 15:44	
Sulfate		410	mg/L	1.0	102	90	110			
Method: E300.0									Batch: R80584	
Sample ID: ICB061112-13		Method Blank				Run: IC102-H_120611A			06/11/12 11:51	
Sulfate		ND	mg/L	0.1						
Sample ID: LFB061112-14		Laboratory Fortified Blank				Run: IC102-H_120611A			06/11/12 12:23	
Sulfate		200	mg/L	1.1	100	90	110			
Sample ID: H12060167-003AMS		Sample Matrix Spike				Run: IC102-H_120611A			06/11/12 13:38	
Sulfate		230	mg/L	1.1	102	90	110			
Sample ID: H12060167-003AMSD		Sample Matrix Spike Duplicate				Run: IC102-H_120611A			06/11/12 13:51	
Sulfate		230	mg/L	1.1	102	90	110	0.4	20	
Sample ID: H12060167-014AMS		Sample Matrix Spike				Run: IC102-H_120611A			06/11/12 16:47	
Sulfate		210	mg/L	1.1	100	90	110			
Sample ID: H12060167-014AMSD		Sample Matrix Spike Duplicate				Run: IC102-H_120611A			06/11/12 17:00	
Sulfate		210	mg/L	1.1	100	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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E350.1									Analytical Run: FIA203-HE_120612C	
Sample ID: ICV	Initial Calibration Verification Standard								06/12/12 14:32	
Nitrogen, Ammonia as N		1.07	mg/L	0.050	107	90	110			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								06/12/12 14:36	
Nitrogen, Ammonia as N		-0.000369	mg/L	0.050		0	0			
Sample ID: CCV	Continuing Calibration Verification Standard								06/12/12 15:28	
Nitrogen, Ammonia as N		0.480	mg/L	0.050	96	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								06/12/12 15:44	
Nitrogen, Ammonia as N		0.474	mg/L	0.050	95	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								06/12/12 16:01	
Nitrogen, Ammonia as N		0.468	mg/L	0.050	94	90	110			
Method: E350.1									Batch: R80614	
Sample ID: LFB	Laboratory Fortified Blank					Run: FIA203-HE_120612C			06/12/12 14:33	
Nitrogen, Ammonia as N		1.08	mg/L	0.050	108	90	110			
Sample ID: LCS	Laboratory Control Sample					Run: FIA203-HE_120612C			06/12/12 14:34	
Nitrogen, Ammonia as N		10.8	mg/L	0.50	106	90	110			
Sample ID: MBLK	Method Blank					Run: FIA203-HE_120612C			06/12/12 14:38	
Nitrogen, Ammonia as N		0.08	mg/L	0.02						
Sample ID: H12060167-004EMS	Sample Matrix Spike					Run: FIA203-HE_120612C			06/12/12 15:36	
Nitrogen, Ammonia as N		0.824	mg/L	0.050	82	80	120			
Sample ID: H12060167-004EMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_120612C			06/12/12 15:37	
Nitrogen, Ammonia as N		0.828	mg/L	0.050	83	80	120	0.5	10	
Sample ID: H12060167-014EMS	Sample Matrix Spike					Run: FIA203-HE_120612C			06/12/12 15:53	
Nitrogen, Ammonia as N		0.846	mg/L	0.050	85	80	120			
Sample ID: H12060167-014EMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_120612C			06/12/12 15:54	
Nitrogen, Ammonia as N		0.841	mg/L	0.050	84	80	120	0.6	10	
Sample ID: H12060169-004EMS	Sample Matrix Spike					Run: FIA203-HE_120612C			06/12/12 16:08	
Nitrogen, Ammonia as N		0.822	mg/L	0.050	82	80	120			
Sample ID: H12060169-004EMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_120612C			06/12/12 16:09	
Nitrogen, Ammonia as N		0.830	mg/L	0.050	83	80	120	1.0	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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2									Analytical Run: FIA203-HE_120611A	
Sample ID: ICV	Initial Calibration Verification Standard								06/11/12 13:00	
Nitrogen, Nitrate+Nitrite as N		0.994	mg/L	0.010	99	90	110			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								06/11/12 13:05	
Nitrogen, Nitrate+Nitrite as N		-0.0102	mg/L	0.010		0	0			
Sample ID: CCV	Continuing Calibration Verification Standard								06/11/12 14:30	
Nitrogen, Nitrate+Nitrite as N		0.481	mg/L	0.010	96	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								06/11/12 14:47	
Nitrogen, Nitrate+Nitrite as N		0.479	mg/L	0.010	96	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								06/11/12 15:04	
Nitrogen, Nitrate+Nitrite as N		0.475	mg/L	0.010	95	90	110			
Method: E353.2									Batch: R80582	
Sample ID: LFB	Laboratory Fortified Blank					Run: FIA203-HE_120611A			06/11/12 13:01	
Nitrogen, Nitrate+Nitrite as N		0.986	mg/L	0.010	99	90	110			
Sample ID: MBLK	Method Blank					Run: FIA203-HE_120611A			06/11/12 13:06	
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.002						
Sample ID: H12060166-006FMS	Sample Matrix Spike					Run: FIA203-HE_120611A			06/11/12 14:38	
Nitrogen, Nitrate+Nitrite as N		0.932	mg/L	0.010	93	90	110			
Sample ID: H12060166-006FMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_120611A			06/11/12 14:39	
Nitrogen, Nitrate+Nitrite as N		0.939	mg/L	0.010	94	90	110	0.7	20	
Sample ID: H12060167-007EMS	Sample Matrix Spike					Run: FIA203-HE_120611A			06/11/12 14:54	
Nitrogen, Nitrate+Nitrite as N		0.935	mg/L	0.010	91	90	110			
Sample ID: H12060167-007EMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_120611A			06/11/12 14:55	
Nitrogen, Nitrate+Nitrite as N		0.936	mg/L	0.010	91	90	110	0.1	20	
Sample ID: H12060167-017EMS	Sample Matrix Spike					Run: FIA203-HE_120611A			06/11/12 15:11	
Nitrogen, Nitrate+Nitrite as N		0.951	mg/L	0.010	95	90	110			
Sample ID: H12060167-017EMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_120611A			06/11/12 15:12	
Nitrogen, Nitrate+Nitrite as N		0.948	mg/L	0.010	95	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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E365.1									Analytical Run: FIA202-HE_120612B	
Sample ID: ICV	Initial Calibration Verification Standard								06/12/12 15:58	
Phosphorus, Total as P		0.253	mg/L	0.010	101	90	110			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								06/12/12 16:03	
Phosphorus, Total as P		0.000310	mg/L	0.010		0	0			
Sample ID: CCV	Continuing Calibration Verification Standard								06/12/12 16:22	
Phosphorus, Total as P		0.263	mg/L	0.010	105	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								06/12/12 16:37	
Phosphorus, Total as P		0.268	mg/L	0.010	107	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								06/12/12 16:54	
Phosphorus, Total as P		0.269	mg/L	0.010	108	90	110			
Method: E365.1									Batch: 16884	
Sample ID: LCS-16884	Laboratory Control Sample					Run: FIA202-HE_120612B			06/12/12 16:04	
Phosphorus, Total as P		43.7	mg/L	0.10	105	90	110			
Sample ID: MB-16884	Method Blank					Run: FIA202-HE_120612B			06/12/12 16:06	
Phosphorus, Total as P		ND	mg/L	0.0009						
Sample ID: H12060164-001EMS	Sample Matrix Spike					Run: FIA202-HE_120612B			06/12/12 16:08	
Phosphorus, Total as P		0.294	mg/L	0.010	109	90	110			
Sample ID: H12060164-001EMSD	Sample Matrix Spike Duplicate					Run: FIA202-HE_120612B			06/12/12 16:09	
Phosphorus, Total as P		0.298	mg/L	0.010	110	90	110	1.1	20	
Sample ID: H12060166-003FMS	Sample Matrix Spike					Run: FIA202-HE_120612B			06/12/12 16:25	
Phosphorus, Total as P		0.259	mg/L	0.010	108	90	110			
Sample ID: H12060166-003FMSD	Sample Matrix Spike Duplicate					Run: FIA202-HE_120612B			06/12/12 16:26	
Phosphorus, Total as P		0.263	mg/L	0.010	110	90	110	1.6	20	
Method: E365.1									Batch: 16885	
Sample ID: MB-16885	Method Blank					Run: FIA202-HE_120612B			06/12/12 16:39	
Phosphorus, Total as P		ND	mg/L	0.0009						
Sample ID: LCS-16885	Laboratory Control Sample					Run: FIA202-HE_120612B			06/12/12 16:40	
Phosphorus, Total as P		45.4	mg/L	0.10	109	90	110			
Sample ID: H12060167-005EMS	Sample Matrix Spike					Run: FIA202-HE_120612B			06/12/12 16:43	
Phosphorus, Total as P		0.203	mg/L	0.010	101	90	110			
Sample ID: H12060167-005EMSD	Sample Matrix Spike Duplicate					Run: FIA202-HE_120612B			06/12/12 16:44	
Phosphorus, Total as P		0.206	mg/L	0.010	103	90	110	1.8	20	
Sample ID: H12060169-001FMS	Sample Matrix Spike					Run: FIA202-HE_120612B			06/12/12 16:58	
Phosphorus, Total as P		0.207	mg/L	0.010	102	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: 07/17/12
Project: CFR Monitoring-474374
Work Order: H12060167

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E365.1										Batch: 16885
Sample ID: H12060169-001FMSD		Sample Matrix Spike Duplicate				Run: FIA202-HE_120612B				06/12/12 16:59
Phosphorus, Total as P		0.211	mg/L	0.010	104	90	110	2.2	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Standard Reporting Procedures

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Workorder Receipt Checklist

MT DEQ-Federal Superfund

H12060167

Login completed by: Amanda B. Blackburn
Date Received: 6/7/2012

Reviewed by: BL2000\sdull
Received by: jdh

Reviewed Date: 6/20/2012
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:	℃ See Comments		
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:

Cooler 1 was received at a temperature of 4.5 C, Cooler 2 at 3.7 C, Cooler 3 at 5.1 C and Cooler 4 3.7 C, all on ice. Temperatures taken from a Temp Blank. DOC samples were received unfiltered and preserved. The Casper laboratory will filter and preserve with Phosphoric Acid. Abb 6/8/12

Chain of Custody and Analytical Request Record

PLEASE PRINT (Provide as much information as possible.)

Company Name: MT DEQ	Project Name, PWS, Permit, Etc.: CFROU Monitoring	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: P.O. Box 200901 Helena, MT 59620-0901	Contact Name: Joe Griffin Phone/Fax: 560-6060 (DEQ) Erich Weber 437-9245	Email:	Sampler: (Please Print) G. Ingman E. Weber
Invoice Address:	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order: 624/9845

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: DOC unfiltered and unpreserved

Shipped by: Hand Del

Cooler ID(s): Cooler 1 546 9.5°C, Cooler 2 360 3.7°C, Cooler 3 341 5.1°C

Receipt Temp: Cooler 4 3.7°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)	DOC	Total Hg (low level)	Methyl Hg	SEE ATTACHED	Standard Turnaround (TAT)	RUSH	Comments	LABORATORY USE ONLY
1	CFR-116A	6-5-12	0930	7W	X	X	X	X	X	X	X	X	X					#12060167-001
2	RC-CFR	6-5-12	1130	7W														167-002
3	CFR-84F	6-5-12	1315	7W														167-003
4	CFR-53C	6-5-12	1445	7W														167-004
5	Field Blank	6-5-12	1600	7W														167-005
6	FC-CFR	6-5-12	1630	7W														167-006
7	FC-CFR dupe	6-5-12	1630	7W														167-007
8	CFR-42G	6-6-12	0900	7W														167-008
9	LBR-CFR	6-6-12	1045	7W														167-009
10	CFR-27H	6-6-12	1215	7W														167-010

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Erich E. Weber	6-7-2012 16:36	[signature]			

Sample Disposal: Return to Client: _____ Lab Disposal: _____

Received by Laboratory: Jonathan Hager Date/Time: 6/7/12 16:36 Signature: [signature]

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.

ENERGY LABORATORIES

Chain of Custody and Analytical Request

Page 2 of 2

PLEASE PRINT (Provide as much information as possible.)

Company Name: MT DEQ	Project Name, PWS, Permit, Etc.: CFROU Monitoring	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: P.O. Box 200901 Helena, MT 59620-0901	Contact Name: Joe Griffin, Erich Weber; Phone/Fax: 560-6060 (DEQ), 439-9245	Email:	Sampler: (Please Print) G. Ingman, E. Weber
Invoice Address:	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order: 624/9845

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

Standard Turnaround (TAT)

RUSH

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

Comments: DOC unfiltered and unpreserved

Shipped by:

Cooler ID(s): Cooler 1 554 4.5°C; Cooler 2 360 3.7°C; Cooler 3 361 5.1°C

Receipt Temp: Cooler 4 3.7°C °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)	DOC	Total Hg (low level)	Methyl Hg	SEE ATTACHED				LABORATORY USE ONLY
1	RTC-1	6-6-12	1345	7W	X	X	X	X	X	X	X	X	X					H12060167.011
2	LC-7	6-6-12	1500	7W														167.012
3	CFR-03A	6-6-12	1615	7W														167.013
4	WSC-SBC	6-7-12	0845	7W														167.014
5	SS-25	6-7-12	0945	7W														167.015
6	MWB-SBC	6-7-12	1030	7W														167.016
7	Field Blank	6-7-12	1130	7W														167.017
8	MCWC-MWB	6-7-12	1230	7W														167.018
9	MCWC-MWB dupe	6-7-12	1230	7W														167.019
10																		

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Relinquished by (print): [signature]	Date/Time: 6-7-2012 1636	Signature: Erich E. Weber	Received by (print):	Date/Time:	Signature:
Sample Disposal: Return to Client: _____		Lab Disposal: _____	Received by Laboratory: Jonathan Hager	Date/Time: 6/7/12 16:36	Signature: [signature]

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 B3

SURFACE WATER AND INSTREAM SEDIMENT: ANALYTICAL LABORATORY RESULTS, THIRD QUARTER

ANALYTICAL SUMMARY REPORT

October 26, 2012

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

Workorder No.: H12090228 Quote ID: H624

Project Name: CFR Monitoring-474374

Energy Laboratories Inc Helena MT received the following 70 samples for MT DEQ-Federal Superfund on 9/14/2012 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H12090228-001	CFR-116A	09/11/12 9:15	09/14/12	Aqueous	Metals by ICP/ICPMS, Dissolved Metals by ICP/ICPMS, Tot. Rec. Alkalinity Carbon, Dissolved Organic Conductivity Mercury, Total Hardness as CaCO3 Anions by Ion Chromatography Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite Nitrogen, Total Persulfate Metals Digestion by EPA 200.2 Digestion, Mercury by CVAA Digestion, Total P Water Nitrogen, Total Persulfate Preparation for TSS Phosphorus, Total Solids, Total Suspended Subcontracted, Analytics
H12090228-002	RC-CFR	09/11/12 11:00	09/14/12	Aqueous	Same As Above
H12090228-003	CFR-84F	09/11/12 13:45	09/14/12	Aqueous	Same As Above
H12090228-004	FC-CFR	09/11/12 15:45	09/14/12	Aqueous	Same As Above
H12090228-005	CFR-53C	09/11/12 17:45	09/14/12	Aqueous	Same As Above
H12090228-006	CFR-53C duplicate	09/11/12 18:30	09/14/12	Aqueous	Same As Above
H12090228-007	Field Blank #1	09/11/12 17:15	09/14/12	Aqueous	Same As Above
H12090228-008	CFR-42G	09/12/12 9:30	09/14/12	Aqueous	Same As Above

ANALYTICAL SUMMARY REPORT

H12090228-009	LBR-CFR	09/12/12 11:30	09/14/12	Aqueous	Metals by ICP/ICPMS, Dissolved Metals by ICP/ICPMS, Tot. Rec. Alkalinity Conductivity Mercury, Total Hardness as CaCO3 Anions by Ion Chromatography Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite Nitrogen, Total Persulfate Metals Digestion by EPA 200.2 Digestion, Mercury by CVAA Digestion, Total P Water Nitrogen, Total Persulfate Preparation for TSS Phosphorus, Total Solids, Total Suspended Subcontracted, Analytics
H12090228-010	CFR-27H	09/12/12 13:00	09/14/12	Aqueous	Metals by ICP/ICPMS, Dissolved Metals by ICP/ICPMS, Tot. Rec. Alkalinity Carbon, Dissolved Organic Conductivity Mercury, Total Hardness as CaCO3 Anions by Ion Chromatography Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite Nitrogen, Total Persulfate Metals Digestion by EPA 200.2 Digestion, Mercury by CVAA Digestion, Total P Water Nitrogen, Total Persulfate Preparation for TSS Phosphorus, Total Solids, Total Suspended Subcontracted, Analytics
H12090228-011	RTC-1	09/12/12 14:15	09/14/12	Aqueous	Same As Above
H12090228-012	LC-7	09/12/12 16:30	09/14/12	Aqueous	Same As Above
H12090228-013	CFR-03A	09/12/12 18:00	09/14/12	Aqueous	Same As Above
H12090228-014	WSC-CFR	09/13/12 10:00	09/14/12	Aqueous	Same As Above
H12090228-015	SS-25	09/13/12 11:30	09/14/12	Aqueous	Same As Above
H12090228-016	MWB-SBC	09/13/12 13:00	09/14/12	Aqueous	Same As Above
H12090228-017	MCWC-MWB	09/13/12 15:00	09/14/12	Aqueous	Same As Above
H12090228-018	MCWC-MWB duplicate	09/13/12 15:00	09/14/12	Aqueous	Same As Above
H12090228-019	Field Blank#2	09/13/12 16:00	09/14/12	Aqueous	Same As Above
H12090228-020	CFR116-A Sediment Sieve <0.065mm	09/11/12 9:15	09/14/12	Sediment	Metals by ICP/ICPMS, Total Digestion, Total Metals Sieves Soil Preparation
H12090228-021	CFR116-A Sediment Sieve 0.065-1mm	09/11/12 9:15	09/14/12	Sediment	Same As Above
H12090228-022	CFR116-A Sediment Sieve 1-2mm	09/11/12 9:15	09/14/12	Sediment	Same As Above

ANALYTICAL SUMMARY REPORT

H12090228-023	RC-CFR Sediment Sieve <0.065mm	09/11/12 11:00	09/14/12	Sediment	Same As Above
H12090228-024	RC-CFR Sediment Sieve 0.065-1mm	09/11/12 11:00	09/14/12	Sediment	Same As Above
H12090228-025	RC-CFR Sediment Sieve 1-2mm	09/11/12 11:00	09/14/12	Sediment	Same As Above
H12090228-026	CFR-84F Sediment Sieve <0.065mm	09/11/12 13:45	09/14/12	Sediment	Same As Above
H12090228-027	CFR-84F Sediment Sieve 0.065-1mm	09/11/12 13:45	09/14/12	Sediment	Same As Above
H12090228-028	CFR-84F Sediment Sieve 1-2mm	09/11/12 13:45	09/14/12	Sediment	Same As Above
H12090228-029	FC-CFR Sediment Sieve <0.065mm	09/11/12 15:45	09/14/12	Sediment	Same As Above
H12090228-030	FC-CFR Sediment Sieve 0.065-1mm	09/11/12 15:45	09/14/12	Sediment	Same As Above
H12090228-031	FC-CFR Sediment Sieve 1-2mm	09/11/12 15:45	09/14/12	Sediment	Same As Above
H12090228-032	CFR-53C Sediment Sieve <0.065mm	09/11/12 17:45	09/14/12	Sediment	Same As Above
H12090228-033	CFR-53C Sediment Sieve 0.065-1mm	09/11/12 17:45	09/14/12	Sediment	Same As Above
H12090228-034	CFR-53C Sediment Sieve 1-2mm	09/11/12 17:45	09/14/12	Sediment	Same As Above
H12090228-035	CFR-42G Sediment Sieve <0.065mm	09/12/12 9:30	09/14/12	Sediment	Same As Above
H12090228-036	CFR-42G Sediment Sieve 0.065-1mm	09/12/12 9:30	09/14/12	Sediment	Same As Above
H12090228-037	CFR-42G Sediment Sieve 1-2mm	09/12/12 9:30	09/14/12	Sediment	Same As Above
H12090228-038	LBR-CFR Sediment Sieve <0.065mm	09/12/12 11:30	09/14/12	Sediment	Same As Above
H12090228-039	LBR-CFR Sediment Sieve 0.065-1mm	09/12/12 11:30	09/14/12	Sediment	Same As Above
H12090228-040	LBR-CFR Sediment Sieve 1-2mm	09/12/12 11:30	09/14/12	Sediment	Same As Above
H12090228-041	CFR-27H Sediment Sieve <0.065mm	09/12/12 13:00	09/14/12	Sediment	Same As Above
H12090228-042	CFR-27H Sediment Sieve 0.065-1mm	09/12/12 13:00	09/14/12	Sediment	Same As Above
H12090228-043	CFR-27H Sediment Sieve 1-2mm	09/12/12 13:00	09/14/12	Sediment	Same As Above
H12090228-044	CFR-27H Duplicate Sediment Sieve <0.065mm	09/12/12 13:00	09/14/12	Sediment	Same As Above
H12090228-045	CFR-27H Duplicate Sediment Sieve 0.065-1mm	09/12/12 13:00	09/14/12	Sediment	Same As Above
H12090228-046	CFR-27H Duplicate Sediment Sieve 1-2mm	09/12/12 13:00	09/14/12	Sediment	Same As Above

ANALYTICAL SUMMARY REPORT

H12090228-047	RTC-1 Sediment Sieve <0.065mm	09/12/12 14:15 09/14/12	Sediment	Same As Above
H12090228-048	RTC-1 Sediment Sieve 0.065-1mm	09/12/12 14:15 09/14/12	Sediment	Same As Above
H12090228-049	RTC-1 Sediment Sieve 1-2mm	09/12/12 14:15 09/14/12	Sediment	Same As Above
H12090228-050	LC-7 Sediment Sieve <0.065mm	09/12/12 16:30 09/14/12	Sediment	Same As Above
H12090228-051	LC-7 Sediment Sieve 0.065-1mm	09/12/12 16:30 09/14/12	Sediment	Same As Above
H12090228-052	LC-7 Sediment Sieve 1-2mm	09/12/12 16:30 09/14/12	Sediment	Same As Above
H12090228-053	CFR-03A Sediment Sieve <0.065mm	09/12/12 18:00 09/14/12	Sediment	Same As Above
H12090228-054	CFR-03A Sediment Sieve 0.065-1mm	09/12/12 18:00 09/14/12	Sediment	Same As Above
H12090228-055	CFR-03A Sediment Sieve 1-2mm	09/12/12 18:00 09/14/12	Sediment	Same As Above
H12090228-056	WSC-CFR Sediment Sieve <0.065mm	09/13/12 10:00 09/14/12	Sediment	Same As Above
H12090228-057	WSC-CFR Sediment Sieve 0.065-1mm	09/13/12 10:00 09/14/12	Sediment	Same As Above
H12090228-058	WSC-CFR Sediment Sieve 1-2mm	09/13/12 10:00 09/14/12	Sediment	Same As Above
H12090228-059	SS-25 Sediment Sieve <0.065mm	09/13/12 11:30 09/14/12	Sediment	Same As Above
H12090228-060	SS-25 Sediment Sieve 0.065-1mm	09/13/12 11:30 09/14/12	Sediment	Same As Above
H12090228-061	SS-25 Sediment Sieve 1-2mm	09/13/12 11:30 09/14/12	Sediment	Same As Above
H12090228-062	MWB-SBC Sediment Sieve <0.065mm	09/13/12 13:00 09/14/12	Sediment	Same As Above
H12090228-063	MWB-SBC Sediment Sieve 0.065-1mm	09/13/12 13:00 09/14/12	Sediment	Same As Above
H12090228-064	MWB-SBC Sediment Sieve 1-2mm	09/13/12 13:00 09/14/12	Sediment	Same As Above
H12090228-065	MCWC-MWB Sediment Sieve <0.065mm	09/13/12 15:00 09/14/12	Sediment	Same As Above
H12090228-066	MCWC-MWB Sediment Sieve 0.065-1mm	09/13/12 15:00 09/14/12	Sediment	Same As Above
H12090228-067	MCWC-MWB Sediment Sieve 1-2mm	09/13/12 15:00 09/14/12	Sediment	Same As Above
H12090228-068	MCWC-MWB Duplicate Sediment Sieve <0.065mm	09/13/12 15:00 09/14/12	Sediment	Same As Above
H12090228-069	MCWC-MWB Duplicate Sediment Sieve 0.065-1mm	09/13/12 15:00 09/14/12	Sediment	Same As Above
H12090228-070	MCWC-MWB Duplicate Sediment Sieve 1-2mm	09/13/12 15:00 09/14/12	Sediment	Same As Above

ANALYTICAL SUMMARY REPORT

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. 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: H12090228

Report Date: 10/26/12

CASE NARRATIVE

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002 and WY00937.

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

Sample 009 for DOC was received in the Casper laboratory broken. Wj 9/18/12

Comments imported for SUBBED Workorder: C12090606
Prep Comments for Sample H12090228-001F, Test PRP-FILT-W: The prep hold time was exceeded by 5.00 days. The prep hold time was exceeded by 5.19 days.
Prep Comments for Sample H12090228-002F, Test PRP-FILT-W: The prep hold time was exceeded by 4.93 days. The prep hold time was exceeded by 5.12 days.
Prep Comments for Sample H12090228-003F, Test PRP-FILT-W: The prep hold time was exceeded by 4.82 days. The prep hold time was exceeded by 5.00 days.
Prep Comments for Sample H12090228-004F, Test PRP-FILT-W: The prep hold time was exceeded by 4.73 days. The prep hold time was exceeded by 4.92 days.
Prep Comments for Sample H12090228-005F, Test PRP-FILT-W: The prep hold time was exceeded by 4.65 days. The prep hold time was exceeded by 4.84 days.
Prep Comments for Sample H12090228-006F, Test PRP-FILT-W: The prep hold time was exceeded by 4.62 days. The prep hold time was exceeded by 4.81 days.
Prep Comments for Sample H12090228-007F, Test PRP-FILT-W: The prep hold time was exceeded by 4.67 days. The prep hold time was exceeded by 4.86 days.
Prep Comments for Sample H12090228-008F, Test PRP-FILT-W: The prep hold time was exceeded by 3.99 days. The prep hold time was exceeded by 4.18 days.
Prep Comments for Sample H12090228-010F, Test PRP-FILT-W: The prep hold time was exceeded by 3.85 days. The prep hold time was exceeded by 4.03 days.
Prep Comments for Sample H12090228-011F, Test PRP-FILT-W: The prep hold time was exceeded by 3.80 days. The prep hold time was exceeded by 3.98 days.
Prep Comments for Sample H12090228-012F, Test PRP-FILT-W: The prep hold time was exceeded by 3.70 days. The prep hold time was exceeded by 3.89 days.
Prep Comments for Sample H12090228-013F, Test PRP-FILT-W: The prep hold time was exceeded by 3.64 days. The prep hold time was exceeded by 3.87 days.
Prep Comments for Sample H12090228-014F, Test PRP-FILT-W: The prep hold time was exceeded by 2.97 days. The prep hold time was exceeded by 3.21 days.
Prep Comments for Sample H12090228-015F, Test PRP-FILT-W: The prep hold time was exceeded by 2.91 days. The prep hold time was exceeded by 3.15 days.
Prep Comments for Sample H12090228-016F, Test PRP-FILT-W: The prep hold time was exceeded by 2.85 days. The prep hold time was exceeded by 3.08 days.
Prep Comments for Sample H12090228-017F, Test PRP-FILT-W: The prep hold time was exceeded by 2.77 days. The prep hold time was exceeded by 3.00 days.
Prep Comments for Sample H12090228-018F, Test PRP-FILT-W: The prep hold time was exceeded by 2.77 days. The prep hold time was exceeded by 3.00 days.
Prep Comments for Sample H12090228-019F, Test PRP-FILT-W: The prep hold time was exceeded by 2.72 days. The prep hold time was exceeded by 2.96 days.
End of comments imported for SUBBED Workorder: C12090606

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Client Sample ID: CFR-116A
Lab ID: H12090228-001
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/11/12 09:15
DateReceived: 09/14/12
Report Date: 10/26/12

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	09/17/12 14:54 / cm	09/17/12 14:43	124 (14410200)_120917A	16	18001
INORGANICS											
Alkalinity, Total as CaCO3	130	mg/L		4		A2320 B	09/17/12 20:11 / cm		MAN-TECH_120917A	82	R82996
Bicarbonate as HCO3	150	mg/L		4		A2320 B	09/17/12 20:11 / cm		MAN-TECH_120917A	82	R82996
Sulfate	43	mg/L		1		E300.0	09/19/12 18:29 / cm		IC102-H_120919A	55	R83065
Hardness as CaCO3	163	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	1	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	1.9	mg/L		0.1		A5310 C	09/19/12 18:25 / eli-c	09/18/12 13:49	SUB-C164761	9	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:21 / reh		FIA203-HE_120924A	16	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/17/12 16:12 / reh		FIA203-HE_120917B	92	R82991
Nitrogen, Total	0.14	mg/L		0.05		A4500 N-C	09/19/12 15:20 / reh	09/19/12 13:50	FIA203-HE_120919A	95	18041
Phosphorus, Total as P	0.015	mg/L		0.005		E365.1	09/20/12 15:00 / reh	09/20/12 12:28	FIA202-HE_120920A	43	18054
METALS, DISSOLVED											
Arsenic	0.005	mg/L		0.005		E200.8	09/19/12 05:20 / dck		ICPMS204-B_120917A	257	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 05:20 / dck		ICPMS204-B_120917A	257	R82986
Copper	0.002	mg/L		0.001		E200.8	09/19/12 05:20 / dck		ICPMS204-B_120917A	257	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 05:20 / dck		ICPMS204-B_120917A	257	R82986
Zinc	0.01	mg/L		0.01		E200.8	09/19/12 05:20 / dck		ICPMS204-B_120917A	257	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 14:39 / eli-b	09/26/12 10:00	SUB-B192866	6	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	0.005	mg/L		0.005		E200.8	09/19/12 05:48 / dck	09/17/12 08:56	ICPMS204-B_120917A	263	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 05:48 / dck	09/17/12 08:56	ICPMS204-B_120917A	263	17987
Calcium	44	mg/L		1		E200.7	09/18/12 14:08 / sld	09/17/12 08:56	ICP2-HE_120918A	59	17987

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
Collection Date: 09/11/12 09:15
DateReceived: 09/14/12
Lab ID: H12090228-001
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.004	mg/L		0.001		E200.8	09/19/12 05:48 / dck	09/17/12 08:56	ICPMS204-B_120917A	263	17987
Lead	ND	mg/L		0.0005		E200.8	09/19/12 05:48 / dck	09/17/12 08:56	ICPMS204-B_120917A	263	17987
Magnesium	13	mg/L		1		E200.7	09/18/12 14:08 / sld	09/17/12 08:56	ICP2-HE_120918A	59	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 05:48 / dck	09/17/12 08:56	ICPMS204-B_120917A	263	17987

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: RC-CFR
Lab ID: H12090228-002
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/11/12 11:00
DateReceived: 09/14/12
Report Date: 10/26/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	2	mg/L		1		A2540 D	09/17/12 14:54 / cm	09/17/12 14:43	124 (14410200)_120917A	17	18001
INORGANICS											
Alkalinity, Total as CaCO3	73	mg/L		4		A2320 B	09/17/12 20:18 / cm		MAN-TECH_120917A	83	R82996
Bicarbonate as HCO3	87	mg/L		4		A2320 B	09/17/12 20:18 / cm		MAN-TECH_120917A	83	R82996
Sulfate	3	mg/L		1		E300.0	09/19/12 18:42 / cm		IC102-H_120919A	56	R83065
Hardness as CaCO3	65	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	2	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	1.2	mg/L		0.1		A5310 C	09/19/12 19:49 / eli-c	09/18/12 13:49	SUB-C164761	13	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:23 / reh		FIA203-HE_120924A	17	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/17/12 16:16 / reh		FIA203-HE_120917B	95	R82991
Nitrogen, Total	0.09	mg/L		0.05		A4500 N-C	09/19/12 15:23 / reh	09/19/12 13:50	FIA203-HE_120919A	98	18041
Phosphorus, Total as P	0.014	mg/L		0.005		E365.1	09/20/12 14:59 / reh	09/20/12 12:28	FIA202-HE_120920A	42	18054
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	09/19/12 05:53 / dck		ICPMS204-B_120917A	264	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 05:53 / dck		ICPMS204-B_120917A	264	R82986
Copper	0.006	mg/L		0.001		E200.8	09/19/12 05:53 / dck		ICPMS204-B_120917A	264	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 05:53 / dck		ICPMS204-B_120917A	264	R82986
Zinc	0.02	mg/L		0.01		E200.8	09/19/12 05:53 / dck		ICPMS204-B_120917A	264	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 14:46 / eli-b	09/26/12 10:00	SUB-B192866	9	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	ND	mg/L		0.005		E200.8	09/19/12 05:57 / dck	09/17/12 12:47	ICPMS204-B_120917A	265	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 05:57 / dck	09/17/12 12:47	ICPMS204-B_120917A	265	17987
Calcium	17	mg/L		1		E200.7	09/18/12 14:12 / sld	09/17/12 12:47	ICP2-HE_120918A	60	17987

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: RC-CFR
Collection Date: 09/11/12 11:00
DateReceived: 09/14/12
Lab ID: H12090228-002
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	ND	mg/L		0.001		E200.8	09/19/12 05:57 / dck	09/17/12 12:47	ICPMS204-B_120917A	265	17987
Lead	ND	mg/L		0.0005		E200.8	09/19/12 05:57 / dck	09/17/12 12:47	ICPMS204-B_120917A	265	17987
Magnesium	6	mg/L		1		E200.7	09/18/12 14:12 / sld	09/17/12 12:47	ICP2-HE_120918A	60	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 05:57 / dck	09/17/12 12:47	ICPMS204-B_120917A	265	17987

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: H12090228-003
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/11/12 13:45
DateReceived: 09/14/12
Report Date: 10/26/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	2	mg/L		1		A2540 D	09/17/12 14:55 / cm	09/17/12 14:43	124 (14410200)_120917A	18	18001
INORGANICS											
Alkalinity, Total as CaCO3	190	mg/L		4		A2320 B	09/17/12 20:26 / cm		MAN-TECH_120917A	84	R82996
Bicarbonate as HCO3	210	mg/L		4		A2320 B	09/17/12 20:26 / cm		MAN-TECH_120917A	84	R82996
Sulfate	89	mg/L		1		E300.0	09/19/12 18:54 / cm		IC102-H_120919A	57	R83065
Hardness as CaCO3	250	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	3	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	2.6	mg/L		0.1		A5310 C	09/19/12 19:59 / eli-c	09/18/12 13:49	SUB-C164761	14	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:24 / reh		FIA203-HE_120924A	18	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/17/12 16:17 / reh		FIA203-HE_120917B	96	R82991
Nitrogen, Total	0.17	mg/L		0.05		A4500 N-C	09/19/12 15:24 / reh	09/19/12 13:50	FIA203-HE_120919A	99	18041
Phosphorus, Total as P	0.023	mg/L		0.005		E365.1	09/20/12 15:06 / reh	09/20/12 12:30	FIA202-HE_120920A	49	18056
METALS, DISSOLVED											
Arsenic	0.010	mg/L		0.005		E200.8	09/19/12 06:20 / dck		ICPMS204-B_120917A	270	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 06:20 / dck		ICPMS204-B_120917A	270	R82986
Copper	0.004	mg/L		0.001		E200.8	09/19/12 06:20 / dck		ICPMS204-B_120917A	270	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 06:20 / dck		ICPMS204-B_120917A	270	R82986
Zinc	ND	mg/L		0.01		E200.8	09/19/12 06:20 / dck		ICPMS204-B_120917A	270	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 14:48 / eli-b	09/26/12 10:00	SUB-B192866	10	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	0.010	mg/L		0.005		E200.8	09/19/12 06:25 / dck	09/17/12 08:56	ICPMS204-B_120917A	271	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 06:25 / dck	09/17/12 08:56	ICPMS204-B_120917A	271	17987
Calcium	70	mg/L		1		E200.7	09/18/12 14:27 / sld	09/17/12 08:56	ICP2-HE_120918A	64	17987

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
Collection Date: 09/11/12 13:45
DateReceived: 09/14/12
Lab ID: H12090228-003
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.006	mg/L		0.001		E200.8	09/19/12 06:25 / dck	09/17/12 08:56	ICPMS204-B_120917A	271	17987
Lead	ND	mg/L		0.0005		E200.8	09/19/12 06:25 / dck	09/17/12 08:56	ICPMS204-B_120917A	271	17987
Magnesium	18	mg/L		1		E200.7	09/18/12 14:27 / sld	09/17/12 08:56	ICP2-HE_120918A	64	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 06:25 / dck	09/17/12 08:56	ICPMS204-B_120917A	271	17987

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: FC-CFR
Lab ID: H12090228-004
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/11/12 15:45
DateReceived: 09/14/12
Report Date: 10/26/12

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	09/17/12 14:55 / cm	09/17/12 14:43	124 (14410200)_120917A	19	18001
INORGANICS											
Alkalinity, Total as CaCO3	240	mg/L		4		A2320 B	09/17/12 20:34 / cm		MAN-TECH_120917A	85	R82996
Bicarbonate as HCO3	250	mg/L		4		A2320 B	09/17/12 20:34 / cm		MAN-TECH_120917A	85	R82996
Sulfate	21	mg/L		1		E300.0	09/19/12 19:07 / cm		IC102-H_120919A	58	R83065
Hardness as CaCO3	221	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	4	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	3.4	mg/L		0.1		A5310 C	09/19/12 20:09 / eli-c	09/18/12 13:49	SUB-C164761	15	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:26 / reh		FIA203-HE_120924A	20	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/17/12 16:18 / reh		FIA203-HE_120917B	97	R82991
Nitrogen, Total	0.26	mg/L		0.05		A4500 N-C	09/19/12 15:26 / reh	09/19/12 13:50	FIA203-HE_120919A	100	18041
Phosphorus, Total as P	0.060	mg/L		0.005		E365.1	09/20/12 15:07 / reh	09/20/12 12:30	FIA202-HE_120920A	50	18056
METALS, DISSOLVED											
Arsenic	0.009	mg/L		0.005		E200.8	09/19/12 06:30 / dck		ICPMS204-B_120917A	272	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 06:30 / dck		ICPMS204-B_120917A	272	R82986
Copper	0.001	mg/L		0.001		E200.8	09/19/12 06:30 / dck		ICPMS204-B_120917A	272	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 06:30 / dck		ICPMS204-B_120917A	272	R82986
Zinc	ND	mg/L		0.01		E200.8	09/19/12 06:30 / dck		ICPMS204-B_120917A	272	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 15:38 / eli-b	09/26/12 10:00	SUB-B192866	24	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	0.009	mg/L		0.005		E200.8	09/19/12 06:34 / dck	09/17/12 08:56	ICPMS204-B_120917A	273	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 06:34 / dck	09/17/12 08:56	ICPMS204-B_120917A	273	17987
Calcium	60	mg/L		1		E200.7	09/18/12 14:30 / sld	09/17/12 08:56	ICP2-HE_120918A	65	17987

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: FC-CFR
Collection Date: 09/11/12 15:45
DateReceived: 09/14/12
Lab ID: H12090228-004
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.002	mg/L		0.001		E200.8	09/19/12 06:34 / dck	09/17/12 08:56	ICPMS204-B_120917A	273	17987
Lead	0.0010	mg/L		0.0005		E200.8	09/19/12 06:34 / dck	09/17/12 08:56	ICPMS204-B_120917A	273	17987
Magnesium	17	mg/L		1		E200.7	09/18/12 14:30 / sld	09/17/12 08:56	ICP2-HE_120918A	65	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 06:34 / dck	09/17/12 08:56	ICPMS204-B_120917A	273	17987

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: H12090228-005
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/11/12 17:45
DateReceived: 09/14/12
Report Date: 10/26/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	12	mg/L		1		A2540 D	09/17/12 14:55 / cm	09/17/12 14:43	124 (14410200)_120917A	: 20	18001
INORGANICS											
Alkalinity, Total as CaCO3	160	mg/L		4		A2320 B	09/17/12 20:41 / cm		MAN-TECH_120917A	: 86	R82996
Bicarbonate as HCO3	170	mg/L		4		A2320 B	09/17/12 20:41 / cm		MAN-TECH_120917A	: 86	R82996
Sulfate	58	mg/L		1		E300.0	09/19/12 19:20 / cm		IC102-H_120919A	: 59	R83065
Hardness as CaCO3	192	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	: 5	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	2.7	mg/L		0.1		A5310 C	09/19/12 20:19 / eli-c	09/18/12 13:49	SUB-C164761	: 16	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:27 / reh		FIA203-HE_120924A	: 21	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/17/12 16:22 / reh		FIA203-HE_120917B	: 100	R82991
Nitrogen, Total	0.18	mg/L		0.05		A4500 N-C	09/19/12 15:27 / reh	09/19/12 13:50	FIA203-HE_120919A	: 101	18041
Phosphorus, Total as P	0.024	mg/L		0.005		E365.1	09/20/12 15:08 / reh	09/20/12 12:30	FIA202-HE_120920A	: 51	18056
METALS, DISSOLVED											
Arsenic	0.010	mg/L		0.005		E200.8	09/19/12 06:58 / dck		ICPMS204-B_120917A	: 278	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 06:58 / dck		ICPMS204-B_120917A	: 278	R82986
Copper	0.005	mg/L		0.001		E200.8	09/19/12 06:58 / dck		ICPMS204-B_120917A	: 278	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 06:58 / dck		ICPMS204-B_120917A	: 278	R82986
Zinc	ND	mg/L		0.01		E200.8	09/19/12 06:58 / dck		ICPMS204-B_120917A	: 278	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 15:40 / eli-b	09/26/12 10:00	SUB-B192866	: 25	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	0.010	mg/L		0.005		E200.8	09/19/12 07:02 / dck	09/17/12 08:56	ICPMS204-B_120917A	: 279	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 07:02 / dck	09/17/12 08:56	ICPMS204-B_120917A	: 279	17987
Calcium	56	mg/L		1		E200.7	09/18/12 14:34 / sld	09/17/12 08:56	ICP2-HE_120918A	: 66	17987

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
Collection Date: 09/11/12 17:45
DateReceived: 09/14/12
Lab ID: H12090228-005
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.009	mg/L		0.001		E200.8	09/19/12 07:02 / dck	09/17/12 08:56	ICPMS204-B_120917A	279	17987
Lead	0.0006	mg/L		0.0005		E200.8	09/19/12 07:02 / dck	09/17/12 08:56	ICPMS204-B_120917A	279	17987
Magnesium	13	mg/L		1		E200.7	09/18/12 14:34 / sld	09/17/12 08:56	ICP2-HE_120918A	66	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 07:02 / dck	09/17/12 08:56	ICPMS204-B_120917A	279	17987

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 duplicate
Collection Date: 09/11/12 18:30
DateReceived: 09/14/12
Lab ID: H12090228-006
Report Date: 10/26/12
Matrix: Aqueous

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	09/17/12 14:56 / cm	09/17/12 14:43	124 (14410200)_120917A	21	18001
INORGANICS											
Alkalinity, Total as CaCO3	160	mg/L		4		A2320 B	09/17/12 20:47 / cm		MAN-TECH_120917A	87	R82996
Bicarbonate as HCO3	180	mg/L		4		A2320 B	09/17/12 20:47 / cm		MAN-TECH_120917A	87	R82996
Sulfate	58	mg/L		1		E300.0	09/19/12 19:32 / cm		IC102-H_120919A	60	R83065
Hardness as CaCO3	192	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	6	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	2.8	mg/L		0.1		A5310 C	09/19/12 20:30 / eli-c	09/18/12 13:49	SUB-C164761	17	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:29 / reh		FIA203-HE_120924A	22	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/17/12 16:23 / reh		FIA203-HE_120917B	101	R82991
Nitrogen, Total	0.19	mg/L		0.05		A4500 N-C	09/19/12 15:28 / reh	09/19/12 13:50	FIA203-HE_120919A	102	18041
Phosphorus, Total as P	0.025	mg/L		0.005		E365.1	09/20/12 15:09 / reh	09/20/12 12:30	FIA202-HE_120920A	52	18056
METALS, DISSOLVED											
Arsenic	0.010	mg/L		0.005		E200.8	09/19/12 07:07 / dck		ICPMS204-B_120917A	280	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 07:07 / dck		ICPMS204-B_120917A	280	R82986
Copper	0.005	mg/L		0.001		E200.8	09/19/12 07:07 / dck		ICPMS204-B_120917A	280	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 07:07 / dck		ICPMS204-B_120917A	280	R82986
Zinc	ND	mg/L		0.01		E200.8	09/19/12 07:07 / dck		ICPMS204-B_120917A	280	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 15:42 / eli-b	09/26/12 10:00	SUB-B192866	26	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	0.011	mg/L		0.005		E200.8	09/19/12 07:12 / dck	09/17/12 08:56	ICPMS204-B_120917A	281	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 07:12 / dck	09/17/12 08:56	ICPMS204-B_120917A	281	17987
Calcium	57	mg/L		1		E200.7	09/18/12 15:12 / sld	09/17/12 08:56	ICP2-HE_120918A	76	17987

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 duplicate
Collection Date: 09/11/12 18:30
DateReceived: 09/14/12
Lab ID: H12090228-006
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.009	mg/L		0.001		E200.8	09/19/12 07:12 / dck	09/17/12 08:56	ICPMS204-B_120917A	281	17987
Lead	0.0006	mg/L		0.0005		E200.8	09/19/12 07:12 / dck	09/17/12 08:56	ICPMS204-B_120917A	281	17987
Magnesium	12	mg/L		1		E200.7	09/18/12 15:12 / sld	09/17/12 08:56	ICP2-HE_120918A	76	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 07:12 / dck	09/17/12 08:56	ICPMS204-B_120917A	281	17987

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: Field Blank #1
Lab ID: H12090228-007
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/11/12 17:15
DateReceived: 09/14/12
Report Date: 10/26/12

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	09/17/12 14:56 / cm	09/17/12 14:43	124 (14410200)_120917A	22	18001
INORGANICS											
Alkalinity, Total as CaCO3	ND	mg/L		4		A2320 B	09/17/12 20:51 / cm		MAN-TECH_120917A	88	R82996
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	09/17/12 20:51 / cm		MAN-TECH_120917A	88	R82996
Sulfate	ND	mg/L		1		E300.0	09/19/12 19:45 / cm		IC102-H_120919A	61	R83065
Hardness as CaCO3	ND	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	7	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	0.5	mg/L		0.1		A5310 C	09/19/12 20:39 / eli-c	09/18/12 13:49	SUB-C164761	18	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:30 / reh		FIA203-HE_120924A	23	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/17/12 16:24 / reh		FIA203-HE_120917B	102	R82991
Nitrogen, Total	ND	mg/L		0.05		A4500 N-C	09/19/12 15:29 / reh	09/19/12 13:50	FIA203-HE_120919A	103	18041
Phosphorus, Total as P	ND	mg/L		0.005		E365.1	09/20/12 15:10 / reh	09/20/12 12:30	FIA202-HE_120920A	53	18056
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	09/19/12 07:16 / dck		ICPMS204-B_120917A	282	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 07:16 / dck		ICPMS204-B_120917A	282	R82986
Copper	ND	mg/L		0.001		E200.8	09/19/12 07:16 / dck		ICPMS204-B_120917A	282	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 07:16 / dck		ICPMS204-B_120917A	282	R82986
Zinc	0.02	mg/L		0.01		E200.8	09/19/12 07:16 / dck		ICPMS204-B_120917A	282	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 15:00 / eli-b	09/26/12 10:00	SUB-B192866	14	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	ND	mg/L		0.005		E200.8	09/19/12 07:21 / dck	09/17/12 08:56	ICPMS204-B_120917A	283	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 07:21 / dck	09/17/12 08:56	ICPMS204-B_120917A	283	17987
Calcium	ND	mg/L		1		E200.7	09/18/12 15:15 / sld	09/17/12 08:56	ICP2-HE_120918A	77	17987

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: Field Blank #1
Lab ID: H12090228-007
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/11/12 17:15
DateReceived: 09/14/12
Report Date: 10/26/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	ND	mg/L		0.001		E200.8	09/19/12 07:21 / dck	09/17/12 08:56	ICPMS204-B_120917A	283	17987
Lead	ND	mg/L		0.0005		E200.8	09/19/12 07:21 / dck	09/17/12 08:56	ICPMS204-B_120917A	283	17987
Magnesium	ND	mg/L		1		E200.7	09/18/12 15:15 / sld	09/17/12 08:56	ICP2-HE_120918A	77	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 07:21 / dck	09/17/12 08:56	ICPMS204-B_120917A	283	17987

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: H12090228-008
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/12/12 09:30
DateReceived: 09/14/12
Report Date: 10/26/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	14	mg/L		1		A2540 D	09/17/12 14:56 / cm	09/17/12 14:43	124 (14410200)_120917A	23	18001
INORGANICS											
Alkalinity, Total as CaCO3	180	mg/L		4		A2320 B	09/17/12 21:18 / cm		MAN-TECH_120917A	96	R82996
Bicarbonate as HCO3	210	mg/L		4		A2320 B	09/17/12 21:18 / cm		MAN-TECH_120917A	96	R82996
Sulfate	64	mg/L		1		E300.0	09/19/12 19:57 / cm		IC102-H_120919A	62	R83065
Hardness as CaCO3	218	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	8	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	3.2	mg/L		0.1		A5310 C	09/19/12 20:50 / eli-c	09/18/12 13:49	SUB-C164761	19	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:31 / reh		FIA203-HE_120924A	24	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/17/12 16:28 / reh		FIA203-HE_120917B	105	R82991
Nitrogen, Total	0.23	mg/L		0.05		A4500 N-C	09/19/12 15:30 / reh	09/19/12 13:50	FIA203-HE_120919A	104	18041
Phosphorus, Total as P	0.022	mg/L		0.005		E365.1	09/20/12 15:13 / reh	09/20/12 12:30	FIA202-HE_120920A	56	18056
METALS, DISSOLVED											
Arsenic	0.014	mg/L		0.005		E200.8	09/19/12 07:26 / dck		ICPMS204-B_120917A	284	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 07:26 / dck		ICPMS204-B_120917A	284	R82986
Copper	0.008	mg/L		0.001		E200.8	09/19/12 07:26 / dck		ICPMS204-B_120917A	284	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 07:26 / dck		ICPMS204-B_120917A	284	R82986
Zinc	0.01	mg/L		0.01		E200.8	09/19/12 07:26 / dck		ICPMS204-B_120917A	284	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 15:44 / eli-b	09/26/12 10:00	SUB-B192866	27	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	0.014	mg/L		0.005		E200.8	09/19/12 07:30 / dck	09/17/12 08:56	ICPMS204-B_120917A	285	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 07:30 / dck	09/17/12 08:56	ICPMS204-B_120917A	285	17987
Calcium	64	mg/L		1		E200.7	09/18/12 15:19 / sld	09/17/12 08:56	ICP2-HE_120918A	78	17987

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
Collection Date: 09/12/12 09:30
DateReceived: 09/14/12
Lab ID: H12090228-008
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.016	mg/L		0.001		E200.8	09/19/12 07:30 / dck	09/17/12 08:56	ICPMS204-B_120917A	285	17987
Lead	0.0011	mg/L		0.0005		E200.8	09/19/12 07:30 / dck	09/17/12 08:56	ICPMS204-B_120917A	285	17987
Magnesium	14	mg/L		1		E200.7	09/18/12 15:19 / sld	09/17/12 08:56	ICP2-HE_120918A	78	17987
Zinc	0.01	mg/L		0.01		E200.8	09/19/12 07:30 / dck	09/17/12 08:56	ICPMS204-B_120917A	285	17987

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: LBR-CFR
Lab ID: H12090228-009
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/12/12 11:30 **DateReceived:** 09/14/12
Report Date: 10/26/12

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	09/17/12 14:57 / cm	09/17/12 14:43	124 (14410200)_120917A	: 24	18001
INORGANICS											
Alkalinity, Total as CaCO3	170	mg/L		4		A2320 B	09/17/12 21:26 / cm		MAN-TECH_120917A	: 97	R82996
Bicarbonate as HCO3	200	mg/L		4		A2320 B	09/17/12 21:26 / cm		MAN-TECH_120917A	: 97	R82996
Sulfate	11	mg/L		1		E300.0	09/19/12 20:10 / cm		IC102-H_120919A	: 63	R83065
Hardness as CaCO3	168	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	: 9	R83067
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:35 / reh		FIA203-HE_120924A	: 27	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/17/12 16:29 / reh		FIA203-HE_120917B	: 106	R82991
Nitrogen, Total	0.12	mg/L		0.05		A4500 N-C	09/25/12 11:11 / reh	09/24/12 09:02	FIA203-HE_120925A	: 21	18111
Phosphorus, Total as P	0.028	mg/L		0.005		E365.1	09/20/12 15:14 / reh	09/20/12 12:30	FIA202-HE_120920A	: 57	18056
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	09/19/12 07:54 / dck		ICPMS204-B_120917A	: 290	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 07:54 / dck		ICPMS204-B_120917A	: 290	R82986
Copper	ND	mg/L		0.001		E200.8	09/19/12 07:54 / dck		ICPMS204-B_120917A	: 290	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 07:54 / dck		ICPMS204-B_120917A	: 290	R82986
Zinc	0.01	mg/L		0.01		E200.8	09/19/12 07:54 / dck		ICPMS204-B_120917A	: 290	R82986
METALS, TOTAL											
Mercury	0.000040	mg/L		0.000010		E245.1	10/05/12 14:43 / eli-b	10/04/12 16:49	SUB-B192894	: 4	B_65980
METALS, TOTAL RECOVERABLE											
Arsenic	ND	mg/L		0.005		E200.8	09/19/12 08:13 / dck	09/17/12 08:56	ICPMS204-B_120917A	: 294	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 08:13 / dck	09/17/12 08:56	ICPMS204-B_120917A	: 294	17987
Calcium	50	mg/L		1		E200.7	09/18/12 15:23 / sld	09/17/12 08:56	ICP2-HE_120918A	: 79	17987
Copper	0.003	mg/L		0.001		E200.8	09/19/12 08:13 / dck	09/17/12 08:56	ICPMS204-B_120917A	: 294	17987
Lead	ND	mg/L		0.0005		E200.8	09/19/12 08:13 / dck	09/17/12 08:56	ICPMS204-B_120917A	: 294	17987
Magnesium	11	mg/L		1		E200.7	09/18/12 15:23 / sld	09/17/12 08:56	ICP2-HE_120918A	: 79	17987

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: LBR-CFR
Lab ID: H12090228-009
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/12/12 11:30 **DateReceived:** 09/14/12
Report Date: 10/26/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Zinc	ND	mg/L		0.01		E200.8	09/19/12 08:13 / dck	09/17/12 08:56	ICPMS204-B_120917A	294	17987

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: H12090228-010
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/12/12 13:00
DateReceived: 09/14/12
Report Date: 10/26/12

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	09/17/12 14:57 / cm	09/17/12 14:44	124 (14410200)_120917A	27	18002
INORGANICS											
Alkalinity, Total as CaCO3	180	mg/L		4		A2320 B	09/17/12 21:33 / cm		MAN-TECH_120917A	98	R82996
Bicarbonate as HCO3	200	mg/L		4		A2320 B	09/17/12 21:33 / cm		MAN-TECH_120917A	98	R82996
Sulfate	69	mg/L		1		E300.0	09/19/12 21:13 / cm		IC102-H_120919A	68	R83065
Hardness as CaCO3	212	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	10	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	2.8	mg/L		0.1		A5310 C	09/19/12 21:00 / eli-c	09/18/12 13:49	SUB-C164761	20	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:38 / reh		FIA203-HE_120924A	30	R83158
Nitrogen, Nitrate+Nitrite as N	0.07	mg/L		0.05		E353.2	09/17/12 16:30 / reh		FIA203-HE_120917B	107	R82991
Nitrogen, Total	0.28	mg/L		0.05		A4500 N-C	09/25/12 11:15 / reh	09/24/12 09:02	FIA203-HE_120925A	24	18111
Phosphorus, Total as P	0.019	mg/L		0.005		E365.1	09/20/12 15:15 / reh	09/20/12 12:30	FIA202-HE_120920A	58	18056
METALS, DISSOLVED											
Arsenic	0.014	mg/L		0.005		E200.8	09/19/12 08:17 / dck		ICPMS204-B_120917A	295	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 08:17 / dck		ICPMS204-B_120917A	295	R82986
Copper	0.007	mg/L		0.001		E200.8	09/19/12 08:17 / dck		ICPMS204-B_120917A	295	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 08:17 / dck		ICPMS204-B_120917A	295	R82986
Zinc	ND	mg/L		0.01		E200.8	09/19/12 08:17 / dck		ICPMS204-B_120917A	295	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 15:46 / eli-b	09/26/12 10:00	SUB-B192866	28	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	0.014	mg/L		0.005		E200.8	09/19/12 08:22 / dck	09/17/12 08:56	ICPMS204-B_120917A	296	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 08:22 / dck	09/17/12 08:56	ICPMS204-B_120917A	296	17987
Calcium	64	mg/L		1		E200.7	09/18/12 15:27 / sld	09/17/12 08:56	ICP2-HE_120918A	80	17987

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
Collection Date: 09/12/12 13:00
DateReceived: 09/14/12
Lab ID: H12090228-010
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.013	mg/L		0.001		E200.8	09/19/12 08:22 / dck	09/17/12 08:56	ICPMS204-B_120917A	296	17987
Lead	0.0010	mg/L		0.0005		E200.8	09/19/12 08:22 / dck	09/17/12 08:56	ICPMS204-B_120917A	296	17987
Magnesium	13	mg/L		1		E200.7	09/18/12 15:27 / sld	09/17/12 08:56	ICP2-HE_120918A	80	17987
Zinc	0.01	mg/L		0.01		E200.8	09/19/12 08:22 / dck	09/17/12 08:56	ICPMS204-B_120917A	296	17987

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: RTC-1
Collection Date: 09/12/12 14:15
DateReceived: 09/14/12
Lab ID: H12090228-011
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	2	mg/L		1		A2540 D	09/17/12 14:58 / cm	09/17/12 14:44	124 (14410200)_120917A	29	18002
INORGANICS											
Alkalinity, Total as CaCO3	160	mg/L		4		A2320 B	09/17/12 21:40 / cm		MAN-TECH_120917A	99	R82996
Bicarbonate as HCO3	180	mg/L		4		A2320 B	09/17/12 21:40 / cm		MAN-TECH_120917A	99	R82996
Sulfate	65	mg/L		1		E300.0	09/19/12 21:26 / cm		IC102-H_120919A	69	R83065
Hardness as CaCO3	202	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	11	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	2.6	mg/L		0.1		A5310 C	09/19/12 21:10 / eli-c	09/18/12 13:49	SUB-C164761	21	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:39 / reh		FIA203-HE_120924A	31	R83158
Nitrogen, Nitrate+Nitrite as N	0.31	mg/L		0.05		E353.2	09/17/12 16:31 / reh		FIA203-HE_120917B	108	R82991
Nitrogen, Total	0.50	mg/L		0.05		A4500 N-C	09/25/12 11:18 / reh	09/24/12 09:02	FIA203-HE_120925A	27	18111
Phosphorus, Total as P	0.027	mg/L		0.005		E365.1	09/20/12 15:16 / reh	09/20/12 12:30	FIA202-HE_120920A	59	18056
METALS, DISSOLVED											
Arsenic	0.013	mg/L		0.005		E200.8	09/19/12 08:27 / dck		ICPMS204-B_120917A	297	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 08:27 / dck		ICPMS204-B_120917A	297	R82986
Copper	0.004	mg/L		0.001		E200.8	09/19/12 08:27 / dck		ICPMS204-B_120917A	297	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 08:27 / dck		ICPMS204-B_120917A	297	R82986
Zinc	ND	mg/L		0.01		E200.8	09/19/12 08:27 / dck		ICPMS204-B_120917A	297	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 15:10 / eli-b	09/26/12 10:00	SUB-B192866	18	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	0.013	mg/L		0.005		E200.8	09/19/12 08:31 / dck	09/17/12 08:56	ICPMS204-B_120917A	298	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 08:31 / dck	09/17/12 08:56	ICPMS204-B_120917A	298	17987
Calcium	60	mg/L		1		E200.7	09/18/12 15:31 / sld	09/17/12 08:56	ICP2-HE_120918A	81	17987

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: RTC-1
Collection Date: 09/12/12 14:15 **DateReceived:** 09/14/12
Lab ID: H12090228-011
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.007	mg/L		0.001		E200.8	09/19/12 08:31 / dck	09/17/12 08:56	ICPMS204-B_120917A	298	17987
Lead	ND	mg/L		0.0005		E200.8	09/19/12 08:31 / dck	09/17/12 08:56	ICPMS204-B_120917A	298	17987
Magnesium	13	mg/L		1		E200.7	09/18/12 15:31 / sld	09/17/12 08:56	ICP2-HE_120918A	81	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 08:31 / dck	09/17/12 08:56	ICPMS204-B_120917A	298	17987

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: LC-7
Collection Date: 09/12/12 16:30
DateReceived: 09/14/12
Lab ID: H12090228-012
Report Date: 10/26/12
Matrix: Aqueous

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	09/17/12 14:58 / cm	09/17/12 14:44	124 (14410200)_120917A	: 30	18002
INORGANICS											
Alkalinity, Total as CaCO3	210	mg/L		4		A2320 B	09/17/12 21:48 / cm		MAN-TECH_120917A	: 100	R82996
Bicarbonate as HCO3	230	mg/L		4		A2320 B	09/17/12 21:48 / cm		MAN-TECH_120917A	: 100	R82996
Sulfate	150	mg/L		1		E300.0	09/19/12 21:38 / cm		IC102-H_120919A	: 70	R83065
Hardness as CaCO3	312	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	: 12	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	2.5	mg/L		0.1		A5310 C	09/19/12 21:20 / eli-c	09/18/12 13:49	SUB-C164761	: 22	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:40 / reh		FIA203-HE_120924A	: 32	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/17/12 16:32 / reh		FIA203-HE_120917B	: 109	R82991
Nitrogen, Total	0.19	mg/L		0.05		A4500 N-C	09/25/12 11:19 / reh	09/24/12 09:02	FIA203-HE_120925A	: 28	18111
Phosphorus, Total as P	0.015	mg/L		0.005		E365.1	09/20/12 15:17 / reh	09/20/12 12:30	FIA202-HE_120920A	: 60	18056
METALS, DISSOLVED											
Arsenic	0.010	mg/L		0.005		E200.8	09/19/12 08:36 / dck		ICPMS204-B_120917A	: 299	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 08:36 / dck		ICPMS204-B_120917A	: 299	R82986
Copper	0.002	mg/L		0.001		E200.8	09/19/12 08:36 / dck		ICPMS204-B_120917A	: 299	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 08:36 / dck		ICPMS204-B_120917A	: 299	R82986
Zinc	ND	mg/L		0.01		E200.8	09/19/12 08:36 / dck		ICPMS204-B_120917A	: 299	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 15:12 / eli-b	09/26/12 10:00	SUB-B192866	: 19	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	0.010	mg/L		0.005		E200.8	09/19/12 08:41 / dck	09/17/12 12:48	ICPMS204-B_120917A	: 300	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 08:41 / dck	09/17/12 12:48	ICPMS204-B_120917A	: 300	17987
Calcium	87	mg/L		1		E200.7	09/18/12 15:34 / sld	09/17/12 12:48	ICP2-HE_120918A	: 82	17987

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: LC-7
Collection Date: 09/12/12 16:30
DateReceived: 09/14/12
Lab ID: H12090228-012
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.004	mg/L		0.001		E200.8	09/19/12 08:41 / dck	09/17/12 12:48	ICPMS204-B_120917A	300	17987
Lead	ND	mg/L		0.0005		E200.8	09/19/12 08:41 / dck	09/17/12 12:48	ICPMS204-B_120917A	300	17987
Magnesium	23	mg/L		1		E200.7	09/18/12 15:34 / sld	09/17/12 12:48	ICP2-HE_120918A	82	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 08:41 / dck	09/17/12 12:48	ICPMS204-B_120917A	300	17987

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-03A
Lab ID: H12090228-013
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/12/12 18:00
DateReceived: 09/14/12
Report Date: 10/26/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	2	mg/L		1		A2540 D	09/17/12 14:58 / cm	09/17/12 14:44	124 (14410200)_120917A	31	18002
INORGANICS											
Alkalinity, Total as CaCO3	130	mg/L		4		A2320 B	09/17/12 21:55 / cm		MAN-TECH_120917A	101	R82996
Bicarbonate as HCO3	120	mg/L		4		A2320 B	09/17/12 21:55 / cm		MAN-TECH_120917A	101	R82996
Sulfate	83	mg/L		1		E300.0	09/19/12 21:51 / cm		IC102-H_120919A	71	R83065
Hardness as CaCO3	194	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	13	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	2.9	mg/L		0.1		A5310 C	09/20/12 19:18 / eli-c	09/18/12 14:59	SUB-C164824	3	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:42 / reh		FIA203-HE_120924A	33	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/17/12 16:34 / reh		FIA203-HE_120917B	110	R82991
Nitrogen, Total	0.25	mg/L		0.05		A4500 N-C	09/25/12 11:21 / reh	09/24/12 09:02	FIA203-HE_120925A	29	18111
Phosphorus, Total as P	0.035	mg/L		0.005		E365.1	09/25/12 14:45 / reh	09/25/12 09:16	FIA202-HE_120925A	15	18114
METALS, DISSOLVED											
Arsenic	0.020	mg/L		0.005		E200.8	09/19/12 09:04 / dck		ICPMS204-B_120917A	305	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 09:04 / dck		ICPMS204-B_120917A	305	R82986
Copper	0.004	mg/L		0.001		E200.8	09/19/12 09:04 / dck		ICPMS204-B_120917A	305	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 09:04 / dck		ICPMS204-B_120917A	305	R82986
Zinc	ND	mg/L		0.01		E200.8	09/19/12 09:04 / dck		ICPMS204-B_120917A	305	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 16:04 / eli-b	09/26/12 10:00	SUB-B192866	34	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	0.021	mg/L		0.005		E200.8	09/19/12 09:09 / dck	09/17/12 12:48	ICPMS204-B_120917A	306	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 09:09 / dck	09/17/12 12:48	ICPMS204-B_120917A	306	17987
Calcium	57	mg/L		1		E200.7	09/18/12 15:38 / sld	09/17/12 12:48	ICP2-HE_120918A	83	17987

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
Collection Date: 09/12/12 18:00
DateReceived: 09/14/12
Lab ID: H12090228-013
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.008	mg/L		0.001		E200.8	09/19/12 09:09 / dck	09/17/12 12:48	ICPMS204-B_120917A	306	17987
Lead	0.0008	mg/L		0.0005		E200.8	09/19/12 09:09 / dck	09/17/12 12:48	ICPMS204-B_120917A	306	17987
Magnesium	12	mg/L		1		E200.7	09/18/12 15:38 / sld	09/17/12 12:48	ICP2-HE_120918A	83	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 09:09 / dck	09/17/12 12:48	ICPMS204-B_120917A	306	17987

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: WSC-CFR
Lab ID: H12090228-014
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/13/12 10:00
DateReceived: 09/14/12
Report Date: 10/26/12

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	09/17/12 14:59 / cm	09/17/12 14:44	124 (14410200)_120917A	32	18002
INORGANICS											
Alkalinity, Total as CaCO3	140	mg/L		4		A2320 B	09/17/12 22:02 / cm		MAN-TECH_120917A	102	R82996
Bicarbonate as HCO3	160	mg/L		4		A2320 B	09/17/12 22:02 / cm		MAN-TECH_120917A	102	R82996
Sulfate	33	mg/L		1		E300.0	09/19/12 22:03 / cm		IC102-H_120919A	72	R83065
Hardness as CaCO3	165	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	14	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	1.0	mg/L		0.1		A5310 C	09/20/12 19:27 / eli-c	09/18/12 14:59	SUB-C164824	4	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:43 / reh		FIA203-HE_120924A	34	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/17/12 16:35 / reh		FIA203-HE_120917B	111	R82991
Nitrogen, Total	0.09	mg/L		0.05		A4500 N-C	09/25/12 11:22 / reh	09/24/12 09:02	FIA203-HE_120925A	30	18111
Phosphorus, Total as P	ND	mg/L		0.005		E365.1	09/25/12 14:48 / reh	09/25/12 09:16	FIA202-HE_120925A	18	18114
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	09/19/12 09:32 / dck		ICPMS204-B_120917A	311	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 09:32 / dck		ICPMS204-B_120917A	311	R82986
Copper	0.002	mg/L		0.001		E200.8	09/19/12 09:32 / dck		ICPMS204-B_120917A	311	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 09:32 / dck		ICPMS204-B_120917A	311	R82986
Zinc	ND	mg/L		0.01		E200.8	09/19/12 09:32 / dck		ICPMS204-B_120917A	311	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 16:06 / eli-b	09/26/12 10:00	SUB-B192866	35	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	ND	mg/L		0.005		E200.8	09/19/12 09:37 / dck	09/17/12 08:56	ICPMS204-B_120917A	312	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 09:37 / dck	09/17/12 08:56	ICPMS204-B_120917A	312	17987
Calcium	50	mg/L		1		E200.7	09/18/12 16:00 / sld	09/17/12 08:56	ICP2-HE_120918A	89	17987

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: WSC-CFR
Collection Date: 09/13/12 10:00 **DateReceived:** 09/14/12
Lab ID: H12090228-014
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.006	mg/L		0.001		E200.8	09/19/12 09:37 / dck	09/17/12 08:56	ICPMS204-B_120917A	312	17987
Lead	ND	mg/L		0.0005		E200.8	09/19/12 09:37 / dck	09/17/12 08:56	ICPMS204-B_120917A	312	17987
Magnesium	10	mg/L		1		E200.7	09/18/12 16:00 / sld	09/17/12 08:56	ICP2-HE_120918A	89	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 09:37 / dck	09/17/12 08:56	ICPMS204-B_120917A	312	17987

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
Collection Date: 09/13/12 11:30
DateReceived: 09/14/12
Lab ID: H12090228-015
Report Date: 10/26/12
Matrix: Aqueous

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	09/17/12 14:59 / cm	09/17/12 14:44	124 (14410200)_120917A	33	18002
INORGANICS											
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	09/17/12 22:09 / cm		MAN-TECH_120917A	103	R82996
Bicarbonate as HCO3	96	mg/L		4		A2320 B	09/17/12 22:09 / cm		MAN-TECH_120917A	103	R82996
Sulfate	130	mg/L		1		E300.0	09/19/12 22:16 / cm		IC102-H_120919A	73	R83065
Hardness as CaCO3	221	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	15	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	5.0	mg/L		0.1		A5310 C	09/20/12 19:38 / eli-c	09/18/12 14:59	SUB-C164824	5	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:44 / reh		FIA203-HE_120924A	35	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/18/12 14:00 / reh		FIA203-HE_120918A	22	R83021
Nitrogen, Total	0.48	mg/L		0.05		A4500 N-C	09/25/12 11:23 / reh	09/24/12 09:02	FIA203-HE_120925A	31	18111
Phosphorus, Total as P	0.079	mg/L		0.005		E365.1	09/25/12 14:49 / reh	09/25/12 09:16	FIA202-HE_120925A	19	18114
METALS, DISSOLVED											
Arsenic	0.034	mg/L		0.005		E200.8	09/19/12 09:41 / dck		ICPMS204-B_120917A	313	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 09:41 / dck		ICPMS204-B_120917A	313	R82986
Copper	0.003	mg/L		0.001		E200.8	09/19/12 09:41 / dck		ICPMS204-B_120917A	313	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 09:41 / dck		ICPMS204-B_120917A	313	R82986
Zinc	ND	mg/L		0.01		E200.8	09/19/12 09:41 / dck		ICPMS204-B_120917A	313	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 16:08 / eli-b	09/26/12 10:00	SUB-B192866	36	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	0.034	mg/L		0.005		E200.8	09/19/12 09:46 / dck	09/17/12 08:56	ICPMS204-B_120917A	314	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 09:46 / dck	09/17/12 08:56	ICPMS204-B_120917A	314	17987
Calcium	64	mg/L		1		E200.7	09/18/12 16:04 / sld	09/17/12 08:56	ICP2-HE_120918A	90	17987

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
Collection Date: 09/13/12 11:30
DateReceived: 09/14/12
Lab ID: H12090228-015
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.004	mg/L		0.001		E200.8	09/19/12 09:46 / dck	09/17/12 08:56	ICPMS204-B_120917A	314	17987
Lead	ND	mg/L		0.0005		E200.8	09/19/12 09:46 / dck	09/17/12 08:56	ICPMS204-B_120917A	314	17987
Magnesium	14	mg/L		1		E200.7	09/18/12 16:04 / sld	09/17/12 08:56	ICP2-HE_120918A	90	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 09:46 / dck	09/17/12 08:56	ICPMS204-B_120917A	314	17987

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: MWB-SBC
Lab ID: H12090228-016
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/13/12 13:00
DateReceived: 09/14/12
Report Date: 10/26/12

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	09/17/12 14:59 / cm	09/17/12 14:44	124 (14410200)_120917A	: 34	18002
INORGANICS											
Alkalinity, Total as CaCO3	130	mg/L		4		A2320 B	09/17/12 22:17 / cm		MAN-TECH_120917A	: 104	R82996
Bicarbonate as HCO3	150	mg/L		4		A2320 B	09/17/12 22:17 / cm		MAN-TECH_120917A	: 104	R82996
Sulfate	160	mg/L		1		E300.0	09/19/12 22:29 / cm		IC102-H_120919A	: 74	R83065
Hardness as CaCO3	277	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	: 16	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	2.5	mg/L		0.1		A5310 C	09/20/12 19:48 / eli-c	09/18/12 14:59	SUB-C164824	: 6	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:45 / reh		FIA203-HE_120924A	: 36	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/18/12 14:04 / reh		FIA203-HE_120918A	: 25	R83021
Nitrogen, Total	0.16	mg/L		0.05		A4500 N-C	09/25/12 11:24 / reh	09/24/12 09:02	FIA203-HE_120925A	: 32	18111
Phosphorus, Total as P	0.008	mg/L		0.005		E365.1	09/25/12 14:50 / reh	09/25/12 09:16	FIA202-HE_120925A	: 20	18114
METALS, DISSOLVED											
Arsenic	0.015	mg/L		0.005		E200.8	09/19/12 09:51 / dck		ICPMS204-B_120917A	: 315	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 09:51 / dck		ICPMS204-B_120917A	: 315	R82986
Copper	0.002	mg/L		0.001		E200.8	09/19/12 09:51 / dck		ICPMS204-B_120917A	: 315	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 09:51 / dck		ICPMS204-B_120917A	: 315	R82986
Zinc	ND	mg/L		0.01		E200.8	09/19/12 09:51 / dck		ICPMS204-B_120917A	: 315	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 16:10 / eli-b	09/26/12 10:00	SUB-B192866	: 37	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	0.016	mg/L		0.005		E200.8	09/19/12 09:55 / dck	09/17/12 08:56	ICPMS204-B_120917A	: 316	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 09:55 / dck	09/17/12 08:56	ICPMS204-B_120917A	: 316	17987
Calcium	81	mg/L		1		E200.7	09/18/12 16:08 / sld	09/17/12 08:56	ICP2-HE_120918A	: 91	17987

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: MWB-SBC
Collection Date: 09/13/12 13:00
DateReceived: 09/14/12
Lab ID: H12090228-016
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.003	mg/L		0.001		E200.8	09/19/12 09:55 / dck	09/17/12 08:56	ICPMS204-B_120917A	316	17987
Lead	ND	mg/L		0.0005		E200.8	09/19/12 09:55 / dck	09/17/12 08:56	ICPMS204-B_120917A	316	17987
Magnesium	18	mg/L		1		E200.7	09/18/12 16:08 / sld	09/17/12 08:56	ICP2-HE_120918A	91	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 09:55 / dck	09/17/12 08:56	ICPMS204-B_120917A	316	17987

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: MCWC-MWB
Collection Date: 09/13/12 15:00
DateReceived: 09/14/12
Lab ID: H12090228-017
Report Date: 10/26/12
Matrix: Aqueous

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	09/17/12 14:59 / cm	09/17/12 14:44	124 (14410200)_120917A	35	18002
INORGANICS											
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	09/17/12 22:31 / cm		MAN-TECH_120917A	107	R82996
Bicarbonate as HCO3	130	mg/L		4		A2320 B	09/17/12 22:31 / cm		MAN-TECH_120917A	107	R82996
Sulfate	27	mg/L		1		E300.0	09/19/12 22:41 / cm		IC102-H_120919A	75	R83065
Hardness as CaCO3	127	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	17	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	2.0	mg/L		0.1		A5310 C	09/20/12 19:58 / eli-c	09/18/12 14:59	SUB-C164824	7	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:46 / reh		FIA203-HE_120924A	37	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/18/12 14:05 / reh		FIA203-HE_120918A	26	R83021
Nitrogen, Total	0.11	mg/L		0.05		A4500 N-C	09/25/12 11:25 / reh	09/24/12 09:02	FIA203-HE_120925A	33	18111
Phosphorus, Total as P	0.013	mg/L		0.005		E365.1	09/25/12 14:51 / reh	09/25/12 09:16	FIA202-HE_120925A	21	18114
METALS, DISSOLVED											
Arsenic	0.012	mg/L		0.005		E200.8	09/19/12 10:19 / dck		ICPMS204-B_120917A	321	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 10:19 / dck		ICPMS204-B_120917A	321	R82986
Copper	0.002	mg/L		0.001		E200.8	09/19/12 10:19 / dck		ICPMS204-B_120917A	321	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 10:19 / dck		ICPMS204-B_120917A	321	R82986
Zinc	ND	mg/L		0.01		E200.8	09/19/12 10:19 / dck		ICPMS204-B_120917A	321	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 15:48 / eli-b	09/26/12 10:00	SUB-B192866	29	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	0.013	mg/L		0.005		E200.8	09/19/12 10:23 / dck	09/17/12 08:56	ICPMS204-B_120917A	322	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 10:23 / dck	09/17/12 08:56	ICPMS204-B_120917A	322	17987
Calcium	36	mg/L		1		E200.7	09/18/12 16:12 / sld	09/17/12 08:56	ICP2-HE_120918A	92	17987

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: MCWC-MWB
Collection Date: 09/13/12 15:00 **DateReceived:** 09/14/12
Lab ID: H12090228-017
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.007	mg/L		0.001		E200.8	09/19/12 10:23 / dck	09/17/12 08:56	ICPMS204-B_120917A	322	17987
Lead	0.0010	mg/L		0.0005		E200.8	09/19/12 10:23 / dck	09/17/12 08:56	ICPMS204-B_120917A	322	17987
Magnesium	9	mg/L		1		E200.7	09/18/12 16:12 / sld	09/17/12 08:56	ICP2-HE_120918A	92	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 10:23 / dck	09/17/12 08:56	ICPMS204-B_120917A	322	17987

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: MCWC-MWB duplicate
Lab ID: H12090228-018
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/13/12 15:00
DateReceived: 09/14/12
Report Date: 10/26/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	2	mg/L		1		A2540 D	09/17/12 15:00 / cm	09/17/12 14:44	124 (14410200)_120917A	36	18002
INORGANICS											
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	09/17/12 22:47 / cm		MAN-TECH_120917A	110	R82996
Bicarbonate as HCO3	130	mg/L		4		A2320 B	09/17/12 22:47 / cm		MAN-TECH_120917A	110	R82996
Sulfate	27	mg/L		1		E300.0	09/19/12 22:54 / cm		IC102-H_120919A	76	R83065
Hardness as CaCO3	128	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	18	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	1.8	mg/L		0.1		A5310 C	09/20/12 20:07 / eli-c	09/18/12 14:59	SUB-C164824	8	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:48 / reh		FIA203-HE_120924A	38	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/18/12 14:09 / reh		FIA203-HE_120918A	29	R83021
Nitrogen, Total	0.11	mg/L		0.05		A4500 N-C	09/25/12 11:27 / reh	09/24/12 09:02	FIA203-HE_120925A	34	18111
Phosphorus, Total as P	0.015	mg/L		0.005		E365.1	09/25/12 14:52 / reh	09/25/12 09:16	FIA202-HE_120925A	22	18114
METALS, DISSOLVED											
Arsenic	0.012	mg/L		0.005		E200.8	09/19/12 10:28 / dck		ICPMS204-B_120917A	323	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 10:28 / dck		ICPMS204-B_120917A	323	R82986
Copper	0.002	mg/L		0.001		E200.8	09/19/12 10:28 / dck		ICPMS204-B_120917A	323	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 10:28 / dck		ICPMS204-B_120917A	323	R82986
Zinc	ND	mg/L		0.01		E200.8	09/19/12 10:28 / dck		ICPMS204-B_120917A	323	R82986
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 15:50 / eli-b	09/26/12 10:00	SUB-B192866	30	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	0.013	mg/L		0.005		E200.8	09/19/12 10:33 / dck	09/17/12 08:56	ICPMS204-B_120917A	324	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 10:33 / dck	09/17/12 08:56	ICPMS204-B_120917A	324	17987
Calcium	36	mg/L		1		E200.7	09/18/12 16:15 / sld	09/17/12 08:56	ICP2-HE_120918A	93	17987

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: MCWC-MWB duplicate
Collection Date: 09/13/12 15:00
DateReceived: 09/14/12
Lab ID: H12090228-018
Report Date: 10/26/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	0.005	mg/L		0.001		E200.8	09/19/12 10:33 / dck	09/17/12 08:56	ICPMS204-B_120917A	324	17987
Lead	0.0011	mg/L		0.0005		E200.8	09/19/12 10:33 / dck	09/17/12 08:56	ICPMS204-B_120917A	324	17987
Magnesium	9	mg/L		1		E200.7	09/18/12 16:15 / sld	09/17/12 08:56	ICP2-HE_120918A	93	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 10:33 / dck	09/17/12 08:56	ICPMS204-B_120917A	324	17987

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: Field Blank#2
Lab ID: H12090228-019
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/13/12 16:00
DateReceived: 09/14/12
Report Date: 10/26/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL PROPERTIES											
Solids, Total Suspended TSS @ 105 C	2	mg/L		1		A2540 D	09/17/12 15:00 / cm	09/17/12 14:44	124 (14410200)_120917A	37	18002
INORGANICS											
Alkalinity, Total as CaCO3	ND	mg/L		4		A2320 B	09/17/12 22:52 / cm		MAN-TECH_120917A	111	R82996
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	09/17/12 22:52 / cm		MAN-TECH_120917A	111	R82996
Sulfate	ND	mg/L		1		E300.0	09/19/12 23:06 / cm		IC102-H_120919A	77	R83065
Hardness as CaCO3	ND	mg/L		1		A2340 B	09/20/12 10:05 / sld		WATERCALC_120920A	19	R83067
AGGREGATE ORGANICS											
Organic Carbon, Dissolved (DOC)	0.5	mg/L		0.1		A5310 C	09/20/12 20:17 / eli-c	09/18/12 14:59	SUB-C164824	9	C_35070
NUTRIENTS											
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	09/24/12 10:51 / reh		FIA203-HE_120924A	41	R83158
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	09/18/12 14:10 / reh		FIA203-HE_120918A	30	R83021
Nitrogen, Total	ND	mg/L		0.05		A4500 N-C	09/25/12 11:28 / reh	09/24/12 09:02	FIA203-HE_120925A	35	18111
Phosphorus, Total as P	ND	mg/L		0.005		E365.1	09/25/12 14:53 / reh	09/25/12 09:16	FIA202-HE_120925A	23	18114
METALS, DISSOLVED											
Arsenic	ND	mg/L		0.005		E200.8	09/19/12 10:37 / dck		ICPMS204-B_120917A	325	R82986
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 10:37 / dck		ICPMS204-B_120917A	325	R82986
Copper	ND	mg/L		0.001		E200.8	09/19/12 10:37 / dck		ICPMS204-B_120917A	325	R82986
Lead	ND	mg/L		0.0005		E200.8	09/19/12 10:37 / dck		ICPMS204-B_120917A	325	R82986
Zinc	ND	mg/L		0.01		E200.8	10/12/12 14:31 / dck		ICPMS204-B_121010C	596	R83638
METALS, TOTAL											
Mercury	ND	mg/L		0.000010		E245.1	10/04/12 15:52 / eli-b	09/26/12 10:00	SUB-B192866	31	B_65708
METALS, TOTAL RECOVERABLE											
Arsenic	ND	mg/L		0.005		E200.8	09/19/12 11:10 / dck	09/17/12 08:56	ICPMS204-B_120917A	332	17987
Cadmium	ND	mg/L		0.00008		E200.8	09/19/12 11:10 / dck	09/17/12 08:56	ICPMS204-B_120917A	332	17987
Calcium	ND	mg/L		1		E200.7	09/18/12 16:19 / sld	09/17/12 08:56	ICP2-HE_120918A	94	17987

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: Field Blank#2
Lab ID: H12090228-019
Matrix: Aqueous

Project: CFR Monitoring-474374
Collection Date: 09/13/12 16:00
DateReceived: 09/14/12
Report Date: 10/26/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
METALS, TOTAL RECOVERABLE											
Copper	ND	mg/L		0.001		E200.8	09/19/12 11:10 / dck	09/17/12 08:56	ICPMS204-B_120917A	332	17987
Lead	ND	mg/L		0.0005		E200.8	09/19/12 11:10 / dck	09/17/12 08:56	ICPMS204-B_120917A	332	17987
Magnesium	ND	mg/L		1		E200.7	09/18/12 16:19 / sld	09/17/12 08:56	ICP2-HE_120918A	94	17987
Zinc	ND	mg/L		0.01		E200.8	09/19/12 11:10 / dck	09/17/12 08:56	ICPMS204-B_120917A	332	17987

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: CFR116-A Sediment Sieve <0.065mm
Collection Date: 09/11/12 09:15
DateReceived: 09/14/12
Lab ID: H12090228-020
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	7.7	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	1	R83591
3050 EXTRACTABLE METALS											
Arsenic	6	mg/kg		1		SW6010B	10/10/12 12:29 / sld	10/08/12 13:01	ICP2-HE_121010A	18	18295
Cadmium	1.2	mg/kg		0.2		SW6020	10/10/12 01:03 / dck	10/02/12 13:53	ICPMS204-B_121008B	47	18230
Copper	92	mg/kg		5		SW6010B	10/04/12 15:15 / sld	10/02/12 13:53	ICP2-HE_121004B	50	18230
Lead	73	mg/kg		5		SW6010B	10/04/12 15:15 / sld	10/02/12 13:53	ICP2-HE_121004B	50	18230
Zinc	206	mg/kg		5		SW6010B	10/04/12 15:15 / sld	10/02/12 13:53	ICP2-HE_121004B	50	18230

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: CFR116-A Sediment Sieve 0.065-1mm
Collection Date: 09/11/12 09:15
DateReceived: 09/14/12
Lab ID: H12090228-021
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	78.6	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	2	R83591
3050 EXTRACTABLE METALS											
Arsenic	4	mg/kg		1		SW6010B	10/10/12 12:40 / sld	10/08/12 13:01	ICP2-HE_121010A	21	18295
Cadmium	0.3	mg/kg		0.2		SW6020	10/10/12 01:08 / dck	10/02/12 13:53	ICPMS204-B_121008B	48	18230
Copper	38	mg/kg		5		SW6010B	10/04/12 15:18 / sld	10/02/12 13:53	ICP2-HE_121004B	51	18230
Lead	17	mg/kg		5		SW6010B	10/04/12 15:18 / sld	10/02/12 13:53	ICP2-HE_121004B	51	18230
Zinc	119	mg/kg		5		SW6010B	10/04/12 15:18 / sld	10/02/12 13:53	ICP2-HE_121004B	51	18230

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: CFR116-A Sediment Sieve 1-2mm
Collection Date: 09/11/12 09:15
DateReceived: 09/14/12
Lab ID: H12090228-022
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	3.1	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	3	R83591
3050 EXTRACTABLE METALS											
Arsenic	5	mg/kg		1		SW6010B	10/10/12 12:43 / sld	10/08/12 13:01	ICP2-HE_121010A	22	18295
Cadmium	0.3	mg/kg		0.2		SW6020	10/10/12 01:12 / dck	10/02/12 13:53	ICPMS204-B_121008B	49	18230
Copper	36	mg/kg		5		SW6010B	10/04/12 15:22 / sld	10/02/12 13:53	ICP2-HE_121004B	52	18230
Lead	11	mg/kg		5		SW6010B	10/04/12 15:22 / sld	10/02/12 13:53	ICP2-HE_121004B	52	18230
Zinc	96	mg/kg		5		SW6010B	10/04/12 15:22 / sld	10/02/12 13:53	ICP2-HE_121004B	52	18230

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: RC-CFR Sediment Sieve <0.065mm
Collection Date: 09/11/12 11:00
DateReceived: 09/14/12
Lab ID: H12090228-023
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	13.5	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	4	R83591
3050 EXTRACTABLE METALS											
Arsenic	1	mg/kg		1		SW6010B	10/10/12 12:47 / sld	10/08/12 13:01	ICP2-HE_121010A	23	18295
Cadmium	ND	mg/kg		0.2		SW6010B	10/04/12 15:26 / sld	10/02/12 13:53	ICP2-HE_121004B	53	18230
Copper	6	mg/kg		5		SW6010B	10/04/12 15:26 / sld	10/02/12 13:53	ICP2-HE_121004B	53	18230
Lead	15	mg/kg		5		SW6010B	10/04/12 15:26 / sld	10/02/12 13:53	ICP2-HE_121004B	53	18230
Zinc	10	mg/kg		5		SW6010B	10/04/12 15:26 / sld	10/02/12 13:53	ICP2-HE_121004B	53	18230

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: RC-CFR Sediment Sieve 0.065-1mm
Collection Date: 09/11/12 11:00
DateReceived: 09/14/12
Lab ID: H12090228-024
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	71.7	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	5	R83591
3050 EXTRACTABLE METALS											
Arsenic	3	mg/kg		1		SW6010B	10/10/12 12:51 / sld	10/08/12 13:01	ICP2-HE_121010A	24	18295
Cadmium	ND	mg/kg		0.2		SW6020	10/10/12 01:21 / dck	10/02/12 13:53	ICPMS204-B_121008B	51	18230
Copper	ND	mg/kg		5		SW6010B	10/04/12 15:29 / sld	10/02/12 13:53	ICP2-HE_121004B	54	18230
Lead	6	mg/kg		5		SW6010B	10/04/12 15:29 / sld	10/02/12 13:53	ICP2-HE_121004B	54	18230
Zinc	5	mg/kg		5		SW6010B	10/04/12 15:29 / sld	10/02/12 13:53	ICP2-HE_121004B	54	18230

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: RC-CFR Sediment Sieve 1-2mm
Collection Date: 09/11/12 11:00
DateReceived: 09/14/12
Lab ID: H12090228-025
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	2.9	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	6	R83591
3050 EXTRACTABLE METALS											
Arsenic	2	mg/kg		1		SW6010B	10/10/12 12:54 / sld	10/08/12 13:01	ICP2-HE_121010A	25	18295
Cadmium	ND	mg/kg		0.2		SW6020	10/10/12 01:26 / dck	10/02/12 13:53	ICPMS204-B_121008B	52	18230
Copper	ND	mg/kg		5		SW6010B	10/04/12 15:33 / sld	10/02/12 13:53	ICP2-HE_121004B	55	18230
Lead	7	mg/kg		5		SW6010B	10/04/12 15:33 / sld	10/02/12 13:53	ICP2-HE_121004B	55	18230
Zinc	9	mg/kg		5		SW6010B	10/04/12 15:33 / sld	10/02/12 13:53	ICP2-HE_121004B	55	18230

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 <0.065mm
Collection Date: 09/11/12 13:45
DateReceived: 09/14/12
Lab ID: H12090228-026
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	5.2	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	7	R83591
3050 EXTRACTABLE METALS											
Arsenic	10	mg/kg		1		SW6010B	10/10/12 12:58 / sld	10/08/12 13:01	ICP2-HE_121010A	26	18295
Cadmium	1.1	mg/kg		0.2		SW6020	10/10/12 01:31 / dck	10/02/12 13:53	ICPMS204-B_121008B	53	18230
Copper	89	mg/kg		5		SW6010B	10/04/12 15:37 / sld	10/02/12 13:53	ICP2-HE_121004B	56	18230
Lead	29	mg/kg		5		SW6010B	10/04/12 15:37 / sld	10/02/12 13:53	ICP2-HE_121004B	56	18230
Zinc	200	mg/kg		5		SW6010B	10/04/12 15:37 / sld	10/02/12 13:53	ICP2-HE_121004B	56	18230

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: 09/11/12 13:45
DateReceived: 09/14/12
Lab ID: H12090228-027
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	66.8	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	8	R83591
3050 EXTRACTABLE METALS											
Arsenic	7	mg/kg		1		SW6010B	10/10/12 13:02 / sld	10/08/12 13:01	ICP2-HE_121010A	27	18295
Cadmium	0.4	mg/kg		0.2		SW6020	10/10/12 01:53 / dck	10/02/12 13:53	ICPMS204-B_121008B	58	18230
Copper	49	mg/kg		5		SW6010B	10/04/12 15:41 / sld	10/02/12 13:53	ICP2-HE_121004B	57	18230
Lead	15	mg/kg		5		SW6010B	10/04/12 15:41 / sld	10/02/12 13:53	ICP2-HE_121004B	57	18230
Zinc	162	mg/kg		5		SW6010B	10/04/12 15:41 / sld	10/02/12 13:53	ICP2-HE_121004B	57	18230

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: 09/11/12 13:45
DateReceived: 09/14/12
Lab ID: H12090228-028
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	27.3	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	9	R83591
3050 EXTRACTABLE METALS											
Arsenic	7	mg/kg		1		SW6010B	10/10/12 13:06 / sld	10/08/12 13:01	ICP2-HE_121010A	28	18295
Cadmium	0.3	mg/kg		0.2		SW6020	10/10/12 01:58 / dck	10/02/12 13:53	ICPMS204-B_121008B	59	18230
Copper	37	mg/kg		5		SW6010B	10/04/12 15:52 / sld	10/02/12 13:53	ICP2-HE_121004B	60	18230
Lead	13	mg/kg		5		SW6010B	10/04/12 15:52 / sld	10/02/12 13:53	ICP2-HE_121004B	60	18230
Zinc	132	mg/kg		5		SW6010B	10/04/12 15:52 / sld	10/02/12 13:53	ICP2-HE_121004B	60	18230

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: FC-CFR Sediment Sieve <0.065mm
Collection Date: 09/11/12 15:45
DateReceived: 09/14/12
Lab ID: H12090228-029
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	27.5	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	10	R83591
3050 EXTRACTABLE METALS											
Arsenic	17	mg/kg		1		SW6010B	10/10/12 13:09 / sld	10/08/12 13:01	ICP2-HE_121010A	29	18295
Cadmium	0.5	mg/kg		0.2		SW6020	10/10/12 02:03 / dck	10/02/12 13:53	ICPMS204-B_121008B	60	18230
Copper	14	mg/kg		5		SW6010B	10/04/12 15:55 / sld	10/02/12 13:53	ICP2-HE_121004B	61	18230
Lead	37	mg/kg		5		SW6010B	10/04/12 15:55 / sld	10/02/12 13:53	ICP2-HE_121004B	61	18230
Zinc	119	mg/kg		5		SW6010B	10/04/12 15:55 / sld	10/02/12 13:53	ICP2-HE_121004B	61	18230

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: FC-CFR Sediment Sieve 0.065-1mm
Collection Date: 09/11/12 15:45
DateReceived: 09/14/12
Lab ID: H12090228-030
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	59.8	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	11	R83591
3050 EXTRACTABLE METALS											
Arsenic	19	mg/kg		1		SW6010B	10/10/12 13:13 / sld	10/08/12 13:01	ICP2-HE_121010A	30	18295
Cadmium	0.4	mg/kg		0.2		SW6020	10/10/12 02:07 / dck	10/02/12 13:53	ICPMS204-B_121008B	61	18230
Copper	12	mg/kg		5		SW6010B	10/04/12 15:59 / sld	10/02/12 13:53	ICP2-HE_121004B	62	18230
Lead	31	mg/kg		5		SW6010B	10/04/12 15:59 / sld	10/02/12 13:53	ICP2-HE_121004B	62	18230
Zinc	112	mg/kg		5		SW6010B	10/04/12 15:59 / sld	10/02/12 13:53	ICP2-HE_121004B	62	18230

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: FC-CFR Sediment Sieve 1-2mm
Collection Date: 09/11/12 15:45
DateReceived: 09/14/12
Lab ID: H12090228-031
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	4.9	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	12	R83591
3050 EXTRACTABLE METALS											
Arsenic	24	mg/kg	D	3		SW6010B	10/10/12 13:24 / sld	10/08/12 13:01	ICP2-HE_121010A	33	18295
Cadmium	0.2	mg/kg		0.2		SW6020	10/10/12 02:12 / dck	10/02/12 13:53	ICPMS204-B_121008B	62	18230
Copper	9	mg/kg		5		SW6010B	10/04/12 16:02 / sld	10/02/12 13:53	ICP2-HE_121004B	63	18230
Lead	13	mg/kg	D	6		SW6010B	10/10/12 13:24 / sld	10/08/12 13:01	ICP2-HE_121010A	33	18295
Zinc	74	mg/kg		5		SW6010B	10/04/12 16:02 / sld	10/02/12 13:53	ICP2-HE_121004B	63	18230

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-53C Sediment Sieve <0.065mm
Collection Date: 09/11/12 17:45
DateReceived: 09/14/12
Lab ID: H12090228-032
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	31.8	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	13	R83591
3050 EXTRACTABLE METALS											
Arsenic	10	mg/kg		1		SW6010B	10/10/12 13:28 / sld	10/08/12 13:01	ICP2-HE_121010A	34	18295
Cadmium	0.8	mg/kg		0.2		SW6020	10/10/12 02:16 / dck	10/02/12 13:53	ICPMS204-B_121008B	63	18230
Copper	93	mg/kg		5		SW6010B	10/04/12 16:06 / sld	10/02/12 13:53	ICP2-HE_121004B	64	18230
Lead	20	mg/kg		5		SW6010B	10/04/12 16:06 / sld	10/02/12 13:53	ICP2-HE_121004B	64	18230
Zinc	139	mg/kg		5		SW6010B	10/04/12 16:06 / sld	10/02/12 13:53	ICP2-HE_121004B	64	18230

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 0.065-1mm
Collection Date: 09/11/12 17:45
DateReceived: 09/14/12
Lab ID: H12090228-033
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	63.9	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	14	R83591
3050 EXTRACTABLE METALS											
Arsenic	7	mg/kg		1		SW6010B	10/10/12 13:31 / sld	10/08/12 13:01	ICP2-HE_121010A	35	18295
Cadmium	0.6	mg/kg		0.2		SW6020	10/10/12 02:21 / dck	10/02/12 13:53	ICPMS204-B_121008B	64	18230
Copper	62	mg/kg		5		SW6010B	10/04/12 16:10 / sld	10/02/12 13:53	ICP2-HE_121004B	65	18230
Lead	12	mg/kg		5		SW6010B	10/04/12 16:10 / sld	10/02/12 13:53	ICP2-HE_121004B	65	18230
Zinc	101	mg/kg		5		SW6010B	10/04/12 16:10 / sld	10/02/12 13:53	ICP2-HE_121004B	65	18230

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: 09/11/12 17:45
DateReceived: 09/14/12
Lab ID: H12090228-034
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	3.3	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	15	R83591
3050 EXTRACTABLE METALS											
Arsenic	3	mg/kg		1		SW6010B	10/16/12 17:38 / sld	10/11/12 08:52	ICP2-HE_121016D	41	18337
Cadmium	0.3	mg/kg		0.2		SW6020	10/10/12 02:25 / dck	10/02/12 13:53	ICPMS204-B_121008B	65	18230
Copper	30	mg/kg		5		SW6010B	10/16/12 17:38 / sld	10/11/12 08:52	ICP2-HE_121016D	41	18337
Lead	ND	mg/kg		5		SW6010B	10/04/12 16:14 / sld	10/02/12 13:53	ICP2-HE_121004B	66	18230
Zinc	43	mg/kg		5		SW6010B	10/04/12 16:14 / sld	10/02/12 13:53	ICP2-HE_121004B	66	18230

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: 09/12/12 09:30
DateReceived: 09/14/12
Lab ID: H12090228-035
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	2.8	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	16	R83591
3050 EXTRACTABLE METALS											
Arsenic	25	mg/kg		1		SW6010B	10/10/12 13:39 / sld	10/08/12 13:01	ICP2-HE_121010A	37	18295
Cadmium	2.7	mg/kg		0.2		SW6010B	10/04/12 16:17 / sld	10/02/12 13:53	ICP2-HE_121004B	67	18230
Copper	367	mg/kg		5		SW6010B	10/04/12 16:17 / sld	10/02/12 13:53	ICP2-HE_121004B	67	18230
Lead	70	mg/kg		5		SW6010B	10/04/12 16:17 / sld	10/02/12 13:53	ICP2-HE_121004B	67	18230
Zinc	458	mg/kg		5		SW6010B	10/04/12 16:17 / sld	10/02/12 13:53	ICP2-HE_121004B	67	18230

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: 09/12/12 09:30
DateReceived: 09/14/12
Lab ID: H12090228-036
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	52.6	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	17	R83591
3050 EXTRACTABLE METALS											
Arsenic	12	mg/kg		1		SW6010B	10/10/12 13:43 / sld	10/08/12 13:01	ICP2-HE_121010A	38	18295
Cadmium	0.5	mg/kg		0.2		SW6020	10/10/12 02:34 / dck	10/02/12 13:53	ICPMS204-B_121008B	67	18230
Copper	88	mg/kg		5		SW6010B	10/04/12 16:21 / sld	10/02/12 13:53	ICP2-HE_121004B	68	18230
Lead	25	mg/kg		5		SW6010B	10/04/12 16:21 / sld	10/02/12 13:53	ICP2-HE_121004B	68	18230
Zinc	183	mg/kg		5		SW6010B	10/04/12 16:21 / sld	10/02/12 13:53	ICP2-HE_121004B	68	18230

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 1-2mm
Collection Date: 09/12/12 09:30
DateReceived: 09/14/12
Lab ID: H12090228-037
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	37.8	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	18	R83591
3050 EXTRACTABLE METALS											
Arsenic	13	mg/kg		1		SW6010B	10/10/12 13:46 / sld	10/08/12 13:01	ICP2-HE_121010A	39	18295
Cadmium	0.6	mg/kg		0.2		SW6020	10/18/12 06:59 / dck	10/11/12 08:52	ICPMS204-B_121017B	104	18337
Copper	73	mg/kg		5		SW6010B	10/16/12 17:42 / sld	10/11/12 08:52	ICP2-HE_121016D	42	18337
Lead	18	mg/kg		5		SW6010B	10/04/12 16:25 / sld	10/02/12 13:53	ICP2-HE_121004B	69	18230
Zinc	366	mg/kg		5		SW6010B	10/04/12 16:25 / sld	10/02/12 13:53	ICP2-HE_121004B	69	18230

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: LBR-CFR Sediment Sieve <0.065mm
Collection Date: 09/12/12 11:30
DateReceived: 09/14/12
Lab ID: H12090228-038
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	14.2	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	19	R83591
3050 EXTRACTABLE METALS											
Arsenic	8	mg/kg		1		SW6010B	10/05/12 23:50 / sld	10/03/12 09:32	ICP2-HE_121005B	49	18234
Cadmium	0.3	mg/kg		0.2		SW6020	10/10/12 03:46 / dck	10/03/12 09:32	ICPMS204-B_121008B	83	18234
Copper	18	mg/kg		5		SW6010B	10/05/12 23:50 / sld	10/03/12 09:32	ICP2-HE_121005B	49	18234
Lead	34	mg/kg		5		SW6010B	10/05/12 23:50 / sld	10/03/12 09:32	ICP2-HE_121005B	49	18234
Zinc	50	mg/kg		5		SW6010B	10/11/12 11:56 / sld	10/09/12 10:57	ICP2-HE_121011A	23	18308

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: LBR-CFR Sediment Sieve 0.065-1mm
Collection Date: 09/12/12 11:30
DateReceived: 09/14/12
Lab ID: H12090228-039
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	71.8	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	20	R83591
3050 EXTRACTABLE METALS											
Arsenic	7	mg/kg		1		SW6020	10/10/12 03:51 / dck	10/03/12 09:32	ICPMS204-B_121008B	84	18234
Cadmium	ND	mg/kg		0.2		SW6020	10/10/12 03:51 / dck	10/03/12 09:32	ICPMS204-B_121008B	84	18234
Copper	9	mg/kg		5		SW6010B	10/05/12 23:54 / sld	10/03/12 09:32	ICP2-HE_121005B	50	18234
Lead	12	mg/kg		5		SW6010B	10/12/12 12:59 / sld	10/09/12 10:57	ICP2-HE_121012B	51	18308
Zinc	38	mg/kg		5		SW6010B	10/11/12 12:00 / sld	10/09/12 10:57	ICP2-HE_121011A	24	18308

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: LBR-CFR Sediment Sieve 1-2mm
Collection Date: 09/12/12 11:30
DateReceived: 09/14/12
Lab ID: H12090228-040
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	9.9	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	21	R83591
3050 EXTRACTABLE METALS											
Arsenic	9	mg/kg		1		SW6010B	10/05/12 23:58 / sld	10/03/12 09:32	ICP2-HE_121005B	51	18234
Cadmium	ND	mg/kg		0.2		SW6020	10/10/12 04:14 / dck	10/03/12 09:32	ICPMS204-B_121008B	89	18234
Copper	10	mg/kg		5		SW6010B	10/05/12 23:58 / sld	10/03/12 09:32	ICP2-HE_121005B	51	18234
Lead	10	mg/kg		5		SW6010B	10/12/12 13:03 / sld	10/09/12 10:57	ICP2-HE_121012B	52	18308
Zinc	32	mg/kg		5		SW6010B	10/11/12 12:04 / sld	10/09/12 10:57	ICP2-HE_121011A	25	18308

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 <0.065mm
Collection Date: 09/12/12 13:00
DateReceived: 09/14/12
Lab ID: H12090228-041
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	11.0	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	22	R83591
3050 EXTRACTABLE METALS											
Arsenic	32	mg/kg		1		SW6010B	10/06/12 00:01 / sld	10/03/12 09:32	ICP2-HE_121005B	52	18234
Cadmium	2.0	mg/kg		0.2		SW6010B	10/06/12 00:01 / sld	10/03/12 09:32	ICP2-HE_121005B	52	18234
Copper	437	mg/kg		5		SW6010B	10/06/12 00:01 / sld	10/03/12 09:32	ICP2-HE_121005B	52	18234
Lead	82	mg/kg		5		SW6010B	10/06/12 00:01 / sld	10/03/12 09:32	ICP2-HE_121005B	52	18234
Zinc	373	mg/kg		5		SW6010B	10/11/12 12:07 / sld	10/09/12 10:57	ICP2-HE_121011A	26	18308

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 0.065-1mm
Collection Date: 09/12/12 13:00
DateReceived: 09/14/12
Lab ID: H12090228-042
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	44.2	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	23	R83591
3050 EXTRACTABLE METALS											
Arsenic	19	mg/kg		1		SW6010B	10/06/12 00:05 / sld	10/03/12 09:32	ICP2-HE_121005B	53	18234
Cadmium	0.6	mg/kg		0.2		SW6020	10/10/12 04:23 / dck	10/03/12 09:32	ICPMS204-B_121008B	91	18234
Copper	132	mg/kg		5		SW6010B	10/06/12 00:05 / sld	10/03/12 09:32	ICP2-HE_121005B	53	18234
Lead	35	mg/kg		5		SW6010B	10/06/12 00:05 / sld	10/03/12 09:32	ICP2-HE_121005B	53	18234
Zinc	210	mg/kg		5		SW6010B	10/11/12 12:11 / sld	10/09/12 10:57	ICP2-HE_121011A	27	18308

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: 09/12/12 13:00
DateReceived: 09/14/12
Lab ID: H12090228-043
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	29.5	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	24	R83591
3050 EXTRACTABLE METALS											
Arsenic	8	mg/kg		1		SW6010B	10/06/12 00:16 / sld	10/03/12 09:32	ICP2-HE_121005B	56	18234
Cadmium	0.3	mg/kg		0.2		SW6020	10/10/12 04:27 / dck	10/03/12 09:32	ICPMS204-B_121008B	92	18234
Copper	87	mg/kg		5		SW6010B	10/06/12 00:16 / sld	10/03/12 09:32	ICP2-HE_121005B	56	18234
Lead	26	mg/kg		5		SW6010B	10/06/12 00:16 / sld	10/03/12 09:32	ICP2-HE_121005B	56	18234
Zinc	68	mg/kg		5		SW6010B	10/16/12 17:46 / sld	10/11/12 08:52	ICP2-HE_121016D	43	18337

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 Duplicate Sediment Sieve <0.065mm
Collection Date: 09/12/12 13:00
DateReceived: 09/14/12
Lab ID: H12090228-044
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	12.3	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	25	R83591
3050 EXTRACTABLE METALS											
Arsenic	37	mg/kg		1		SW6010B	10/06/12 00:20 / sld	10/03/12 09:32	ICP2-HE_121005B	57	18234
Cadmium	2.5	mg/kg		0.2		SW6010B	10/06/12 00:20 / sld	10/03/12 09:32	ICP2-HE_121005B	57	18234
Copper	472	mg/kg		5		SW6010B	10/06/12 00:20 / sld	10/03/12 09:32	ICP2-HE_121005B	57	18234
Lead	91	mg/kg		5		SW6010B	10/06/12 00:20 / sld	10/03/12 09:32	ICP2-HE_121005B	57	18234
Zinc	412	mg/kg		5		SW6010B	10/11/12 12:18 / sld	10/09/12 10:57	ICP2-HE_121011A	29	18308

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 Duplicate Sediment Sieve 0.065-1mm
Collection Date: 09/12/12 13:00
DateReceived: 09/14/12
Lab ID: H12090228-045
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	54.0	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	26	R83591
3050 EXTRACTABLE METALS											
Arsenic	19	mg/kg		1		SW6010B	10/06/12 00:24 / sld	10/03/12 09:32	ICP2-HE_121005B	58	18234
Cadmium	0.6	mg/kg		0.2		SW6020	10/10/12 04:36 / dck	10/03/12 09:32	ICPMS204-B_121008B	94	18234
Copper	142	mg/kg		5		SW6010B	10/06/12 00:24 / sld	10/03/12 09:32	ICP2-HE_121005B	58	18234
Lead	35	mg/kg		5		SW6010B	10/06/12 00:24 / sld	10/03/12 09:32	ICP2-HE_121005B	58	18234
Zinc	196	mg/kg		5		SW6010B	10/11/12 12:22 / sld	10/09/12 10:57	ICP2-HE_121011A	30	18308

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 Duplicate Sediment Sieve 1-2mm
Collection Date: 09/12/12 13:00
DateReceived: 09/14/12
Lab ID: H12090228-046
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	23.7	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	27	R83591
3050 EXTRACTABLE METALS											
Arsenic	10	mg/kg		1		SW6010B	10/16/12 17:49 / sld	10/11/12 08:52	ICP2-HE_121016D	44	18337
Cadmium	0.5	mg/kg		0.2		SW6020	10/10/12 04:41 / dck	10/03/12 09:32	ICPMS204-B_121008B	95	18234
Copper	116	mg/kg		5		SW6010B	10/06/12 00:27 / sld	10/03/12 09:32	ICP2-HE_121005B	59	18234
Lead	21	mg/kg		5		SW6010B	10/11/12 12:33 / sld	10/09/12 10:57	ICP2-HE_121011A	33	18308
Zinc	110	mg/kg		5		SW6010B	10/11/12 12:33 / sld	10/09/12 10:57	ICP2-HE_121011A	33	18308

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: RTC-1 Sediment Sieve <0.065mm
Collection Date: 09/12/12 14:15
DateReceived: 09/14/12
Lab ID: H12090228-047
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	3.1	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	28	R83591
3050 EXTRACTABLE METALS											
Arsenic	20	mg/kg		1		SW6010B	10/06/12 00:31 / sld	10/03/12 09:32	ICP2-HE_121005B	60	18234
Cadmium	1.1	mg/kg		0.2		SW6020	10/10/12 04:45 / dck	10/03/12 09:32	ICPMS204-B_121008B	96	18234
Copper	145	mg/kg		5		SW6010B	10/06/12 00:31 / sld	10/03/12 09:32	ICP2-HE_121005B	60	18234
Lead	79	mg/kg		5		SW6010B	10/06/12 00:31 / sld	10/03/12 09:32	ICP2-HE_121005B	60	18234
Zinc	234	mg/kg		5		SW6010B	10/11/12 12:36 / sld	10/09/12 10:57	ICP2-HE_121011A	34	18308

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: RTC-1 Sediment Sieve 0.065-1mm
Collection Date: 09/12/12 14:15
DateReceived: 09/14/12
Lab ID: H12090228-048
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	55.4	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	29	R83591
3050 EXTRACTABLE METALS											
Arsenic	3	mg/kg		1		SW6020	10/10/12 04:50 / dck	10/03/12 09:32	ICPMS204-B_121008B	97	18234
Cadmium	ND	mg/kg		0.2		SW6020	10/10/12 04:50 / dck	10/03/12 09:32	ICPMS204-B_121008B	97	18234
Copper	11	mg/kg		5		SW6010B	10/06/12 00:35 / sld	10/03/12 09:32	ICP2-HE_121005B	61	18234
Lead	6	mg/kg		5		SW6010B	10/12/12 13:07 / sld	10/09/12 10:57	ICP2-HE_121012B	53	18308
Zinc	24	mg/kg		5		SW6010B	10/11/12 12:40 / sld	10/09/12 10:57	ICP2-HE_121011A	35	18308

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: RTC-1 Sediment Sieve 1-2mm
Collection Date: 09/12/12 14:15
DateReceived: 09/14/12
Lab ID: H12090228-049
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	26.7	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	30	R83591
3050 EXTRACTABLE METALS											
Arsenic	3	mg/kg		1		SW6020	10/10/12 04:54 / dck	10/03/12 09:32	ICPMS204-B_121008B	98	18234
Cadmium	ND	mg/kg		0.2		SW6020	10/10/12 04:54 / dck	10/03/12 09:32	ICPMS204-B_121008B	98	18234
Copper	ND	mg/kg		5		SW6010B	10/06/12 00:38 / sld	10/03/12 09:32	ICP2-HE_121005B	62	18234
Lead	ND	mg/kg		5		SW6010B	10/11/12 12:44 / sld	10/09/12 10:57	ICP2-HE_121011A	36	18308
Zinc	16	mg/kg		5		SW6010B	10/11/12 12:44 / sld	10/09/12 10:57	ICP2-HE_121011A	36	18308

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: LC-7 Sediment Sieve <0.065mm
Collection Date: 09/12/12 16:30
DateReceived: 09/14/12
Lab ID: H12090228-050
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	11.2	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	31	R83591
3050 EXTRACTABLE METALS											
Arsenic	28	mg/kg		1		SW6010B	10/06/12 00:42 / sld	10/03/12 09:32	ICP2-HE_121005B	63	18234
Cadmium	1.0	mg/kg		0.2		SW6020	10/10/12 05:17 / dck	10/03/12 09:32	ICPMS204-B_121008B	103	18234
Copper	202	mg/kg		5		SW6010B	10/06/12 00:42 / sld	10/03/12 09:32	ICP2-HE_121005B	63	18234
Lead	54	mg/kg		5		SW6010B	10/06/12 00:42 / sld	10/03/12 09:32	ICP2-HE_121005B	63	18234
Zinc	129	mg/kg		5		SW6010B	10/11/12 12:47 / sld	10/09/12 10:57	ICP2-HE_121011A	37	18308

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: LC-7 Sediment Sieve 0.065-1mm
Collection Date: 09/12/12 16:30
DateReceived: 09/14/12
Lab ID: H12090228-051
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	43.1	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	32	R83591
3050 EXTRACTABLE METALS											
Arsenic	9	mg/kg		1		SW6020	10/10/12 05:22 / dck	10/03/12 09:32	ICPMS204-B_121008B	104	18234
Cadmium	0.3	mg/kg		0.2		SW6020	10/10/12 05:22 / dck	10/03/12 09:32	ICPMS204-B_121008B	104	18234
Copper	52	mg/kg		5		SW6010B	10/06/12 00:46 / sld	10/03/12 09:32	ICP2-HE_121005B	64	18234
Lead	12	mg/kg		5		SW6010B	10/12/12 13:10 / sld	10/09/12 10:57	ICP2-HE_121012B	54	18308
Zinc	42	mg/kg		5		SW6010B	10/11/12 12:51 / sld	10/09/12 10:57	ICP2-HE_121011A	38	18308

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: LC-7 Sediment Sieve 1-2mm
Lab ID: H12090228-052
Matrix: Sediment

Project: CFR Monitoring-474374
Collection Date: 09/12/12 16:30
DateReceived: 09/14/12
Report Date: 10/26/12

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	9.4	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	33	R83591
3050 EXTRACTABLE METALS											
Arsenic	7	mg/kg		1		SW6020	10/10/12 05:26 / dck	10/03/12 09:32	ICPMS204-B_121008B	105	18234
Cadmium	ND	mg/kg		0.2		SW6020	10/10/12 05:26 / dck	10/03/12 09:32	ICPMS204-B_121008B	105	18234
Copper	26	mg/kg		5		SW6010B	10/06/12 00:49 / sld	10/03/12 09:32	ICP2-HE_121005B	65	18234
Lead	10	mg/kg		5		SW6010B	10/12/12 13:14 / sld	10/09/12 10:57	ICP2-HE_121012B	55	18308
Zinc	24	mg/kg		5		SW6010B	10/11/12 12:55 / sld	10/09/12 10:57	ICP2-HE_121011A	39	18308

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: 09/12/12 18:00
DateReceived: 09/14/12
Lab ID: H12090228-053
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	6.1	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	34	R83591
3050 EXTRACTABLE METALS											
Arsenic	73	mg/kg		1		SW6010B	10/08/12 17:11 / sld	10/03/12 09:32	ICP2-HE_121008B	51	18234
Cadmium	2.5	mg/kg		0.2		SW6010B	10/08/12 17:11 / sld	10/03/12 09:32	ICP2-HE_121008B	51	18234
Copper	519	mg/kg		5		SW6010B	10/08/12 17:11 / sld	10/03/12 09:32	ICP2-HE_121008B	51	18234
Lead	120	mg/kg		5		SW6010B	10/12/12 13:18 / sld	10/09/12 10:57	ICP2-HE_121012B	56	18308
Zinc	540	mg/kg		5		SW6010B	10/11/12 12:58 / sld	10/09/12 10:57	ICP2-HE_121011A	40	18308

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: 09/12/12 18:00
DateReceived: 09/14/12
Lab ID: H12090228-054
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	50.4	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	35	R83591
3050 EXTRACTABLE METALS											
Arsenic	40	mg/kg		1		SW6010B	10/08/12 17:49 / sld	10/03/12 09:32	ICP2-HE_121008B	61	18234
Cadmium	0.6	mg/kg		0.2		SW6020	10/10/12 05:35 / dck	10/03/12 09:32	ICPMS204-B_121008B	107	18234
Copper	172	mg/kg		5		SW6010B	10/08/12 17:49 / sld	10/03/12 09:32	ICP2-HE_121008B	61	18234
Lead	34	mg/kg		5		SW6010B	10/12/12 13:21 / sld	10/09/12 10:57	ICP2-HE_121012B	57	18308
Zinc	276	mg/kg		5		SW6010B	10/11/12 13:02 / sld	10/09/12 10:57	ICP2-HE_121011A	41	18308

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: 09/12/12 18:00
DateReceived: 09/14/12
Lab ID: H12090228-055
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	33.0	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	36	R83591
3050 EXTRACTABLE METALS											
Arsenic	22	mg/kg		1		SW6010B	10/16/12 18:04 / sld	10/11/12 08:52	ICP2-HE_121016D	48	18337
Cadmium	ND	mg/kg		0.2		SW6020	10/10/12 05:40 / dck	10/03/12 09:32	ICPMS204-B_121008B	108	18234
Copper	65	mg/kg		5		SW6010B	10/08/12 17:52 / sld	10/03/12 09:32	ICP2-HE_121008B	62	18234
Lead	14	mg/kg		5		SW6010B	10/11/12 13:06 / sld	10/09/12 10:57	ICP2-HE_121011A	42	18308
Zinc	217	mg/kg		5		SW6010B	10/11/12 13:06 / sld	10/09/12 10:57	ICP2-HE_121011A	42	18308

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: WSC-CFR Sediment Sieve <0.065mm
Collection Date: 09/13/12 10:00
DateReceived: 09/14/12
Lab ID: H12090228-056
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	12.5	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	37	R83591
3050 EXTRACTABLE METALS											
Arsenic	36	mg/kg		1		SW6010B	10/08/12 18:22 / sld	10/03/12 09:34	ICP2-HE_121008B	70	18235
Cadmium	1.3	mg/kg		0.2		SW6010B	10/08/12 18:22 / sld	10/03/12 09:34	ICP2-HE_121008B	70	18235
Copper	475	mg/kg		5		SW6010B	10/08/12 18:22 / sld	10/03/12 09:34	ICP2-HE_121008B	70	18235
Lead	67	mg/kg		5		SW6010B	10/08/12 18:22 / sld	10/03/12 09:34	ICP2-HE_121008B	70	18235
Zinc	158	mg/kg		5		SW6010B	10/08/12 18:22 / sld	10/03/12 09:34	ICP2-HE_121008B	70	18235

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: WSC-CFR Sediment Sieve 0.065-1mm
Collection Date: 09/13/12 10:00
DateReceived: 09/14/12
Lab ID: H12090228-057
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	72.7	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	38	R83591
3050 EXTRACTABLE METALS											
Arsenic	15	mg/kg		1		SW6010B	10/10/12 04:40 / sld	10/03/12 09:34	ICP2-HE_121009D	127	18235
Cadmium	0.4	mg/kg		0.2		SW6020	10/10/12 06:38 / dck	10/03/12 09:34	ICPMS204-B_121008B	121	18235
Copper	166	mg/kg		5		SW6010B	10/08/12 18:33 / sld	10/03/12 09:34	ICP2-HE_121008B	73	18235
Lead	25	mg/kg		5		SW6010B	10/08/12 18:33 / sld	10/03/12 09:34	ICP2-HE_121008B	73	18235
Zinc	111	mg/kg		5		SW6010B	10/08/12 18:33 / sld	10/03/12 09:34	ICP2-HE_121008B	73	18235

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: WSC-CFR Sediment Sieve 1-2mm
Collection Date: 09/13/12 10:00
DateReceived: 09/14/12
Lab ID: H12090228-058
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	3.3	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	39	R83591
3050 EXTRACTABLE METALS											
Arsenic	14	mg/kg		1		SW6010B	10/10/12 04:43 / sld	10/03/12 09:34	ICP2-HE_121009D	128	18235
Cadmium	0.2	mg/kg		0.2		SW6020	10/10/12 06:42 / dck	10/03/12 09:34	ICPMS204-B_121008B	122	18235
Copper	95	mg/kg		5		SW6010B	10/08/12 18:36 / sld	10/03/12 09:34	ICP2-HE_121008B	74	18235
Lead	11	mg/kg		5		SW6010B	10/08/12 18:36 / sld	10/03/12 09:34	ICP2-HE_121008B	74	18235
Zinc	57	mg/kg		5		SW6010B	10/08/12 18:36 / sld	10/03/12 09:34	ICP2-HE_121008B	74	18235

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: 09/13/12 11:30
DateReceived: 09/14/12
Lab ID: H12090228-059
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	0.9	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	40	R83591
3050 EXTRACTABLE METALS											
Arsenic	37	mg/kg	D	2		SW6010B	10/08/12 18:40 / sld	10/03/12 09:34	ICP2-HE_121008B	75	18235
Cadmium	2.4	mg/kg		0.2		SW6010B	10/08/12 18:40 / sld	10/03/12 09:34	ICP2-HE_121008B	75	18235
Copper	138	mg/kg		5		SW6010B	10/08/12 18:40 / sld	10/03/12 09:34	ICP2-HE_121008B	75	18235
Lead	141	mg/kg		5		SW6010B	10/08/12 18:40 / sld	10/03/12 09:34	ICP2-HE_121008B	75	18235
Zinc	425	mg/kg		5		SW6010B	10/08/12 18:40 / sld	10/03/12 09:34	ICP2-HE_121008B	75	18235

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: 09/13/12 11:30
DateReceived: 09/14/12
Lab ID: H12090228-060
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	28.3	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	41	R83591
3050 EXTRACTABLE METALS											
Arsenic	11	mg/kg		1		SW6010B	10/10/12 04:47 / sld	10/03/12 09:34	ICP2-HE_121009D	129	18235
Cadmium	0.5	mg/kg		0.2		SW6020	10/10/12 06:47 / dck	10/03/12 09:34	ICPMS204-B_121008B	123	18235
Copper	33	mg/kg		5		SW6010B	10/08/12 18:44 / sld	10/03/12 09:34	ICP2-HE_121008B	76	18235
Lead	15	mg/kg		5		SW6010B	10/08/12 18:44 / sld	10/03/12 09:34	ICP2-HE_121008B	76	18235
Zinc	130	mg/kg		5		SW6010B	10/08/12 18:44 / sld	10/03/12 09:34	ICP2-HE_121008B	76	18235

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: 09/13/12 11:30
DateReceived: 09/14/12
Lab ID: H12090228-061
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	21.2	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	42	R83591
3050 EXTRACTABLE METALS											
Arsenic	14	mg/kg		1		SW6010B	10/10/12 04:58 / sld	10/03/12 09:34	ICP2-HE_121009D	132	18235
Cadmium	0.3	mg/kg		0.2		SW6020	10/10/12 06:52 / dck	10/03/12 09:34	ICPMS204-B_121008B	124	18235
Copper	26	mg/kg		5		SW6010B	10/08/12 18:47 / sld	10/03/12 09:34	ICP2-HE_121008B	77	18235
Lead	11	mg/kg		5		SW6010B	10/08/12 18:47 / sld	10/03/12 09:34	ICP2-HE_121008B	77	18235
Zinc	92	mg/kg		5		SW6010B	10/08/12 18:47 / sld	10/03/12 09:34	ICP2-HE_121008B	77	18235

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: MWB-SBC Sediment Sieve <0.065mm
Collection Date: 09/13/12 13:00
DateReceived: 09/14/12
Lab ID: H12090228-062
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	1.4	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	43	R83591
3050 EXTRACTABLE METALS											
Arsenic	78	mg/kg	D	2		SW6010B	10/08/12 18:51 / sld	10/03/12 09:34	ICP2-HE_121008B	78	18235
Cadmium	2.1	mg/kg		0.2		SW6010B	10/08/12 18:51 / sld	10/03/12 09:34	ICP2-HE_121008B	78	18235
Copper	123	mg/kg		5		SW6010B	10/08/12 18:51 / sld	10/03/12 09:34	ICP2-HE_121008B	78	18235
Lead	115	mg/kg		5		SW6010B	10/08/12 18:51 / sld	10/03/12 09:34	ICP2-HE_121008B	78	18235
Zinc	328	mg/kg		5		SW6010B	10/08/12 18:51 / sld	10/03/12 09:34	ICP2-HE_121008B	78	18235

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: MWB-SBC Sediment Sieve 0.065-1mm
Collection Date: 09/13/12 13:00
DateReceived: 09/14/12
Lab ID: H12090228-063
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	38.6	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	44	R83591
3050 EXTRACTABLE METALS											
Arsenic	9	mg/kg		1		SW6010B	10/10/12 05:02 / sld	10/03/12 09:34	ICP2-HE_121009D	133	18235
Cadmium	0.3	mg/kg		0.2		SW6020	10/10/12 06:56 / dck	10/03/12 09:34	ICPMS204-B_121008B	125	18235
Copper	12	mg/kg		5		SW6010B	10/08/12 18:55 / sld	10/03/12 09:34	ICP2-HE_121008B	79	18235
Lead	9	mg/kg		5		SW6010B	10/08/12 18:55 / sld	10/03/12 09:34	ICP2-HE_121008B	79	18235
Zinc	57	mg/kg		5		SW6010B	10/08/12 18:55 / sld	10/03/12 09:34	ICP2-HE_121008B	79	18235

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: MWB-SBC Sediment Sieve 1-2mm
Collection Date: 09/13/12 13:00
DateReceived: 09/14/12
Lab ID: H12090228-064
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	29.6	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	45	R83591
3050 EXTRACTABLE METALS											
Arsenic	12	mg/kg		1		SW6010B	10/10/12 05:06 / sld	10/03/12 09:34	ICP2-HE_121009D	134	18235
Cadmium	ND	mg/kg		0.2		SW6020	10/10/12 07:01 / dck	10/03/12 09:34	ICPMS204-B_121008B	126	18235
Copper	11	mg/kg		5		SW6010B	10/08/12 18:58 / sld	10/03/12 09:34	ICP2-HE_121008B	80	18235
Lead	9	mg/kg		5		SW6010B	10/08/12 18:58 / sld	10/03/12 09:34	ICP2-HE_121008B	80	18235
Zinc	41	mg/kg		5		SW6010B	10/08/12 18:58 / sld	10/03/12 09:34	ICP2-HE_121008B	80	18235

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: MCWC-MWB Sediment Sieve <0.065mm
Collection Date: 09/13/12 15:00
DateReceived: 09/14/12
Lab ID: H12090228-065
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	1.9	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	46	R83591
3050 EXTRACTABLE METALS											
Arsenic	48	mg/kg		1		SW6010B	10/08/12 19:02 / sld	10/03/12 09:34	ICP2-HE_121008B	81	18235
Cadmium	2.1	mg/kg		0.2		SW6010B	10/08/12 19:02 / sld	10/03/12 09:34	ICP2-HE_121008B	81	18235
Copper	193	mg/kg		5		SW6010B	10/08/12 19:02 / sld	10/03/12 09:34	ICP2-HE_121008B	81	18235
Lead	141	mg/kg		5		SW6010B	10/08/12 19:02 / sld	10/03/12 09:34	ICP2-HE_121008B	81	18235
Zinc	255	mg/kg		5		SW6010B	10/08/12 19:02 / sld	10/03/12 09:34	ICP2-HE_121008B	81	18235

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: MCWC-MWB Sediment Sieve 0.065-1mm
Collection Date: 09/13/12 15:00
DateReceived: 09/14/12
Lab ID: H12090228-066
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	56.4	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	47	R83591
3050 EXTRACTABLE METALS											
Arsenic	11	mg/kg		1		SW6010B	10/10/12 05:09 / sld	10/03/12 09:34	ICP2-HE_121009D	135	18235
Cadmium	ND	mg/kg		0.2		SW6020	10/10/12 07:05 / dck	10/03/12 09:34	ICPMS204-B_121008B	127	18235
Copper	18	mg/kg		5		SW6010B	10/08/12 19:06 / sld	10/03/12 09:34	ICP2-HE_121008B	82	18235
Lead	10	mg/kg		5		SW6010B	10/08/12 19:06 / sld	10/03/12 09:34	ICP2-HE_121008B	82	18235
Zinc	41	mg/kg		5		SW6010B	10/08/12 19:06 / sld	10/03/12 09:34	ICP2-HE_121008B	82	18235

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: MCWC-MWB Sediment Sieve 1-2mm
Collection Date: 09/13/12 15:00
DateReceived: 09/14/12
Lab ID: H12090228-067
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	22.8	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	48	R83591
3050 EXTRACTABLE METALS											
Arsenic	9	mg/kg		1		SW6010B	10/08/12 19:17 / sld	10/03/12 09:34	ICP2-HE_121008B	85	18235
Cadmium	ND	mg/kg		0.2		SW6020	10/10/12 07:28 / dck	10/03/12 09:34	ICPMS204-B_121008B	132	18235
Copper	6	mg/kg		5		SW6010B	10/08/12 19:17 / sld	10/03/12 09:34	ICP2-HE_121008B	85	18235
Lead	8	mg/kg		5		SW6010B	10/12/12 12:52 / sld	10/03/12 09:34	ICP2-HE_121012B	49	18235
Zinc	19	mg/kg		5		SW6010B	10/08/12 19:17 / sld	10/03/12 09:34	ICP2-HE_121008B	85	18235

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: MCWC-MWB Duplicate Sediment Sieve <0.065mm
Collection Date: 09/13/12 15:00
DateReceived: 09/14/12
Lab ID: H12090228-068
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	1.7	wt% Passed		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	49	R83591
3050 EXTRACTABLE METALS											
Arsenic	51	mg/kg		1		SW6010B	10/08/12 19:20 / sld	10/03/12 09:34	ICP2-HE_121008B	86	18235
Cadmium	2.3	mg/kg		0.2		SW6010B	10/08/12 19:20 / sld	10/03/12 09:34	ICP2-HE_121008B	86	18235
Copper	195	mg/kg		5		SW6010B	10/08/12 19:20 / sld	10/03/12 09:34	ICP2-HE_121008B	86	18235
Lead	159	mg/kg		5		SW6010B	10/08/12 19:20 / sld	10/03/12 09:34	ICP2-HE_121008B	86	18235
Zinc	248	mg/kg		5		SW6010B	10/08/12 19:20 / sld	10/03/12 09:34	ICP2-HE_121008B	86	18235

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: MCWC-MWB Duplicate Sediment Sieve 0.065-1mm
Collection Date: 09/13/12 15:00
DateReceived: 09/14/12
Lab ID: H12090228-069
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 230 Sieve	52.4	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	50	R83591
3050 EXTRACTABLE METALS											
Arsenic	11	mg/kg		1		SW6010B	10/08/12 19:24 / sld	10/03/12 09:34	ICP2-HE_121008B	87	18235
Cadmium	0.2	mg/kg		0.2		SW6020	10/10/12 07:32 / dck	10/03/12 09:34	ICPMS204-B_121008B	133	18235
Copper	19	mg/kg		5		SW6010B	10/08/12 19:24 / sld	10/03/12 09:34	ICP2-HE_121008B	87	18235
Lead	12	mg/kg		5		SW6010B	10/10/12 05:17 / sld	10/03/12 09:34	ICP2-HE_121009D	137	18235
Zinc	45	mg/kg		5		SW6010B	10/08/12 19:24 / sld	10/03/12 09:34	ICP2-HE_121008B	87	18235

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: MCWC-MWB Duplicate Sediment Sieve 1-2mm
Collection Date: 09/13/12 15:00
DateReceived: 09/14/12
Lab ID: H12090228-070
Report Date: 10/26/12
Matrix: Sediment

Analyses	Result	Units	Qualifiers	RL	MDL	Method	Analysis Date / By	Prep Date	RunID	Run Order	BatchID
PHYSICAL CHARACTERISTICS											
No. 18 Sieve, Retained	26.1	wt% retained		0.1		ASA15-2	10/02/12 14:12 / rgk		MISC SOILS_121002A	51	R83591
3050 EXTRACTABLE METALS											
Arsenic	7	mg/kg		1		SW6010B	10/08/12 19:28 / sld	10/03/12 09:34	ICP2-HE_121008B	88	18235
Cadmium	ND	mg/kg		0.2		SW6020	10/10/12 07:37 / dck	10/03/12 09:34	ICPMS204-B_121008B	134	18235
Copper	6	mg/kg		5		SW6010B	10/08/12 19:28 / sld	10/03/12 09:34	ICP2-HE_121008B	88	18235
Lead	9	mg/kg		5		SW6010B	10/10/12 05:20 / sld	10/03/12 09:34	ICP2-HE_121009D	138	18235
Zinc	20	mg/kg		5		SW6010B	10/08/12 19:28 / sld	10/03/12 09:34	ICP2-HE_121008B	88	18235

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

Client: MT DEQ-Federal Superfund
Work Order: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 17987

Run ID :Run Order: **ICP2-HE_120918A: 57** SampType: **Method Blank** Sample ID: **MB-17987** Method: **E200.7**
Analysis Date: **09/18/12 14:00** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** Prep Method: **E200.2**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	0.05	0.01									
Magnesium	ND	0.005									

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

Run ID :Run Order: **ICP2-HE_120918A: 58** SampType: **Laboratory Control Sample** Sample ID: **LCS-17987** Method: **E200.7**
Analysis Date: **09/18/12 14:04** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** Prep Method: **E200.2**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	25.7	1.0	25	0.05245	103	85	115				
Magnesium	26.8	1.0	25		107	85	115				

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

Run ID :Run Order: **ICP2-HE_120918A: 62** SampType: **Sample Matrix Spike** Sample ID: **H12090228-002DMS3** Method: **E200.7**
Analysis Date: **09/18/12 14:19** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** Prep Method: **E200.2**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	41.0	1.0	25	16.71	97	70	130				
Magnesium	30.5	1.0	25	5.562	100	70	130				

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

Run ID :Run Order: **ICP2-HE_120918A: 63** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-002DMSD3** Method: **E200.7**
Analysis Date: **09/18/12 14:23** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** Prep Method: **E200.2**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	41.1	1.0	25	16.71	98	70	130	41.03	0.2	20	
Magnesium	30.7	1.0	25	5.562	100	70	130	30.53	0.5	20	

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 17987

Run ID :Run Order: **ICP2-HE_120918A: 85** SampType: **Sample Matrix Spike** Sample ID: **H12090228-013DMS3** Method: **E200.7**

Analysis Date: **09/18/12 15:46** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** Prep Method: **E200.2**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	81.0	1.0	25	57.36	95	70	130				
Magnesium	36.3	1.0	25	12.25	96	70	130				

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

Run ID :Run Order: **ICP2-HE_120918A: 88** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-013DMSD3** Method: **E200.7**

Analysis Date: **09/18/12 15:57** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** Prep Method: **E200.2**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	85.2	1.0	25	57.36	111	70	130	80.98	5.1	20	
Magnesium	39.0	1.0	25	12.25	107	70	130	36.26	7.3	20	

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 17987

Run ID :Run Order: **ICPMS204-B_120917A: 259** SampType: **Method Blank** Sample ID: **MB-17987** Method: **E200.8**

Analysis Date: **09/19/12 05:29** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** Prep Method: **E200.2**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	4E-05	3E-05									
Cadmium	ND	2E-05									
Copper	0.0004	0.0003									
Lead	ND	2E-05									
Zinc	0.002	0.0007									

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 260** SampType: **Laboratory Control Sample** Sample ID: **LCS-17987** Method: **E200.8**

Analysis Date: **09/19/12 05:34** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** Prep Method: **E200.2**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.507	0.0010	0.5	0.0000411	101	85	115				
Cadmium	0.263	0.0010	0.25		105	85	115				
Copper	0.510	0.0050	0.5	0.0004	102	85	115				
Lead	0.535	0.0010	0.5		107	85	115				
Zinc	0.507	0.010	0.5	0.002304	101	85	115				

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 266** SampType: **Sample Matrix Spike** Sample ID: **H12090228-002DMS3** Method: **E200.8**

Analysis Date: **09/19/12 06:02** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** Prep Method: **E200.2**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.497	0.0010	0.5	0.0006998	99	70	130				
Cadmium	0.256	0.0010	0.25		102	70	130				
Copper	0.496	0.0050	0.5	0.0006631	99	70	130				
Lead	0.522	0.0010	0.5	0.0000477	104	70	130				
Zinc	0.491	0.010	0.5	0.002644	98	70	130				

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 17987

Run ID :Run Order: **ICPMS204-B_120917A: 267** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-002DMSD3** Method: **E200.8**

Analysis Date: **09/19/12 06:06** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** Prep Method: **E200.2**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.499	0.0010	0.5	0.0006998	100	70	130	0.4966	0.5	20	
Cadmium	0.260	0.0010	0.25		104	70	130	0.2559	1.4	20	
Copper	0.496	0.0050	0.5	0.0006631	99	70	130	0.4955	0.1	20	
Lead	0.535	0.0010	0.5	0.0000477	107	70	130	0.5221	2.5	20	
Zinc	0.496	0.010	0.5	0.002644	99	70	130	0.4911	0.9	20	

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 307** SampType: **Sample Matrix Spike** Sample ID: **H12090228-013DMS3** Method: **E200.8**

Analysis Date: **09/19/12 09:14** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** Prep Method: **E200.2**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.520	0.0010	0.5	0.02115	100	70	130				
Cadmium	0.252	0.0010	0.25	0.0000576	101	70	130				
Copper	0.505	0.0050	0.5	0.008052	99	70	130				
Lead	0.524	0.0010	0.5	0.0007927	105	70	130				
Zinc	0.500	0.010	0.5	0.009235	98	70	130				

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 308** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-013DMSD3** Method: **E200.8**

Analysis Date: **09/19/12 09:18** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** Prep Method: **E200.2**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.517	0.0010	0.5	0.02115	99	70	130	0.5197	0.5	20	
Cadmium	0.255	0.0010	0.25	0.0000576	102	70	130	0.2523	0.9	20	
Copper	0.500	0.0050	0.5	0.008052	98	70	130	0.5049	1.0	20	
Lead	0.524	0.0010	0.5	0.0007927	105	70	130	0.5236	0.0	20	
Zinc	0.496	0.010	0.5	0.009235	97	70	130	0.4997	0.7	20	

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18001

Run ID :Run Order: **ACCU-124 (14410200)_120917A: 1** SampType: **Method Blank** Sample ID: **MB-18001** Method: **A2540 D**

Analysis Date: **09/17/12 14:51** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** 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	2									

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A**

Run ID :Run Order: **ACCU-124 (14410200)_120917A: 2** SampType: **Laboratory Control Sample** Sample ID: **LCS-18001** Method: **A2540 D**

Analysis Date: **09/17/12 14:51** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** 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	1940	10	2000		97	70	130				

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A**

Run ID :Run Order: **ACCU-124 (14410200)_120917A: 4** SampType: **Sample Duplicate** Sample ID: **H12090224-001ADUP** Method: **A2540 D**

Analysis Date: **09/17/12 14:52** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** 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	8.00	10						4		5	

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A**

Run ID :Run Order: **ACCU-124 (14410200)_120917A: 15** SampType: **Sample Duplicate** Sample ID: **H12090225-008ADUP** Method: **A2540 D**

Analysis Date: **09/17/12 14:54** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** 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	9.00	10						8		5	

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18002

Run ID :Run Order: **ACCU-124 (14410200)_120917A: 25** SampType: **Method Blank** Sample ID: **MB-18002** Method: **A2540 D**

Analysis Date: **09/17/12 14:57** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** 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	2									

Associated samples: **H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **ACCU-124 (14410200)_120917A: 26** SampType: **Laboratory Control Sample** Sample ID: **LCS-18002** Method: **A2540 D**

Analysis Date: **09/17/12 14:57** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** 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	2150	10	2000		107	70	130				

Associated samples: **H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **ACCU-124 (14410200)_120917A: 28** SampType: **Sample Duplicate** Sample ID: **H12090228-010ADUP** Method: **A2540 D**

Analysis Date: **09/17/12 14:58** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** 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						4		5	

Associated samples: **H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **ACCU-124 (14410200)_120917A: 39** SampType: **Sample Duplicate** Sample ID: **H12090230-001ADUP** Method: **A2540 D**

Analysis Date: **09/17/12 15:00** Units: **mg/L** **Prep Info:** Prep Date: **9/17/2012** 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: **H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18041

Run ID :Run Order: **FIA203-HE_120919A: 79** SampType: **Method Blank** Sample ID: **MB-18041** Method: **A4500 N-C**
Analysis Date: **09/19/12 15:00** Units: **mg/L** **Prep Info:** Prep Date: **9/19/2012** 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	ND	0.03									

Associated samples: **H12090228-001B; H12090228-002B; H12090228-003B; H12090228-004B; H12090228-005B; H12090228-006B; H12090228-007B; H12090228-008B**

Run ID :Run Order: **FIA203-HE_120919A: 80** SampType: **Laboratory Control Sample** Sample ID: **LCS-18041** Method: **A4500 N-C**
Analysis Date: **09/19/12 15:02** Units: **mg/L** **Prep Info:** Prep Date: **9/19/2012** 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	21.6	0.20	22.6		96	90	110				

Associated samples: **H12090228-001B; H12090228-002B; H12090228-003B; H12090228-004B; H12090228-005B; H12090228-006B; H12090228-007B; H12090228-008B**

Run ID :Run Order: **FIA203-HE_120919A: 84** SampType: **Sample Matrix Spike** Sample ID: **H12090219-005AMS** Method: **A4500 N-C**
Analysis Date: **09/19/12 15:06** 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, Total	1.41	0.10	1	0.514	89	90	110				S

Associated samples: **H12090228-001B; H12090228-002B; H12090228-003B; H12090228-004B; H12090228-005B; H12090228-006B; H12090228-007B; H12090228-008B**

Run ID :Run Order: **FIA203-HE_120919A: 85** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090219-005AMSD** Method: **A4500 N-C**
Analysis Date: **09/19/12 15:08** 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	1.40	0.10	1	0.514	89	90	110	1.406	0.1	20	S

Associated samples: **H12090228-001B; H12090228-002B; H12090228-003B; H12090228-004B; H12090228-005B; H12090228-006B; H12090228-007B; H12090228-008B**

Run ID :Run Order: **FIA203-HE_120919A: 96** SampType: **Sample Matrix Spike** Sample ID: **H12090228-001BMS** Method: **A4500 N-C**
Analysis Date: **09/19/12 15:21** 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	1.16	0.10	1	0.1354	103	90	110				

Associated samples: **H12090228-001B; H12090228-002B; H12090228-003B; H12090228-004B; H12090228-005B; H12090228-006B; H12090228-007B; H12090228-008B**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: 18041

Date: *29-Oct-12*

Run ID :Run Order: **FIA203-HE_120919A: 97** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-001BMSD** Method: **A4500 N-C**

Analysis Date: **09/19/12 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
Nitrogen, Total	1.16	0.10	1	0.1354	102	90	110	1.162	0.4	20	

Associated samples: **H12090228-001B; H12090228-002B; H12090228-003B; H12090228-004B; H12090228-005B; H12090228-006B; H12090228-007B; H12090228-008B**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18054

Run ID :Run Order: **FIA202-HE_120920A: 9** SampType: **Laboratory Control Sample** Sample ID: **LCS-18054** Method: **E365.1**
Analysis Date: **09/20/12 14:25** Units: **mg/L** **Prep Info:** Prep Date: **9/20/2012** 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	4.14	0.010	4.16		99	90	110				

Associated samples: **H12090228-001E; H12090228-002E**

Run ID :Run Order: **FIA202-HE_120920A: 25** SampType: **Method Blank** Sample ID: **MB-18054** Method: **E365.1**
Analysis Date: **09/20/12 14:41** Units: **mg/L** **Prep Info:** Prep Date: **9/20/2012** 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: **H12090228-001E; H12090228-002E**

Run ID :Run Order: **FIA202-HE_120920A: 39** SampType: **Sample Matrix Spike** Sample ID: **H12090214-001FMS** Method: **E365.1**
Analysis Date: **09/20/12 14:56** Units: **mg/L** **Prep Info:** Prep Date: **9/20/2012** 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	0.194	0.010	0.2		97	90	110				

Associated samples: **H12090228-001E; H12090228-002E**

Run ID :Run Order: **FIA202-HE_120920A: 40** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090214-001FMSD** Method: **E365.1**
Analysis Date: **09/20/12 14:57** Units: **mg/L** **Prep Info:** Prep Date: **9/20/2012** 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	0.194	0.010	0.2		97	90	110	0.1939	0.2	20	

Associated samples: **H12090228-001E; H12090228-002E**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18056

Run ID :Run Order: **FIA202-HE_120920A: 47** SampType: **Method Blank** Sample ID: **MB-18056** Method: **E365.1**
Analysis Date: **09/20/12 15:04** Units: **mg/L** **Prep Info:** Prep Date: **9/20/2012** 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: **H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E**

Run ID :Run Order: **FIA202-HE_120920A: 48** SampType: **Laboratory Control Sample** Sample ID: **LCS-18056** Method: **E365.1**
Analysis Date: **09/20/12 15:05** Units: **mg/L** **Prep Info:** Prep Date: **9/20/2012** 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	4.24	0.010	4.16		102	90	110				

Associated samples: **H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E**

Run ID :Run Order: **FIA202-HE_120920A: 54** SampType: **Sample Matrix Spike** Sample ID: **H12090228-007EMS** Method: **E365.1**
Analysis Date: **09/20/12 15:11** 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	0.193	0.010	0.2		97	90	110				

Associated samples: **H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E**

Run ID :Run Order: **FIA202-HE_120920A: 55** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-007EMSD** Method: **E365.1**
Analysis Date: **09/20/12 15:12** 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	0.1933	0.2	20	

Associated samples: **H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18111

Run ID :Run Order: **FIA203-HE_120925A: 12** SampType: **Method Blank** Sample ID: **MB-18111** Method: **A4500 N-C**
Analysis Date: **09/25/12 11:00** Units: **mg/L** **Prep Info:** Prep Date: **9/25/2012** 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	ND	0.03									

Associated samples: **H12090228-009B; H12090228-010B; H12090228-011B; H12090228-012B; H12090228-013B; H12090228-014B; H12090228-015B; H12090228-016B; H12090228-017B; H12090228-018B; H12090228-019B**

Run ID :Run Order: **FIA203-HE_120925A: 13** SampType: **Laboratory Control Sample** Sample ID: **LCS-18111** Method: **A4500 N-C**
Analysis Date: **09/25/12 11:02** Units: **mg/L** **Prep Info:** Prep Date: **9/25/2012** 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	22.4	0.20	22.6		99	90	110				

Associated samples: **H12090228-009B; H12090228-010B; H12090228-011B; H12090228-012B; H12090228-013B; H12090228-014B; H12090228-015B; H12090228-016B; H12090228-017B; H12090228-018B; H12090228-019B**

Run ID :Run Order: **FIA203-HE_120925A: 22** SampType: **Sample Matrix Spike** Sample ID: **H12090228-009BMS** Method: **A4500 N-C**
Analysis Date: **09/25/12 11:12** Units: **mg/L** **Prep Info:** Prep Date: **9/25/2012** 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	1.09	0.10	1	0.1244	96	90	110				

Associated samples: **H12090228-009B; H12090228-010B; H12090228-011B; H12090228-012B; H12090228-013B; H12090228-014B; H12090228-015B; H12090228-016B; H12090228-017B; H12090228-018B; H12090228-019B**

Run ID :Run Order: **FIA203-HE_120925A: 23** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-009BMSD** Method: **A4500 N-C**
Analysis Date: **09/25/12 11:13** Units: **mg/L** **Prep Info:** Prep Date: **9/25/2012** 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	1.09	0.10	1	0.1244	97	90	110	1.088	0.5	20	

Associated samples: **H12090228-009B; H12090228-010B; H12090228-011B; H12090228-012B; H12090228-013B; H12090228-014B; H12090228-015B; H12090228-016B; H12090228-017B; H12090228-018B; H12090228-019B**

Run ID :Run Order: **FIA203-HE_120925A: 36** SampType: **Sample Matrix Spike** Sample ID: **H12090228-019BMS** Method: **A4500 N-C**
Analysis Date: **09/25/12 11:29** Units: **mg/L** **Prep Info:** Prep Date: **9/25/2012** 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	0.982	0.10	1		98	90	110				

Associated samples: **H12090228-009B; H12090228-010B; H12090228-011B; H12090228-012B; H12090228-013B; H12090228-014B; H12090228-015B; H12090228-016B; H12090228-017B; H12090228-018B; H12090228-019B**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: 18111

Date: *29-Oct-12*

Run ID :Run Order: **FIA203-HE_120925A: 37** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-019BMSD** Method: **A4500 N-C**

Analysis Date: **09/25/12 11:30** Units: **mg/L** **Prep Info:** Prep Date: **9/25/2012** 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	0.984	0.10	1		98	90	110	0.9821	0.2	20	

Associated samples: **H12090228-009B; H12090228-010B; H12090228-011B; H12090228-012B; H12090228-013B; H12090228-014B; H12090228-015B; H12090228-016B; H12090228-017B; H12090228-018B; H12090228-019B**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18114

Run ID :Run Order: **FIA202-HE_120925A: 9** SampType: **Laboratory Control Sample** Sample ID: **LCS-18114** Method: **E365.1**
Analysis Date: **09/25/12 14:39** Units: **mg/L** **Prep Info:** Prep Date: **9/25/2012** 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	4.24	0.010	4.16		102	90	110				

Associated samples: **H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA202-HE_120925A: 14** SampType: **Method Blank** Sample ID: **MB-18114** Method: **E365.1**
Analysis Date: **09/25/12 14:44** Units: **mg/L** **Prep Info:** Prep Date: **9/25/2012** 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: **H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA202-HE_120925A: 16** SampType: **Sample Matrix Spike** Sample ID: **H12090228-013EMS** Method: **E365.1**
Analysis Date: **09/25/12 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
Phosphorus, Total as P	0.229	0.010	0.2	0.03526	97	90	110				

Associated samples: **H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA202-HE_120925A: 17** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-013EMSD** Method: **E365.1**
Analysis Date: **09/25/12 14:47** 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
Phosphorus, Total as P	0.234	0.010	0.2	0.03526	99	90	110	0.2291	2.1	20	

Associated samples: **H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA202-HE_120925A: 31** SampType: **Sample Matrix Spike** Sample ID: **H12090240-004CMS** Method: **E365.1**
Analysis Date: **09/25/12 15:02** 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	0.212	0.010	0.2	0.02208	95	90	110				

Associated samples: **H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: 18114

Date: *29-Oct-12*

Run ID :Run Order: **FIA202-HE_120925A: 32** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090240-004CMSD** Method: **E365.1**

Analysis Date: **09/25/12 15:03** 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
Phosphorus, Total as P	0.217	0.010	0.2	0.02208	97	90	110	0.2121	2.2	20	

Associated samples: **H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18230

Run ID :Run Order: **ICP2-HE_121004B: 45** SampType: **Method Blank** Sample ID: **MB-18230** Method: **SW6010B**
Analysis Date: **10/04/12 14:56** Units: **mg/kg** **Prep Info:** Prep Date: **10/2/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	ND	0.01									
Copper	ND	0.2									
Lead	ND	1									
Zinc	0.1	0.1									

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-034A; H12090228-035A; H12090228-036A; H12090228-037A**

Run ID :Run Order: **ICP2-HE_121004B: 48** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-18230** Method: **SW6010B**
Analysis Date: **10/04/12 15:07** Units: **mg/kg** **Prep Info:** Prep Date: **10/2/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	24.3	1.0	25		97	80	120				
Copper	52.4	1.0	50		105	80	120				
Lead	50.8	1.0	50		102	80	120				
Zinc	50.6	1.0	50	0.1495	101	80	120				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-034A; H12090228-035A; H12090228-036A; H12090228-037A**

Run ID :Run Order: **ICP2-HE_121004B: 49** SampType: **Laboratory Control Sample** Sample ID: **LCS-18230** Method: **SW6010B**
Analysis Date: **10/04/12 15:11** Units: **mg/kg** **Prep Info:** Prep Date: **10/2/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	113	1.0	135.6		83	73	105.1				
Copper	252	1.0	277.2		91	77.5	109.6				
Lead	166	3.1	185.1		90	75.9	108.6				
Zinc	183	1.0	210.9	0.1495	87	74.2	109.9				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-034A; H12090228-035A; H12090228-036A; H12090228-037A**

Run ID :Run Order: **ICP2-HE_121004B: 74** SampType: **Sample Matrix Spike** Sample ID: **H12090228-037AMS** Method: **SW6010B**
Analysis Date: **10/04/12 16:43** Units: **mg/kg** **Prep Info:** Prep Date: **10/2/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	11.7	1.0	12.44	0.9908	86	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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18230

Run ID :Run Order: **ICP2-HE_121004B: 74** SampType: **Sample Matrix Spike** Sample ID: **H12090228-037AMS** Method: **SW6010B**

Analysis Date: **10/04/12 16:43** Units: **mg/kg** **Prep Info:** Prep Date: **10/2/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Copper	93.3	1.0	24.88	161		75	125				A
Lead	37.5	1.5	24.88	18.03	78	75	125				
Zinc	125	1.0	24.88	365.7		75	125				A

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-034A; H12090228-035A; H12090228-036A; H12090228-037A**

Run ID :Run Order: **ICP2-HE_121004B: 75** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-037AMSD** Method: **SW6010B**

Analysis Date: **10/04/12 16:47** Units: **mg/kg** **Prep Info:** Prep Date: **10/2/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	11.0	1.0	12.44	0.9908	81	75	125	11.73	6.4	20	
Copper	108	1.0	24.88	161		75	125	93.29	15	20	A
Lead	40.7	1.5	24.88	18.03	91	75	125	37.55	8.1	20	
Zinc	125	1.0	24.88	365.7		75	125	124.6	0.1	20	A

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-034A; H12090228-035A; H12090228-036A; H12090228-037A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18230

Run ID :Run Order: **ICPMS204-B_121008B: 43** SampType: **Method Blank** Sample ID: **MB-18230** Method: **SW6020**
Analysis Date: **10/10/12 00:45** Units: **mg/kg** **Prep Info:** Prep Date: **10/2/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	0.04	0.003									

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-034A; H12090228-036A**

Run ID :Run Order: **ICPMS204-B_121008B: 44** SampType: **Laboratory Control Sample** Sample ID: **LCS-18230** Method: **SW6020**
Analysis Date: **10/10/12 00:50** Units: **mg/kg** **Prep Info:** Prep Date: **10/2/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	131	1.0	135.6	0.04332	96	73	105.1				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-034A; H12090228-036A**

Run ID :Run Order: **ICPMS204-B_121008B: 45** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-18230** Method: **SW6020**
Analysis Date: **10/10/12 00:54** Units: **mg/kg** **Prep Info:** Prep Date: **10/2/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	29.6	1.0	25	0.04332	118	80	120				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-034A; H12090228-036A**

Run ID :Run Order: **ICPMS204-B_121008B: 75** SampType: **Sample Matrix Spike** Sample ID: **H12090228-037AMS** Method: **SW6020**
Analysis Date: **10/10/12 03:10** Units: **mg/kg** **Prep Info:** Prep Date: **10/2/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	13.4	1.0	12.44	1.303	97	75	125				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-034A; H12090228-036A**

Run ID :Run Order: **ICPMS204-B_121008B: 76** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-037AMSD** Method: **SW6020**
Analysis Date: **10/10/12 03:15** Units: **mg/kg** **Prep Info:** Prep Date: **10/2/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	13.3	1.0	12.44	1.303	96	75	125	13.42	0.8	20	

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-034A; H12090228-036A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18234

Run ID :Run Order: **ICP2-HE_121005B: 46** SampType: **Method Blank** Sample ID: **MB-18234** Method: **SW6010B**
Analysis Date: **10/05/12 23:39** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.4									
Cadmium	0.02	0.01									
Copper	ND	0.2									
Lead	ND	1									

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-043A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121005B: 47** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-18234** Method: **SW6010B**
Analysis Date: **10/05/12 23:43** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	46.8	1.0	50		94	80	120				
Cadmium	22.9	1.0	25	0.02	91	80	120				
Copper	49.9	1.0	50		100	80	120				
Lead	46.6	1.0	50		93	80	120				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-043A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121005B: 48** SampType: **Laboratory Control Sample** Sample ID: **LCS-18234** Method: **SW6010B**
Analysis Date: **10/05/12 23:47** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	280	1.5	339.6		82	72.3	106.4				
Cadmium	120	1.0	135.6	0.02	88	73	105.1				
Copper	255	1.0	277.2		92	77.5	109.6				
Lead	177	3.1	185.1		96	75.9	108.6				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-043A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121008B: 33** SampType: **Method Blank** Sample ID: **MB-18234** Method: **SW6010B**
Analysis Date: **10/08/12 16:05** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.4									

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18234

Run ID :Run Order: **ICP2-HE_121008B: 33** SampType: **Method Blank** Sample ID: **MB-18234** Method: **SW6010B**
Analysis Date: **10/08/12 16:05** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	ND	0.01									
Copper	ND	0.2									

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-043A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121008B: 34** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-18234** Method: **SW6010B**
Analysis Date: **10/08/12 16:09** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	47.9	1.0	50		96	80	120				
Cadmium	22.9	1.0	25		91	80	120				
Copper	50.3	1.0	50		101	80	120				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-043A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121008B: 35** SampType: **Laboratory Control Sample** Sample ID: **LCS-18234** Method: **SW6010B**
Analysis Date: **10/08/12 16:13** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	289	1.5	339.6		85	72.3	106.4				
Cadmium	123	1.0	135.6		91	73	105.1				
Copper	252	1.0	277.2		91	77.5	109.6				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-043A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121008B: 65** SampType: **Sample Matrix Spike** Sample ID: **H12090228-055AMS** Method: **SW6010B**
Analysis Date: **10/08/12 18:03** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	42.2	1.0	24.75	14.11	113	75	125				
Cadmium	12.2	1.0	12.38	0.1292	97	75	125				
Copper	97.9	1.0	24.75	65.38	131	75	125				S
Lead	45.6	1.5	24.75	9.817	144	75	125				S

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18234

Run ID :Run Order: **ICP2-HE_121008B: 65** SampType: **Sample Matrix Spike** Sample ID: **H12090228-055AMS** Method: **SW6010B**

Analysis Date: **10/08/12 18:03** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-043A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121008B: 66** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-055AMSD** Method: **SW6010B**

Analysis Date: **10/08/12 18:07** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	40.4	1.0	24.75	14.11	106	75	125	42.19	4.3	20	
Cadmium	12.1	1.0	12.38	0.1292	97	75	125	12.18	0.4	20	
Copper	85.6	1.0	24.75	65.38	82	75	125	97.91	13	20	
Lead	37.3	1.5	24.75	9.817	111	75	125	45.57	20	20	

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-043A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18234

Run ID :Run Order: **ICPMS204-B_121008B: 79** SampType: **Method Blank** Sample ID: **MB-18234** Method: **SW6020**
Analysis Date: **10/10/12 03:28** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.04	0.006									
Cadmium	0.04	0.003									

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-042A; H12090228-043A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICPMS204-B_121008B: 80** SampType: **Laboratory Control Sample** Sample ID: **LCS-18234** Method: **SW6020**
Analysis Date: **10/10/12 03:33** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	332	1.0	339.6	0.04216	98	72.3	106.4				
Cadmium	127	1.0	135.6	0.04247	94	73	105.1				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-042A; H12090228-043A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICPMS204-B_121008B: 81** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-18234** Method: **SW6020**
Analysis Date: **10/10/12 03:37** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	55.8	1.0	50	0.04216	111	80	120				
Cadmium	29.4	1.0	25	0.04247	117	80	120				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-042A; H12090228-043A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICPMS204-B_121008B: 111** SampType: **Sample Matrix Spike** Sample ID: **H12090228-055AMS** Method: **SW6020**
Analysis Date: **10/10/12 05:53** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	48.5	1.0	24.75	18.25	122	75	125				
Cadmium	13.0	1.0	12.38	0.1866	104	75	125				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-042A; H12090228-043A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICPMS204-B_121008B: 112** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-055AMSD** Method: **SW6020**
Analysis Date: **10/10/12 05:57** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	47.5	1.0	24.75	18.25	118	75	125	48.54	2.1	20	

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: 18234

Date: *29-Oct-12*

Run ID :Run Order: **ICPMS204-B_121008B: 112** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-055AMSD** Method: **SW6020**

Analysis Date: **10/10/12 05:57** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	12.8	1.0	12.38	0.1866	102	75	125	13.04	2.1	20	

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-042A; H12090228-043A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-054A; H12090228-055A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18235

Run ID :Run Order: **ICP2-HE_121008B: 67** SampType: **Method Blank** Sample ID: **MB-18235** Method: **SW6010B**
Analysis Date: **10/08/12 18:10** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.4									
Cadmium	0.02	0.01									
Copper	ND	0.2									
Lead	ND	1									
Zinc	0.2	0.1									

Associated samples: **H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICP2-HE_121008B: 68** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-18235** Method: **SW6010B**
Analysis Date: **10/08/12 18:14** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	50.7	1.0	50		101	80	120				
Cadmium	24.8	1.0	25	0.015	99	80	120				
Copper	50.7	1.0	50		101	80	120				
Lead	51.7	1.0	50		103	80	120				
Zinc	51.4	1.0	50	0.1545	102	80	120				

Associated samples: **H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICP2-HE_121008B: 69** SampType: **Laboratory Control Sample** Sample ID: **LCS-18235** Method: **SW6010B**
Analysis Date: **10/08/12 18:18** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	284	1.5	339.6		84	72.3	106.4				
Cadmium	123	1.0	135.6	0.015	91	73	105.1				
Copper	259	1.0	277.2		93	77.5	109.6				
Lead	188	3.1	185.1		102	75.9	108.6				
Zinc	196	1.0	210.9	0.1545	93	74.2	109.9				

Associated samples: **H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18235

Run ID :Run Order: **ICP2-HE_121008B: 91** SampType: **Sample Matrix Spike** Sample ID: **H12090228-070AMS** Method: **SW6010B**

Analysis Date: **10/08/12 19:39** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	34.0	1.0	24.88	7.226	108	75	125				
Cadmium	13.2	1.0	12.44	0.03756	106	75	125				
Copper	32.4	1.0	24.88	6.422	104	75	125				
Lead	33.0	1.5	24.88	8.753	98	75	125				
Zinc	47.1	1.0	24.88	20.38	108	75	125				

Associated samples: **H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICP2-HE_121008B: 92** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-070AMSD** Method: **SW6010B**

Analysis Date: **10/08/12 19:42** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	32.9	1.0	24.88	7.226	103	75	125	33.99	3.3	20	
Cadmium	13.2	1.0	12.44	0.03756	106	75	125	13.19	0.4	20	
Copper	31.2	1.0	24.88	6.422	99	75	125	32.41	3.9	20	
Lead	35.8	1.5	24.88	8.753	109	75	125	33.01	8.1	20	
Zinc	47.2	1.0	24.88	20.38	108	75	125	47.14	0.1	20	

Associated samples: **H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICP2-HE_121009D: 124** SampType: **Method Blank** Sample ID: **MB-18235** Method: **SW6010B**

Analysis Date: **10/10/12 04:28** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.4									
Cadmium	ND	0.01									
Copper	ND	0.2									
Lead	ND	1									
Zinc	0.2	0.1									

Associated samples: **H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18235

Run ID :Run Order: **ICP2-HE_121009D: 125** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-18235** Method: **SW6010B**

Analysis Date: **10/10/12 04:32** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	48.4	1.0	50		97	80	120				
Cadmium	23.7	1.0	25		95	80	120				
Copper	50.0	1.0	50		100	80	120				
Lead	49.0	1.0	50		98	80	120				
Zinc	49.3	1.0	50	0.1865	98	80	120				

Associated samples: **H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICP2-HE_121009D: 126** SampType: **Laboratory Control Sample** Sample ID: **LCS-18235** Method: **SW6010B**

Analysis Date: **10/10/12 04:36** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	280	1.5	339.6		82	72.3	106.4				
Cadmium	120	1.0	135.6		88	73	105.1				
Copper	252	1.0	277.2		91	77.5	109.6				
Lead	185	3.1	185.1		100	75.9	108.6				
Zinc	192	1.0	210.9	0.1865	91	74.2	109.9				

Associated samples: **H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICP2-HE_121009D: 141** SampType: **Sample Matrix Spike** Sample ID: **H12090228-070AMS** Method: **SW6010B**

Analysis Date: **10/10/12 05:32** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	34.2	1.0	24.88	7.589	107	75	125				
Cadmium	12.5	1.0	12.44		101	75	125				
Copper	31.7	1.0	24.88	6.571	101	75	125				
Lead	33.5	1.5	24.88	8.886	99	75	125				
Zinc	45.5	1.0	24.88	20.32	101	75	125				

Associated samples: **H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18235

Run ID :Run Order: **ICP2-HE_121009D: 144** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-070AMSD** Method: **SW6010B**

Analysis Date: **10/10/12 05:43** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	32.1	1.0	24.88	7.589	98	75	125	34.17	6.3	20	
Cadmium	12.2	1.0	12.44		98	75	125	12.55	3.1	20	
Copper	30.6	1.0	24.88	6.571	97	75	125	31.67	3.3	20	
Lead	32.5	1.5	24.88	8.886	95	75	125	33.48	2.9	20	
Zinc	44.4	1.0	24.88	20.32	97	75	125	45.51	2.4	20	

Associated samples: **H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICP2-HE_121011A: 16** SampType: **Method Blank** Sample ID: **MB-18235** Method: **SW6010B**

Analysis Date: **10/11/12 11:30** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.6	0.4									
Cadmium	ND	0.01									
Copper	ND	0.2									
Lead	ND	1									
Zinc	0.2	0.1									

Associated samples: **H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICP2-HE_121012B: 48** SampType: **Method Blank** Sample ID: **MB-18235** Method: **SW6010B**

Analysis Date: **10/12/12 12:48** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	2									
Cadmium	ND	0.06									
Copper	ND	1									
Lead	ND	6									
Zinc	0.9	0.7									

Associated samples: **H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18235

Run ID :Run Order: **ICPMS204-B_121008B: 117** SampType: **Method Blank** Sample ID: **MB-18235** Method: **SW6020**
Analysis Date: **10/10/12 06:20** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	0.04	0.003									

Associated samples: **H12090228-057A; H12090228-058A; H12090228-060A; H12090228-061A; H12090228-063A; H12090228-064A; H12090228-066A; H12090228-067A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICPMS204-B_121008B: 118** SampType: **Laboratory Control Sample** Sample ID: **LCS-18235** Method: **SW6020**
Analysis Date: **10/10/12 06:25** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	128	1.0	135.6	0.04207	94	73	105.1				

Associated samples: **H12090228-057A; H12090228-058A; H12090228-060A; H12090228-061A; H12090228-063A; H12090228-064A; H12090228-066A; H12090228-067A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICPMS204-B_121008B: 119** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-18235** Method: **SW6020**
Analysis Date: **10/10/12 06:29** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	29.3	1.0	25	0.04207	117	80	120				

Associated samples: **H12090228-057A; H12090228-058A; H12090228-060A; H12090228-061A; H12090228-063A; H12090228-064A; H12090228-066A; H12090228-067A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICPMS204-B_121008B: 137** SampType: **Sample Matrix Spike** Sample ID: **H12090228-070AMS** Method: **SW6020**
Analysis Date: **10/10/12 07:50** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	14.1	1.0	12.44	0.09891	112	75	125				

Associated samples: **H12090228-057A; H12090228-058A; H12090228-060A; H12090228-061A; H12090228-063A; H12090228-064A; H12090228-066A; H12090228-067A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICPMS204-B_121008B: 138** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-070AMSD** Method: **SW6020**
Analysis Date: **10/10/12 07:55** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	14.1	1.0	12.44	0.09891	112	75	125	14.07	0.1	20	

Associated samples: **H12090228-057A; H12090228-058A; H12090228-060A; H12090228-061A; H12090228-063A; H12090228-064A; H12090228-066A; H12090228-067A; H12090228-069A; H12090228-070A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18295

Run ID :Run Order: **ICP2-HE_121010A: 15** SampType: **Method Blank** Sample ID: **MB-18295** Method: **SW6010B**
Analysis Date: **10/10/12 12:17** Units: **mg/kg** **Prep Info:** Prep Date: **10/8/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.4									

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-035A; H12090228-036A; H12090228-037A**

Run ID :Run Order: **ICP2-HE_121010A: 16** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-18295** Method: **SW6010B**
Analysis Date: **10/10/12 12:21** Units: **mg/kg** **Prep Info:** Prep Date: **10/8/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	50.3	1.0	50		101	80	120				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-035A; H12090228-036A; H12090228-037A**

Run ID :Run Order: **ICP2-HE_121010A: 17** SampType: **Laboratory Control Sample** Sample ID: **LCS-18295** Method: **SW6010B**
Analysis Date: **10/10/12 12:25** Units: **mg/kg** **Prep Info:** Prep Date: **10/8/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	285	1.5	339.6		84	72.3	106.4				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-035A; H12090228-036A; H12090228-037A**

Run ID :Run Order: **ICP2-HE_121010A: 42** SampType: **Sample Matrix Spike** Sample ID: **H12090228-037AMS** Method: **SW6010B**
Analysis Date: **10/10/12 13:57** Units: **mg/kg** **Prep Info:** Prep Date: **10/8/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	35.2	1.0	24.75	13.21	89	75	125				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-035A; H12090228-036A; H12090228-037A**

Run ID :Run Order: **ICP2-HE_121010A: 45** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-037AMSD** Method: **SW6010B**
Analysis Date: **10/10/12 14:08** Units: **mg/kg** **Prep Info:** Prep Date: **10/2/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	38.3	1.0	24.88	13.21	101	75	125	35.21	8.4	20	

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18295

Run ID :Run Order: **ICP2-HE_121010A: 45** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-037AMSD** Method: **SW6010B**

Analysis Date: **10/10/12 14:08** Units: **mg/kg** **Prep Info:** Prep Date: **10/2/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-035A; H12090228-036A; H12090228-037A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18308

Run ID :Run Order: **ICP2-HE_121011A: 18** SampType: **Method Blank** Sample ID: **MB-18308** Method: **SW6010B**
Analysis Date: **10/11/12 11:38** Units: **mg/kg** **Prep Info:** Prep Date: **10/9/2012** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1									
Zinc	0.3	0.1									

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121011A: 21** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-18308** Method: **SW6010B**
Analysis Date: **10/11/12 11:49** Units: **mg/kg** **Prep Info:** Prep Date: **10/9/2012** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	47.5	1.0	50		95	80	120				
Zinc	50.1	1.0	50	0.263	100	80	120				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121011A: 22** SampType: **Laboratory Control Sample** Sample ID: **LCS-18308** Method: **SW6010B**
Analysis Date: **10/11/12 11:53** Units: **mg/kg** **Prep Info:** Prep Date: **10/9/2012** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	170	3.1	185.1		92	75.9	108.6				
Zinc	193	1.0	210.9	0.263	91	74.2	109.9				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121011A: 47** SampType: **Sample Matrix Spike** Sample ID: **H12090228-055AMS** Method: **SW6010B**
Analysis Date: **10/11/12 13:24** Units: **mg/kg** **Prep Info:** Prep Date: **10/9/2012** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	38.5	1.5	24.75	14.41	97	75	125				
Zinc	188	1.0	24.75	216.8		75	125				A

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18308

Run ID :Run Order: **ICP2-HE_121011A: 48** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-055AMSD** Method: **SW6010B**

Analysis Date: **10/11/12 13:28** Units: **mg/kg** **Prep Info:** Prep Date: **10/3/2012** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	48.6	1.5	24.75	14.41	138	75	125	38.46	23	20	SR
Zinc	207	1.0	24.75	216.8		75	125	187.5	10	20	A

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121012B: 50** SampType: **Method Blank** Sample ID: **MB-18308** Method: **SW6010B**

Analysis Date: **10/12/12 12:55** Units: **mg/kg** **Prep Info:** Prep Date: **10/9/2012** Prep Method: **SW3050 B**

Analytes 2	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead	ND	1									
Zinc	0.2	0.1									

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18337

Run ID :Run Order: **ICP2-HE_121016D: 37** SampType: **Method Blank** Sample ID: **MB-18337** Method: **SW6010B**
Analysis Date: **10/16/12 17:23** Units: **mg/kg** **Prep Info:** Prep Date: **10/11/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.4									
Copper	0.3	0.2									
Lead	ND	1									
Zinc	0.2	0.1									

Associated samples: **H12090228-034A; H12090228-037A; H12090228-043A; H12090228-046A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121016D: 38** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-18337** Method: **SW6010B**
Analysis Date: **10/16/12 17:27** Units: **mg/kg** **Prep Info:** Prep Date: **10/11/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	47.3	1.0	50		95	80	120				
Copper	49.2	1.0	50	0.2945	98	80	120				
Lead	44.9	1.0	50		90	80	120				
Zinc	47.9	1.0	50	0.2235	95	80	120				

Associated samples: **H12090228-034A; H12090228-037A; H12090228-043A; H12090228-046A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121016D: 39** SampType: **Laboratory Control Sample** Sample ID: **LCS-18337** Method: **SW6010B**
Analysis Date: **10/16/12 17:31** Units: **mg/kg** **Prep Info:** Prep Date: **10/11/2012** Prep Method: **SW3050 B**

Analytes 4	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	256	1.5	336.3		76	72.3	106.4				
Copper	239	1.0	274.5	0.2945	87	77.5	109.6				
Lead	160	3.0	183.3		87	75.9	108.6				
Zinc	180	1.0	208.8	0.2235	86	74.2	109.9				

Associated samples: **H12090228-034A; H12090228-037A; H12090228-043A; H12090228-046A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121016D: 65** SampType: **Sample Matrix Spike** Sample ID: **H12090341-041AMS** Method: **SW6010B**
Analysis Date: **10/16/12 19:06** Units: **mg/kg** **Prep Info:** Prep Date: **10/11/2012** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	25.0	1.0	24.88		101	75	125				
Copper	35.4	1.0	24.88	12.16	93	75	125				
Zinc	68.6	1.0	24.88	50.11	74	75	125				S

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: 18337

Date: *29-Oct-12*

Run ID :Run Order: **ICP2-HE_121016D: 65** SampType: **Sample Matrix Spike** Sample ID: **H12090341-041AMS** Method: **SW6010B**

Analysis Date: **10/16/12 19:06** Units: **mg/kg** **Prep Info:** Prep Date: **10/11/2012** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Associated samples: **H12090228-034A; H12090228-037A; H12090228-043A; H12090228-046A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121016D: 66** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090341-041AMSD** Method: **SW6010B**

Analysis Date: **10/16/12 19:10** Units: **mg/kg** **Prep Info:** Prep Date: **10/11/2012** Prep Method: **SW3050 B**

Analytes 3	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	26.3	1.0	24.88		106	75	125	25.01	5.1	20	
Copper	40.8	1.0	24.88	12.16	115	75	125	35.36	14	20	
Zinc	87.2	1.0	24.88	50.11	149	75	125	68.59	24	20	SR

Associated samples: **H12090228-034A; H12090228-037A; H12090228-043A; H12090228-046A; H12090228-055A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: 18337

Run ID :Run Order: **ICPMS204-B_121017B: 100** SampType: **Method Blank** Sample ID: **MB-18337** Method: **SW6020**
Analysis Date: **10/18/12 06:41** Units: **mg/kg** **Prep Info:** Prep Date: **10/11/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	0.04	0.003									

Associated samples: **H12090228-037A**

Run ID :Run Order: **ICPMS204-B_121017B: 101** SampType: **Laboratory Control Sample** Sample ID: **LCS-18337** Method: **SW6020**
Analysis Date: **10/18/12 06:45** Units: **mg/kg** **Prep Info:** Prep Date: **10/11/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	119	1.0	134.3	0.03952	89	73	105.1				

Associated samples: **H12090228-037A**

Run ID :Run Order: **ICPMS204-B_121017B: 102** SampType: **Laboratory Fortified Blank** Sample ID: **LFB-18337** Method: **SW6020**
Analysis Date: **10/18/12 06:50** Units: **mg/kg** **Prep Info:** Prep Date: **10/11/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	27.4	1.0	25	0.03952	110	80	120				

Associated samples: **H12090228-037A**

Run ID :Run Order: **ICPMS204-B_121017B: 123** SampType: **Sample Matrix Spike** Sample ID: **H12090341-041AMS** Method: **SW6020**
Analysis Date: **10/18/12 08:24** Units: **mg/kg** **Prep Info:** Prep Date: **10/11/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	13.1	1.0	12.44	0.2334	104	75	125				

Associated samples: **H12090228-037A**

Run ID :Run Order: **ICPMS204-B_121017B: 124** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090341-041AMSD** Method: **SW6020**
Analysis Date: **10/18/12 08:29** Units: **mg/kg** **Prep Info:** Prep Date: **10/11/2012** Prep Method: **SW3050 B**

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	12.8	1.0	12.44	0.2334	101	75	125	13.11	2.4	20	

Associated samples: **H12090228-037A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: B_121004Z

Date: *29-Oct-12*

Run ID :Run Order: **SUB-B192866: 1** SampType: **Initial Calibration Verification Standard** Sample ID: **QCS** Method: **E245.1**

Analysis Date: **10/04/12 14:06** 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
Mercury	0.00022	1.0E-05	0.0002		108	90	110				

Associated samples: **H12090228-001G; H12090228-002G; H12090228-003G; H12090228-004G; H12090228-005G; H12090228-006G; H12090228-007G; H12090228-008G; H12090228-010G; H12090228-011G; H12090228-012G; H12090228-013G; H12090228-014G; H12090228-015G; H12090228-016G; H12090228-017G; H12090228-018G; H12090228-019G**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: B_121005Z

Date: *29-Oct-12*

Run ID :Run Order: **SUB-B192894: 1** SampType: **Initial Calibration Verification Standard** Sample ID: **QCS** Method: **E245.1**

Analysis Date: **10/05/12 08:55** 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
Mercury	0.00010	1.0E-05	0.0001		104	90	110				

Associated samples: **H12090228-009G**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: B_65708

Run ID :Run Order: **SUB-B192866: 2** SampType: **Method Blank** Sample ID: **MB-65708** Method: **E245.1**
Analysis Date: **10/04/12 14:21** Units: **mg/L** **Prep Info:** Prep Date: **9/26/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	1E-06									

Associated samples: **H12090228-001G; H12090228-002G; H12090228-003G; H12090228-004G; H12090228-005G; H12090228-006G; H12090228-007G; H12090228-008G; H12090228-010G; H12090228-011G; H12090228-012G; H12090228-013G; H12090228-014G; H12090228-015G; H12090228-016G; H12090228-017G; H12090228-018G; H12090228-019G**

Run ID :Run Order: **SUB-B192866: 3** SampType: **Laboratory Control Sample** Sample ID: **LCS-65708** Method: **E245.1**
Analysis Date: **10/04/12 14:31** Units: **mg/L** **Prep Info:** Prep Date: **9/26/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00019	1.0E-05	0.0002		93	85	115				

Associated samples: **H12090228-001G; H12090228-002G; H12090228-003G; H12090228-004G; H12090228-005G; H12090228-006G; H12090228-007G; H12090228-008G; H12090228-010G; H12090228-011G; H12090228-012G; H12090228-013G; H12090228-014G; H12090228-015G; H12090228-016G; H12090228-017G; H12090228-018G; H12090228-019G**

Run ID :Run Order: **SUB-B192866: 4** SampType: **Sample Matrix Spike** Sample ID: **B12091287-001BMS** Method: **E245.1**
Analysis Date: **10/04/12 14:35** Units: **mg/L** **Prep Info:** Prep Date: **9/26/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00017	1.0E-05	0.0002		85	70	130				

Associated samples: **H12090228-001G; H12090228-002G; H12090228-003G; H12090228-004G; H12090228-005G; H12090228-006G; H12090228-007G; H12090228-008G; H12090228-010G; H12090228-011G; H12090228-012G; H12090228-013G; H12090228-014G; H12090228-015G; H12090228-016G; H12090228-017G; H12090228-018G; H12090228-019G**

Run ID :Run Order: **SUB-B192866: 5** SampType: **Sample Matrix Spike Duplicate** Sample ID: **B12091287-001BMSD** Method: **E245.1**
Analysis Date: **10/04/12 14:37** Units: **mg/L** **Prep Info:** Prep Date: **9/26/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00019	1.0E-05	0.0002		97	70	130	0.000169	14	30	

Associated samples: **H12090228-001G; H12090228-002G; H12090228-003G; H12090228-004G; H12090228-005G; H12090228-006G; H12090228-007G; H12090228-008G; H12090228-010G; H12090228-011G; H12090228-012G; H12090228-013G; H12090228-014G; H12090228-015G; H12090228-016G; H12090228-017G; H12090228-018G; H12090228-019G**

Run ID :Run Order: **SUB-B192866: 7** SampType: **Sample Matrix Spike** Sample ID: **H12090228-001G** Method: **E245.1**
Analysis Date: **10/04/12 14:41** Units: **mg/L** **Prep Info:** Prep Date: **9/26/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00019	1.0E-05	0.0002		93	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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: B_65708

Run ID :Run Order: **SUB-B192866: 7** SampType: **Sample Matrix Spike** Sample ID: **H12090228-001G** Method: **E245.1**

Analysis Date: **10/04/12 14:41** Units: **mg/L** **Prep Info:** Prep Date: **9/26/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Associated samples: **H12090228-001G; H12090228-002G; H12090228-003G; H12090228-004G; H12090228-005G; H12090228-006G; H12090228-007G; H12090228-008G; H12090228-010G; H12090228-011G; H12090228-012G; H12090228-013G; H12090228-014G; H12090228-015G; H12090228-016G; H12090228-017G; H12090228-018G; H12090228-019G**

Run ID :Run Order: **SUB-B192866: 8** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-001G** Method: **E245.1**

Analysis Date: **10/04/12 14:43** Units: **mg/L** **Prep Info:** Prep Date: **9/26/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00019	1.0E-05	0.0002		95	70	130	0.000186	1.6	30	

Associated samples: **H12090228-001G; H12090228-002G; H12090228-003G; H12090228-004G; H12090228-005G; H12090228-006G; H12090228-007G; H12090228-008G; H12090228-010G; H12090228-011G; H12090228-012G; H12090228-013G; H12090228-014G; H12090228-015G; H12090228-016G; H12090228-017G; H12090228-018G; H12090228-019G**

Run ID :Run Order: **SUB-B192866: 32** SampType: **Sample Matrix Spike** Sample ID: **H12090228-019G** Method: **E245.1**

Analysis Date: **10/04/12 15:56** Units: **mg/L** **Prep Info:** Prep Date: **9/26/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00020	1.0E-05	0.0002	0.00000186	101	70	130				

Associated samples: **H12090228-001G; H12090228-002G; H12090228-003G; H12090228-004G; H12090228-005G; H12090228-006G; H12090228-007G; H12090228-008G; H12090228-010G; H12090228-011G; H12090228-012G; H12090228-013G; H12090228-014G; H12090228-015G; H12090228-016G; H12090228-017G; H12090228-018G; H12090228-019G**

Run ID :Run Order: **SUB-B192866: 33** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-019G** Method: **E245.1**

Analysis Date: **10/04/12 15:58** Units: **mg/L** **Prep Info:** Prep Date: **9/26/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00021	1.0E-05	0.0002	0.00000186	103	70	130	0.000203	2.4	30	

Associated samples: **H12090228-001G; H12090228-002G; H12090228-003G; H12090228-004G; H12090228-005G; H12090228-006G; H12090228-007G; H12090228-008G; H12090228-010G; H12090228-011G; H12090228-012G; H12090228-013G; H12090228-014G; H12090228-015G; H12090228-016G; H12090228-017G; H12090228-018G; H12090228-019G**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: B_65980

Run ID :Run Order: **SUB-B192894: 2** SampType: **Method Blank** Sample ID: **MB-65980** Method: **E245.1**
Analysis Date: **10/05/12 14:37** Units: **mg/L** **Prep Info:** Prep Date: **10/4/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	1E-06									

Associated samples: **H12090228-009G**

Run ID :Run Order: **SUB-B192894: 3** SampType: **Laboratory Control Sample** Sample ID: **LCS-65980** Method: **E245.1**
Analysis Date: **10/05/12 14:42** Units: **mg/L** **Prep Info:** Prep Date: **10/4/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00020	1.0E-05	0.0002		98	85	115				

Associated samples: **H12090228-009G**

Run ID :Run Order: **SUB-B192894: 6** SampType: **Sample Matrix Spike** Sample ID: **B12091808-001FMS** Method: **E245.1**
Analysis Date: **10/05/12 14:49** Units: **mg/L** **Prep Info:** Prep Date: **10/4/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00021	1.0E-05	0.0002		106	70	130				

Associated samples: **H12090228-009G**

Run ID :Run Order: **SUB-B192894: 7** SampType: **Sample Matrix Spike Duplicate** Sample ID: **B12091808-001FMSD** Method: **E245.1**
Analysis Date: **10/05/12 14:51** Units: **mg/L** **Prep Info:** Prep Date: **10/4/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00021	1.0E-05	0.0002		106	70	130	0.000211	0.0	30	

Associated samples: **H12090228-009G**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: C_35070

Run ID :Run Order: **SUB-C164761: 7** SampType: **Method Blank** Sample ID: **MB-35070** Method: **A5310 C**
Analysis Date: **09/19/12 13:45** Units: **mg/L** **Prep Info:** Prep Date: **9/18/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	ND	0.1									

Associated samples: **H12090228-001F; H12090228-002F; H12090228-003F; H12090228-004F; H12090228-005F; H12090228-006F; H12090228-007F; H12090228-008F; H12090228-010F; H12090228-011F; H12090228-012F; H12090228-013F; H12090228-014F; H12090228-015F; H12090228-016F; H12090228-017F; H12090228-018F; H12090228-019F**

Run ID :Run Order: **SUB-C164761: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV-35070** Method: **A5310 C**
Analysis Date: **09/19/12 13:56** Units: **mg/L** **Prep Info:** Prep Date: **9/18/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	10.4	0.10	10		104	90	110				

Associated samples: **H12090228-001F; H12090228-002F; H12090228-003F; H12090228-004F; H12090228-005F; H12090228-006F; H12090228-007F; H12090228-008F; H12090228-010F; H12090228-011F; H12090228-012F**

Run ID :Run Order: **SUB-C164761: 10** SampType: **Sample Matrix Spike** Sample ID: **C12090577-003BMS** Method: **A5310 C**
Analysis Date: **09/19/12 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
Organic Carbon, Dissolved (DOC)	6.76	0.50	5	1.595	103	85	115				

Associated samples: **H12090228-001F; H12090228-002F; H12090228-003F; H12090228-004F; H12090228-005F; H12090228-006F; H12090228-007F; H12090228-008F; H12090228-010F; H12090228-011F; H12090228-012F; H12090228-013F; H12090228-014F; H12090228-015F; H12090228-016F; H12090228-017F; H12090228-018F; H12090228-019F**

Run ID :Run Order: **SUB-C164761: 11** SampType: **Sample Matrix Spike Duplicate** Sample ID: **C12090577-003BMSD** Method: **A5310 C**
Analysis Date: **09/19/12 18:46** 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
Organic Carbon, Dissolved (DOC)	6.77	0.50	5	1.595	104	85	115	6.756	0.3	10	

Associated samples: **H12090228-001F; H12090228-002F; H12090228-003F; H12090228-004F; H12090228-005F; H12090228-006F; H12090228-007F; H12090228-008F; H12090228-010F; H12090228-011F; H12090228-012F; H12090228-013F; H12090228-014F; H12090228-015F; H12090228-016F; H12090228-017F; H12090228-018F; H12090228-019F**

Run ID :Run Order: **SUB-C164761: 12** SampType: **Laboratory Control Sample** Sample ID: **LCS-35070** Method: **A5310 C**
Analysis Date: **09/19/12 18:57** Units: **mg/L** **Prep Info:** Prep Date: **9/18/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	10.3	0.10	10		103	90	110				

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: C_35070

Run ID :Run Order: **SUB-C164761: 12** SampType: **Laboratory Control Sample** Sample ID: **LCS-35070** Method: **A5310 C**
Analysis Date: **09/19/12 18:57** Units: **mg/L** **Prep Info:** Prep Date: **9/18/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Associated samples: **H12090228-001F; H12090228-002F; H12090228-003F; H12090228-004F; H12090228-005F; H12090228-006F; H12090228-007F; H12090228-008F; H12090228-010F; H12090228-011F; H12090228-012F; H12090228-013F; H12090228-014F; H12090228-015F; H12090228-016F; H12090228-017F; H12090228-018F; H12090228-019F**

Run ID :Run Order: **SUB-C164761: 23** SampType: **Sample Matrix Spike** Sample ID: **H12090228-002F** Method: **A5310 C**
Analysis Date: **09/19/12 21:31** Units: **mg/L** **Prep Info:** Prep Date: **9/18/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	6.71	0.50	5	1.209	110	85	115				

Associated samples: **H12090228-001F; H12090228-002F; H12090228-003F; H12090228-004F; H12090228-005F; H12090228-006F; H12090228-007F; H12090228-008F; H12090228-010F; H12090228-011F; H12090228-012F; H12090228-013F; H12090228-014F; H12090228-015F; H12090228-016F; H12090228-017F; H12090228-018F; H12090228-019F**

Run ID :Run Order: **SUB-C164761: 24** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-002F** Method: **A5310 C**
Analysis Date: **09/19/12 21:42** Units: **mg/L** **Prep Info:** Prep Date: **9/18/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	6.92	0.50	5	1.209	114	85	115	6.705	3.1	10	

Associated samples: **H12090228-001F; H12090228-002F; H12090228-003F; H12090228-004F; H12090228-005F; H12090228-006F; H12090228-007F; H12090228-008F; H12090228-010F; H12090228-011F; H12090228-012F; H12090228-013F; H12090228-014F; H12090228-015F; H12090228-016F; H12090228-017F; H12090228-018F; H12090228-019F**

Run ID :Run Order: **SUB-C164824: 1** SampType: **Method Blank** Sample ID: **MB-35070** Method: **A5310 C**
Analysis Date: **09/20/12 18:50** Units: **mg/L** **Prep Info:** Prep Date: **9/18/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	ND	0.1									

Associated samples: **H12090228-001F; H12090228-002F; H12090228-003F; H12090228-004F; H12090228-005F; H12090228-006F; H12090228-007F; H12090228-008F; H12090228-010F; H12090228-011F; H12090228-012F; H12090228-013F; H12090228-014F; H12090228-015F; H12090228-016F; H12090228-017F; H12090228-018F; H12090228-019F**

Run ID :Run Order: **SUB-C164824: 2** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV-35070** Method: **A5310 C**
Analysis Date: **09/20/12 19:08** Units: **mg/L** **Prep Info:** Prep Date: **9/18/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	10.2	0.10	10		102	90	110				

Associated samples: **H12090228-013F; H12090228-014F; H12090228-015F; H12090228-016F; H12090228-017F; H12090228-018F; H12090228-019F**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: C_35070

Date: *29-Oct-12*

Run ID :Run Order: **SUB-C164824: 10** SampType: **Sample Matrix Spike** Sample ID: **H12090228-013F** Method: **A5310 C**

Analysis Date: **09/20/12 20:57** Units: **mg/L** **Prep Info:** Prep Date: **9/18/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	8.24	0.50	5	2.925	106	85	115				

Associated samples: **H12090228-001F; H12090228-002F; H12090228-003F; H12090228-004F; H12090228-005F; H12090228-006F; H12090228-007F; H12090228-008F; H12090228-010F; H12090228-011F; H12090228-012F; H12090228-013F; H12090228-014F; H12090228-015F; H12090228-016F; H12090228-017F; H12090228-018F; H12090228-019F**

Run ID :Run Order: **SUB-C164824: 11** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-013F** Method: **A5310 C**

Analysis Date: **09/20/12 21:08** Units: **mg/L** **Prep Info:** Prep Date: **9/18/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	8.36	0.50	5	2.925	109	85	115	8.237	1.5	10	

Associated samples: **H12090228-001F; H12090228-002F; H12090228-003F; H12090228-004F; H12090228-005F; H12090228-006F; H12090228-007F; H12090228-008F; H12090228-010F; H12090228-011F; H12090228-012F; H12090228-013F; H12090228-014F; H12090228-015F; H12090228-016F; H12090228-017F; H12090228-018F; H12090228-019F**

Run ID :Run Order: **SUB-C164824: 12** SampType: **Laboratory Control Sample** Sample ID: **LCS-35070** Method: **A5310 C**

Analysis Date: **09/20/12 21:19** Units: **mg/L** **Prep Info:** Prep Date: **9/18/2012** Prep Method:

Analytes 1	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Organic Carbon, Dissolved (DOC)	10.2	0.10	10		102	90	110				

Associated samples: **H12090228-001F; H12090228-002F; H12090228-003F; H12090228-004F; H12090228-005F; H12090228-006F; H12090228-007F; H12090228-008F; H12090228-010F; H12090228-011F; H12090228-012F; H12090228-013F; H12090228-014F; H12090228-015F; H12090228-016F; H12090228-017F; H12090228-018F; H12090228-019F**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R82986

Run ID :Run Order: **ICPMS204-B_120917A: 9** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **E200.8**

Analysis Date: **09/17/12 14:17** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0520	0.0050	0.05		104	90	110				
Cadmium	0.0262	0.0010	0.025		105	90	110				
Copper	0.0533	0.010	0.05		107	90	110				
Lead	0.0496	0.010	0.05		99	90	110				
Zinc	0.0545	0.010	0.05		109	90	110				

Associated samples: **H12090228-001C; H12090228-001D; H12090228-002C; H12090228-002D; H12090228-003C; H12090228-003D; H12090228-004C; H12090228-004D; H12090228-005C; H12090228-005D; H12090228-006C; H12090228-006D; H12090228-007C; H12090228-007D; H12090228-008C; H12090228-008D; H12090228-009C; H12090228-009D; H12090228-010C; H12090228-010D; H12090228-011C; H12090228-011D; H12090228-012C; H12090228-012D; H12090228-013C; H12090228-013D; H12090228-014C; H12090228-014D; H12090228-015C; H12090228-015D; H12090228-016C; H12090228-016D; H12090228-017C; H12090228-017D; H12090228-018C; H12090228-018D; H12090228-019C; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.8**

Analysis Date: **09/17/12 14:22** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	8.60E-05	0.0050									
Cadmium	0.000876	0.0010									
Copper	0.000151	0.010									
Lead	0.000144	0.010									
Zinc	0.00160	0.010									

Associated samples: **H12090228-001C; H12090228-001D; H12090228-002C; H12090228-002D; H12090228-003C; H12090228-003D; H12090228-004C; H12090228-004D; H12090228-005C; H12090228-005D; H12090228-006C; H12090228-006D; H12090228-007C; H12090228-007D; H12090228-008C; H12090228-008D; H12090228-009C; H12090228-009D; H12090228-010C; H12090228-010D; H12090228-011C; H12090228-011D; H12090228-012C; H12090228-012D; H12090228-013C; H12090228-013D; H12090228-014C; H12090228-014D; H12090228-015C; H12090228-015D; H12090228-016C; H12090228-016D; H12090228-017C; H12090228-017D; H12090228-018C; H12090228-018D; H12090228-019C; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**

Analysis Date: **09/17/12 14:27** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0104	0.0050	0.01		104	70	130				
Cadmium	0.0105	0.0010	0.01		105	70	130				
Copper	0.0205	0.010	0.02		102	70	130				
Lead	0.000160	0.010				0	0				
Zinc	0.0116	0.010	0.01		116	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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R82986

Run ID :Run Order: **ICPMS204-B_120917A: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**

Analysis Date: **09/17/12 14:27** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Associated samples: **H12090228-001C; H12090228-001D; H12090228-002C; H12090228-002D; H12090228-003C; H12090228-003D; H12090228-004C; H12090228-004D; H12090228-005C; H12090228-005D; H12090228-006C; H12090228-006D; H12090228-007C; H12090228-007D; H12090228-008C; H12090228-008D; H12090228-009C; H12090228-009D; H12090228-010C; H12090228-010D; H12090228-011C; H12090228-011D; H12090228-012C; H12090228-012D; H12090228-013C; H12090228-013D; H12090228-014C; H12090228-014D; H12090228-015C; H12090228-015D; H12090228-016C; H12090228-016D; H12090228-017C; H12090228-017D; H12090228-018C; H12090228-018D; H12090228-019C; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 17** SampType: **Method Blank** Sample ID: **ICB** Method: **E200.8**

Analysis Date: **09/17/12 14:55** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	5E-05									
Cadmium	ND	5E-06									
Copper	0.0002	2E-05									
Lead	1E-05	1E-05									
Zinc	0.001	0.0004									

Associated samples: **H12090228-001C; H12090228-002C; H12090228-003C; H12090228-004C; H12090228-005C; H12090228-006C; H12090228-007C; H12090228-008C; H12090228-009C; H12090228-010C; H12090228-011C; H12090228-012C; H12090228-013C; H12090228-014C; H12090228-015C; H12090228-016C; H12090228-017C; H12090228-018C; H12090228-019C**

Run ID :Run Order: **ICPMS204-B_120917A: 18** SampType: **Laboratory Fortified Blank** Sample ID: **LFB** Method: **E200.8**

Analysis Date: **09/17/12 14:59** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0501	0.0050	0.05		100	85	115				
Cadmium	0.0462	0.0010	0.05		92	85	115				
Copper	0.0491	0.010	0.05	0.0001752	98	85	115				
Lead	0.0482	0.010	0.05	0.000013	96	85	115				
Zinc	0.0499	0.010	0.05	0.001032	98	85	115				

Associated samples: **H12090228-001C; H12090228-002C; H12090228-003C; H12090228-004C; H12090228-005C; H12090228-006C; H12090228-007C; H12090228-008C; H12090228-009C; H12090228-010C; H12090228-011C; H12090228-012C; H12090228-013C; H12090228-014C; H12090228-015C; H12090228-016C; H12090228-017C; H12090228-018C; H12090228-019C**

Run ID :Run Order: **ICPMS204-B_120917A: 51** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.8**

Analysis Date: **09/17/12 18:07** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	7.60E-05	0.0050									

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R82986

Run ID :Run Order: **ICPMS204-B_120917A: 51** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.8**

Analysis Date: **09/17/12 18:07** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	0.000935	0.0010									
Copper	0.000129	0.010									
Lead	0.000145	0.010									
Zinc	0.00156	0.010									

Associated samples: **H12090228-001C; H12090228-001D; H12090228-002C; H12090228-002D; H12090228-003C; H12090228-003D; H12090228-004C; H12090228-004D; H12090228-005C; H12090228-005D; H12090228-006C; H12090228-006D; H12090228-007C; H12090228-007D; H12090228-008C; H12090228-008D; H12090228-009C; H12090228-009D; H12090228-010C; H12090228-010D; H12090228-011C; H12090228-011D; H12090228-012C; H12090228-012D; H12090228-013C; H12090228-013D; H12090228-014C; H12090228-014D; H12090228-015C; H12090228-015D; H12090228-016C; H12090228-016D; H12090228-017C; H12090228-017D; H12090228-018C; H12090228-018D; H12090228-019C; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 52** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**

Analysis Date: **09/17/12 18:11** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0102	0.0050	0.01		102	70	130				
Cadmium	0.0103	0.0010	0.01		103	70	130				
Copper	0.0206	0.010	0.02		103	70	130				
Lead	0.000163	0.010				0	0				
Zinc	0.0112	0.010	0.01		112	70	130				

Associated samples: **H12090228-001C; H12090228-001D; H12090228-002C; H12090228-002D; H12090228-003C; H12090228-003D; H12090228-004C; H12090228-004D; H12090228-005C; H12090228-005D; H12090228-006C; H12090228-006D; H12090228-007C; H12090228-007D; H12090228-008C; H12090228-008D; H12090228-009C; H12090228-009D; H12090228-010C; H12090228-010D; H12090228-011C; H12090228-011D; H12090228-012C; H12090228-012D; H12090228-013C; H12090228-013D; H12090228-014C; H12090228-014D; H12090228-015C; H12090228-015D; H12090228-016C; H12090228-016D; H12090228-017C; H12090228-017D; H12090228-018C; H12090228-018D; H12090228-019C; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 55** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **E200.8**

Analysis Date: **09/17/12 18:25** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0511	0.0050	0.05		102	90	110				
Cadmium	0.0249	0.0010	0.025		99	90	110				
Copper	0.0529	0.010	0.05		106	90	110				
Lead	0.0478	0.010	0.05		96	90	110				
Zinc	0.0546	0.010	0.05		109	90	110				

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R82986

Run ID :Run Order: **ICPMS204-B_120917A: 55** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **E200.8**

Analysis Date: **09/17/12 18:25** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Associated samples: **H12090228-001C; H12090228-001D; H12090228-002C; H12090228-002D; H12090228-003C; H12090228-003D; H12090228-004C; H12090228-004D; H12090228-005C; H12090228-005D; H12090228-006C; H12090228-006D; H12090228-007C; H12090228-007D; H12090228-008C; H12090228-008D; H12090228-009C; H12090228-009D; H12090228-010C; H12090228-010D; H12090228-011C; H12090228-011D; H12090228-012C; H12090228-012D; H12090228-013C; H12090228-013D; H12090228-014C; H12090228-014D; H12090228-015C; H12090228-015D; H12090228-016C; H12090228-016D; H12090228-017C; H12090228-017D; H12090228-018C; H12090228-018D; H12090228-019C; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 162** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **E200.8**

Analysis Date: **09/18/12 03:13** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0511	0.0050	0.05		102	90	110				
Cadmium	0.0257	0.0010	0.025		103	90	110				
Copper	0.0520	0.010	0.05		104	90	110				
Lead	0.0489	0.010	0.05		98	90	110				
Zinc	0.0535	0.010	0.05		107	90	110				

Associated samples: **H12090228-001C; H12090228-001D; H12090228-002C; H12090228-002D; H12090228-003C; H12090228-003D; H12090228-004C; H12090228-004D; H12090228-005C; H12090228-005D; H12090228-006C; H12090228-006D; H12090228-007C; H12090228-007D; H12090228-008C; H12090228-008D; H12090228-009C; H12090228-009D; H12090228-010C; H12090228-010D; H12090228-011C; H12090228-011D; H12090228-012C; H12090228-012D; H12090228-013C; H12090228-013D; H12090228-014C; H12090228-014D; H12090228-015C; H12090228-015D; H12090228-016C; H12090228-016D; H12090228-017C; H12090228-017D; H12090228-018C; H12090228-018D; H12090228-019C; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 163** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.8**

Analysis Date: **09/18/12 03:18** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	4.40E-05	0.0050									
Cadmium	0.000924	0.0010									
Copper	-8.00E-06	0.010									
Lead	0.000250	0.010									
Zinc	0.00146	0.010									

Associated samples: **H12090228-001C; H12090228-001D; H12090228-002C; H12090228-002D; H12090228-003C; H12090228-003D; H12090228-004C; H12090228-004D; H12090228-005C; H12090228-005D; H12090228-006C; H12090228-006D; H12090228-007C; H12090228-007D; H12090228-008C; H12090228-008D; H12090228-009C; H12090228-009D; H12090228-010C; H12090228-010D; H12090228-011C; H12090228-011D; H12090228-012C; H12090228-012D; H12090228-013C; H12090228-013D; H12090228-014C; H12090228-014D; H12090228-015C; H12090228-015D; H12090228-016C; H12090228-016D; H12090228-017C; H12090228-017D; H12090228-018C; H12090228-018D; H12090228-019C; H12090228-019D**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R82986

Run ID :Run Order: **ICPMS204-B_120917A: 164** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**

Analysis Date: **09/18/12 03:22** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0107	0.0050	0.01		107	70	130				
Cadmium	0.0106	0.0010	0.01		106	70	130				
Copper	0.0205	0.010	0.02		103	70	130				
Lead	0.000186	0.010				0	0				
Zinc	0.0118	0.010	0.01		118	70	130				

Associated samples: **H12090228-001C; H12090228-001D; H12090228-002C; H12090228-002D; H12090228-003C; H12090228-003D; H12090228-004C; H12090228-004D; H12090228-005C; H12090228-005D; H12090228-006C; H12090228-006D; H12090228-007C; H12090228-007D; H12090228-008C; H12090228-008D; H12090228-009C; H12090228-009D; H12090228-010C; H12090228-010D; H12090228-011C; H12090228-011D; H12090228-012C; H12090228-012D; H12090228-013C; H12090228-013D; H12090228-014C; H12090228-014D; H12090228-015C; H12090228-015D; H12090228-016C; H12090228-016D; H12090228-017C; H12090228-017D; H12090228-018C; H12090228-018D; H12090228-019C; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 249** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **E200.8**

Analysis Date: **09/19/12 04:42** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0484	0.0050	0.05		97	90	110				
Cadmium	0.0254	0.0010	0.025		101	90	110				
Copper	0.0497	0.010	0.05		99	90	110				
Lead	0.0480	0.010	0.05		96	90	110				
Zinc	0.0496	0.010	0.05		99	90	110				

Associated samples: **H12090228-001C; H12090228-001D; H12090228-002C; H12090228-002D; H12090228-003C; H12090228-003D; H12090228-004C; H12090228-004D; H12090228-005C; H12090228-005D; H12090228-006C; H12090228-006D; H12090228-007C; H12090228-007D; H12090228-008C; H12090228-008D; H12090228-009C; H12090228-009D; H12090228-010C; H12090228-010D; H12090228-011C; H12090228-011D; H12090228-012C; H12090228-012D; H12090228-013C; H12090228-013D; H12090228-014C; H12090228-014D; H12090228-015C; H12090228-015D; H12090228-016C; H12090228-016D; H12090228-017C; H12090228-017D; H12090228-018C; H12090228-018D; H12090228-019C; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 250** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.8**

Analysis Date: **09/19/12 04:47** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.000105	0.0050									
Cadmium	0.000928	0.0010									
Copper	0.000182	0.010									
Lead	0.000169	0.010									
Zinc	0.00143	0.010									

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R82986

Run ID :Run Order: **ICPMS204-B_120917A: 250** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.8**

Analysis Date: **09/19/12 04:47** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Associated samples: **H12090228-001C; H12090228-001D; H12090228-002C; H12090228-002D; H12090228-003C; H12090228-003D; H12090228-004C; H12090228-004D; H12090228-005C; H12090228-005D; H12090228-006C; H12090228-006D; H12090228-007C; H12090228-007D; H12090228-008C; H12090228-008D; H12090228-009C; H12090228-009D; H12090228-010C; H12090228-010D; H12090228-011C; H12090228-011D; H12090228-012C; H12090228-012D; H12090228-013C; H12090228-013D; H12090228-014C; H12090228-014D; H12090228-015C; H12090228-015D; H12090228-016C; H12090228-016D; H12090228-017C; H12090228-017D; H12090228-018C; H12090228-018D; H12090228-019C; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 251** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**

Analysis Date: **09/19/12 04:52** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0103	0.0050	0.01		103	70	130				
Cadmium	0.0104	0.0010	0.01		104	70	130				
Copper	0.0201	0.010	0.02		101	70	130				
Lead	0.000177	0.010				0	0				
Zinc	0.0108	0.010	0.01		108	70	130				

Associated samples: **H12090228-001C; H12090228-001D; H12090228-002C; H12090228-002D; H12090228-003C; H12090228-003D; H12090228-004C; H12090228-004D; H12090228-005C; H12090228-005D; H12090228-006C; H12090228-006D; H12090228-007C; H12090228-007D; H12090228-008C; H12090228-008D; H12090228-009C; H12090228-009D; H12090228-010C; H12090228-010D; H12090228-011C; H12090228-011D; H12090228-012C; H12090228-012D; H12090228-013C; H12090228-013D; H12090228-014C; H12090228-014D; H12090228-015C; H12090228-015D; H12090228-016C; H12090228-016D; H12090228-017C; H12090228-017D; H12090228-018C; H12090228-018D; H12090228-019C; H12090228-019D**

Run ID :Run Order: **ICPMS204-B_120917A: 291** SampType: **Sample Matrix Spike** Sample ID: **H12090228-009CMS** Method: **E200.8**

Analysis Date: **09/19/12 07:59** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0544	0.0010	0.05	0.004375	100	70	130				
Cadmium	0.0469	0.0010	0.05	0.0000099	94	70	130				
Copper	0.0487	0.0050	0.05	0.0007074	96	70	130				
Lead	0.0483	0.0010	0.05	0.0000165	96	70	130				
Zinc	0.0603	0.010	0.05	0.01204	96	70	130				

Associated samples: **H12090228-001C; H12090228-002C; H12090228-003C; H12090228-004C; H12090228-005C; H12090228-006C; H12090228-007C; H12090228-008C; H12090228-009C; H12090228-010C; H12090228-011C; H12090228-012C; H12090228-013C; H12090228-014C; H12090228-015C; H12090228-016C; H12090228-017C; H12090228-018C; H12090228-019C**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R82986

Run ID :Run Order: **ICPMS204-B_120917A: 292** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-009CMSD** Method: **E200.8**

Analysis Date: **09/19/12 08:03** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0529	0.0010	0.05	0.004375	97	70	130	0.05438	2.8	20	
Cadmium	0.0464	0.0010	0.05	0.0000099	93	70	130	0.04686	1.1	20	
Copper	0.0468	0.0050	0.05	0.0007074	92	70	130	0.04869	3.9	20	
Lead	0.0483	0.0010	0.05	0.0000165	96	70	130	0.04826	0.0	20	
Zinc	0.0557	0.010	0.05	0.01204	87	70	130	0.06027	7.9	20	

Associated samples: **H12090228-001C; H12090228-002C; H12090228-003C; H12090228-004C; H12090228-005C; H12090228-006C; H12090228-007C; H12090228-008C; H12090228-009C; H12090228-010C; H12090228-011C; H12090228-012C; H12090228-013C; H12090228-014C; H12090228-015C; H12090228-016C; H12090228-017C; H12090228-018C; H12090228-019C**

Run ID :Run Order: **ICPMS204-B_120917A: 326** SampType: **Sample Matrix Spike** Sample ID: **H12090228-019CMS** Method: **E200.8**

Analysis Date: **09/19/12 10:42** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0473	0.0010	0.05		95	70	130				
Cadmium	0.0463	0.0010	0.05		93	70	130				
Copper	0.0470	0.0050	0.05	0.0000364	94	70	130				
Lead	0.0473	0.0010	0.05		95	70	130				
Zinc	0.0567	0.010	0.05	0.01059	92	70	130				

Associated samples: **H12090228-001C; H12090228-002C; H12090228-003C; H12090228-004C; H12090228-005C; H12090228-006C; H12090228-007C; H12090228-008C; H12090228-009C; H12090228-010C; H12090228-011C; H12090228-012C; H12090228-013C; H12090228-014C; H12090228-015C; H12090228-016C; H12090228-017C; H12090228-018C; H12090228-019C**

Run ID :Run Order: **ICPMS204-B_120917A: 327** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-019CMSD** Method: **E200.8**

Analysis Date: **09/19/12 10:47** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0467	0.0010	0.05		93	70	130	0.04733	1.3	20	
Cadmium	0.0463	0.0010	0.05		93	70	130	0.04631	0.1	20	
Copper	0.0464	0.0050	0.05	0.0000364	93	70	130	0.04702	1.3	20	
Lead	0.0474	0.0010	0.05		95	70	130	0.04731	0.1	20	
Zinc	0.0555	0.010	0.05	0.01059	90	70	130	0.05674	2.1	20	

Associated samples: **H12090228-001C; H12090228-002C; H12090228-003C; H12090228-004C; H12090228-005C; H12090228-006C; H12090228-007C; H12090228-008C; H12090228-009C; H12090228-010C; H12090228-011C; H12090228-012C; H12090228-013C; H12090228-014C; H12090228-015C; H12090228-016C; H12090228-017C; H12090228-018C; H12090228-019C**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R82991

Run ID :Run Order: **FIA203-HE_120917B: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E353.2**
Analysis Date: **09/17/12 14:31** 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	1.00	0.010	1		100	90	110				

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E**

Run ID :Run Order: **FIA203-HE_120917B: 9** SampType: **Laboratory Fortified Blank** Sample ID: **LFB** Method: **E353.2**
Analysis Date: **09/17/12 14:32** 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	0.979	0.010	1		98	90	110				

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E**

Run ID :Run Order: **FIA203-HE_120917B: 12** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **E353.2**
Analysis Date: **09/17/12 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
Nitrogen, Nitrate+Nitrite as N	-0.0108	0.010				0	0				

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E**

Run ID :Run Order: **FIA203-HE_120917B: 13** SampType: **Method Blank** Sample ID: **MBLK** Method: **E353.2**
Analysis Date: **09/17/12 14:37** 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
Nitrogen, Nitrate+Nitrite as N	ND	0.002									

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E**

Run ID :Run Order: **FIA203-HE_120917B: 85** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E353.2**
Analysis Date: **09/17/12 16:04** 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
Nitrogen, Nitrate+Nitrite as N	0.487	0.010	0.5		97	90	110				

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R82991

Run ID :Run Order: **FIA203-HE_120917B: 93** SampType: **Sample Matrix Spike** Sample ID: **H12090228-001EMS** Method: **E353.2**
Analysis Date: **09/17/12 16:13** 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	0.953	0.010	1		95	90	110				

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E**

Run ID :Run Order: **FIA203-HE_120917B: 94** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-001EMSD** Method: **E353.2**
Analysis Date: **09/17/12 16:14** 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	0.955	0.010	1		96	90	110	0.9529	0.2	20	

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E**

Run ID :Run Order: **FIA203-HE_120917B: 99** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E353.2**
Analysis Date: **09/17/12 16:20** 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, Nitrate+Nitrite as N	0.486	0.010	0.5		97	90	110				

Associated samples: **H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E**

Run ID :Run Order: **FIA203-HE_120917B: 103** SampType: **Sample Matrix Spike** Sample ID: **H12090228-007EMS** Method: **E353.2**
Analysis Date: **09/17/12 16:25** 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, Nitrate+Nitrite as N	0.967	0.010	1		97	90	110				

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E**

Run ID :Run Order: **FIA203-HE_120917B: 104** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-007EMSD** Method: **E353.2**
Analysis Date: **09/17/12 16:26** 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, Nitrate+Nitrite as N	0.971	0.010	1		97	90	110	0.967	0.5	20	

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R82996

Run ID :Run Order: **MAN-TECH_120917A: 48** SampType: **Method Blank** Sample ID: **MBLK** Method: **A2320 B**
Analysis Date: **09/17/12 17:48** 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
Alkalinity, Total as CaCO3	1	1									

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **MAN-TECH_120917A: 50** SampType: **Laboratory Control Sample** Sample ID: **LCS-09132012** Method: **A2320 B**
Analysis Date: **09/17/12 17:56** 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
Alkalinity, Total as CaCO3	640	4.0	600	1.29	106	90	110				

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **MAN-TECH_120917A: 70** SampType: **Sample Duplicate** Sample ID: **H12090226-005ADUP** Method: **A2320 B**
Analysis Date: **09/17/12 19:21** 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	880	4.0						874.2	0.2	10	
Bicarbonate as HCO3	1100	4.0						1066	0.2	10	

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **MAN-TECH_120917A: 74** SampType: **Sample Matrix Spike** Sample ID: **H12090226-006AMS** Method: **A2320 B**
Analysis Date: **09/17/12 19:41** 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	1400	4.0	600	844.8	99	80	120				

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **MAN-TECH_120917A: 89** SampType: **Sample Duplicate** Sample ID: **H12090228-007ADUP** Method: **A2320 B**
Analysis Date: **09/17/12 20:54** 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	ND	4.0								10	

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R82996

Run ID :Run Order: **MAN-TECH_120917A: 89** SampType: **Sample Duplicate** Sample ID: **H12090228-007ADUP** Method: **A2320 B**
Analysis Date: **09/17/12 20:54** 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
Bicarbonate as HCO3	ND	4.0								10	

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **MAN-TECH_120917A: 92** SampType: **Method Blank** Sample ID: **MBLK** Method: **A2320 B**
Analysis Date: **09/17/12 21:02** 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	1									

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **MAN-TECH_120917A: 94** SampType: **Laboratory Control Sample** Sample ID: **LCS-09132012** Method: **A2320 B**
Analysis Date: **09/17/12 21:11** 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	640	4.0	600		106	90	110				

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **MAN-TECH_120917A: 105** SampType: **Sample Duplicate** Sample ID: **H12090228-016ADUP** Method: **A2320 B**
Analysis Date: **09/17/12 22:24** 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						131.4	0.4	10	
Bicarbonate as HCO3	140	4.0						145.7	0.6	10	

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **MAN-TECH_120917A: 108** SampType: **Sample Matrix Spike** Sample ID: **H12090228-017AMS** Method: **A2320 B**
Analysis Date: **09/17/12 22:40** 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
Alkalinity, Total as CaCO3	810	4.0	600	115	116	80	120				

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R82996

Run ID :Run Order: **MAN-TECH_120917A: 108** SampType: **Sample Matrix Spike** Sample ID: **H12090228-017AMS** Method: **A2320 B**

Analysis Date: **09/17/12 22:40** 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

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **MAN-TECH_120917A: 124** SampType: **Sample Duplicate** Sample ID: **H12090231-013ADUP** Method: **A2320 B**

Analysis Date: **09/17/12 23:50** 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	77	4.0						75.41	1.5	10	
Bicarbonate as HCO3	93	4.0						92	1.5	10	

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83021

Run ID :Run Order: **FIA203-HE_120918A: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E353.2**
Analysis Date: **09/18/12 13:44** 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, Nitrate+Nitrite as N	1.01	0.010	1		101	90	110				

Associated samples: **H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120918A: 9** SampType: **Laboratory Fortified Blank** Sample ID: **LFB** Method: **E353.2**
Analysis Date: **09/18/12 13:45** 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	0.953	0.010	1		95	90	110				

Associated samples: **H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120918A: 10** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E353.2**
Analysis Date: **09/18/12 13:46** 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	0.498	0.010	0.5		100	90	110				

Associated samples: **H12090228-015E; H12090228-016E; H12090228-017E**

Run ID :Run Order: **FIA203-HE_120918A: 12** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **E353.2**
Analysis Date: **09/18/12 13:48** 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	-0.00750	0.010				0	0				

Associated samples: **H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120918A: 13** SampType: **Method Blank** Sample ID: **MBLK** Method: **E353.2**
Analysis Date: **09/18/12 13:50** 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, Nitrate+Nitrite as N	ND	0.002									

Associated samples: **H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83021

Run ID :Run Order: **FIA203-HE_120918A: 23** SampType: **Sample Matrix Spike** Sample ID: **H12090228-015EMS** Method: **E353.2**
Analysis Date: **09/18/12 14:02** 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	0.945	0.010	1	0.005092	94	90	110				

Associated samples: **H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120918A: 24** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-015EMSD** Method: **E353.2**
Analysis Date: **09/18/12 14:03** 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
Nitrogen, Nitrate+Nitrite as N	0.935	0.010	1	0.005092	93	90	110	0.9454	1.1	20	

Associated samples: **H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120918A: 28** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E353.2**
Analysis Date: **09/18/12 14:08** 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, Nitrate+Nitrite as N	0.488	0.010	0.5		98	90	110				

Associated samples: **H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120918A: 31** SampType: **Sample Matrix Spike** Sample ID: **H12090228-019EMS** Method: **E353.2**
Analysis Date: **09/18/12 14:11** 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	0.927	0.010	1		93	90	110				

Associated samples: **H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120918A: 32** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-019EMSD** Method: **E353.2**
Analysis Date: **09/18/12 14:12** 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	0.937	0.010	1		94	90	110	0.9269	1.1	20	

Associated samples: **H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83033

Run ID :Run Order: **ICP2-HE_120918A: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**

Analysis Date: **09/18/12 10:47** 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
Calcium	39.2	1.0	40		98	95	105				
Magnesium	39.6	1.0	40		99	95	105				

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

Run ID :Run Order: **ICP2-HE_120918A: 7** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV-1** Method: **E200.7**

Analysis Date: **09/18/12 10:51** 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
Calcium	24.7	1.0	25		99	95	105				
Magnesium	24.6	1.0	25		98	95	105				

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

Run ID :Run Order: **ICP2-HE_120918A: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**

Analysis Date: **09/18/12 11:02** 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
Calcium	457	1.0	500		91	80	120				
Magnesium	499	1.0	500		100	80	120				

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

Run ID :Run Order: **ICP2-HE_120918A: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**

Analysis Date: **09/18/12 11:06** 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
Calcium	453	1.0	500		91	80	120				
Magnesium	495	1.0	500		99	80	120				

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D; H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D; H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83033

Run ID :Run Order: **ICP2-HE_120918A: 55** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E200.7**

Analysis Date: **09/18/12 13:53** 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
Calcium	24.3	1.0	25		97	90	110				
Magnesium	24.9	1.0	25		100	90	110				

Associated samples: **H12090228-001D; H12090228-002D; H12090228-003D; H12090228-004D; H12090228-005D**

Run ID :Run Order: **ICP2-HE_120918A: 74** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E200.7**

Analysis Date: **09/18/12 15:04** 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
Calcium	24.8	1.0	25		99	90	110				
Magnesium	24.2	1.0	25		97	90	110				

Associated samples: **H12090228-006D; H12090228-007D; H12090228-008D; H12090228-009D; H12090228-010D; H12090228-011D; H12090228-012D; H12090228-013D**

Run ID :Run Order: **ICP2-HE_120918A: 86** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E200.7**

Analysis Date: **09/18/12 15:49** 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
Calcium	24.4	1.0	25		98	90	110				
Magnesium	23.6	1.0	25		94	90	110				

Associated samples: **H12090228-014D; H12090228-015D; H12090228-016D; H12090228-017D; H12090228-018D; H12090228-019D**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83053

Run ID :Run Order: **FIA203-HE_120919A: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **A4500 N-C**
Analysis Date: **09/19/12 13:35** 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
Nitrogen, Total	1.01	0.10	1		101	90	110				

Associated samples: **H12090228-001B; H12090228-002B; H12090228-003B; H12090228-004B; H12090228-005B; H12090228-006B; H12090228-007B; H12090228-008B**

Run ID :Run Order: **FIA203-HE_120919A: 11** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **A4500 N-C**
Analysis Date: **09/19/12 13:39** 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	-0.00461	0.10				0	0				

Associated samples: **H12090228-001B; H12090228-002B; H12090228-003B; H12090228-004B; H12090228-005B; H12090228-006B; H12090228-007B; H12090228-008B**

Run ID :Run Order: **FIA203-HE_120919A: 92** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **A4500 N-C**
Analysis Date: **09/19/12 15:16** 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
Nitrogen, Total	0.483	0.10	0.5		97	90	110				

Associated samples: **H12090228-001B; H12090228-002B; H12090228-003B; H12090228-004B; H12090228-005B; H12090228-006B; H12090228-007B; H12090228-008B**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83065

Run ID :Run Order: **IC102-H_120919A: 14** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV091812-12** Method: **E300.0**
Analysis Date: **09/19/12 09:29** 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	400	1.0	400		99	90	110				

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **IC102-H_120919A: 15** SampType: **Method Blank** Sample ID: **ICB091812-13** Method: **E300.0**
Analysis Date: **09/19/12 09:41** 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	ND	0.1									

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **IC102-H_120919A: 20** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E300.0**
Analysis Date: **09/19/12 11:08** 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
Sulfate	400	1.0	400		99	90	110				

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **IC102-H_120919A: 22** SampType: **Laboratory Fortified Blank** Sample ID: **LFB** Method: **E300.0**
Analysis Date: **09/19/12 11:33** 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	200	1.0	200		100	90	110				

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **IC102-H_120919A: 49** SampType: **Sample Matrix Spike** Sample ID: **H12090226-008AMS** Method: **E300.0**
Analysis Date: **09/19/12 17:14** 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	1800	1.0	1000	783	100	90	110				

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83065

Run ID :Run Order: **IC102-H_120919A: 49** SampType: **Sample Matrix Spike** Sample ID: **H12090226-008AMS** Method: **E300.0**

Analysis Date: **09/19/12 17:14** 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

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **IC102-H_120919A: 50** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090226-008AMSD** Method: **E300.0**

Analysis Date: **09/19/12 17:26** 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
Sulfate	1800	1.0	1000	783	101	90	110	1784	0.8	20	

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **IC102-H_120919A: 52** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV091812-44** Method: **E300.0**

Analysis Date: **09/19/12 17:51** 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	400	1.0	400		99	90	110				

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A**

Run ID :Run Order: **IC102-H_120919A: 64** SampType: **Sample Matrix Spike** Sample ID: **H12090228-009AMS** Method: **E300.0**

Analysis Date: **09/19/12 20:23** 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	220	1.0	200	11.34	103	90	110				

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **IC102-H_120919A: 65** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-009AMSD** Method: **E300.0**

Analysis Date: **09/19/12 20:35** 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
Sulfate	230	1.0	200	11.34	108	90	110	217.5	4.1	20	

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83065

Run ID :Run Order: **IC102-H_120919A: 66** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV091812-58** Method: **E300.0**

Analysis Date: **09/19/12 20:48** 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	400	1.0	400		99	90	110				

Associated samples: **H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **IC102-H_120919A: 78** SampType: **Sample Matrix Spike** Sample ID: **H12090228-019AMS** Method: **E300.0**

Analysis Date: **09/19/12 23:19** 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	200	1.0	200		101	90	110				

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

Run ID :Run Order: **IC102-H_120919A: 79** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-019AMSD** Method: **E300.0**

Analysis Date: **09/19/12 23:32** 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
Sulfate	200	1.0	200		102	90	110	202.4	1.2	20	

Associated samples: **H12090228-001A; H12090228-002A; H12090228-003A; H12090228-004A; H12090228-005A; H12090228-006A; H12090228-007A; H12090228-008A; H12090228-009A; H12090228-010A; H12090228-011A; H12090228-012A; H12090228-013A; H12090228-014A; H12090228-015A; H12090228-016A; H12090228-017A; H12090228-018A; H12090228-019A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83081

Run ID :Run Order: **FIA202-HE_120920A: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E365.1**
Analysis Date: **09/20/12 14:24** 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
Phosphorus, Total as P	0.246	0.010	0.25		98	90	110				

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E**

Run ID :Run Order: **FIA202-HE_120920A: 13** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **E365.1**
Analysis Date: **09/20/12 14:29** 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
Phosphorus, Total as P	-0.00400	0.010				0	0				

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E**

Run ID :Run Order: **FIA202-HE_120920A: 29** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E365.1**
Analysis Date: **09/20/12 14:45** 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
Phosphorus, Total as P	0.248	0.010	0.25		99	90	110				

Associated samples: **H12090228-001E; H12090228-002E**

Run ID :Run Order: **FIA202-HE_120920A: 45** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E365.1**
Analysis Date: **09/20/12 15:02** 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	0.250	0.010	0.25		100	90	110				

Associated samples: **H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83158

Run ID :Run Order: **FIA203-HE_120924A: 8** SampType: **Laboratory Fortified Blank** Sample ID: **LFB** Method: **E350.1**
Analysis Date: **09/24/12 10:12** 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	0.996	0.050	1		100	90	110				

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120924A: 9** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E350.1**
Analysis Date: **09/24/12 10:13** 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	0.530	0.050	0.5		106	90	110				

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E**

Run ID :Run Order: **FIA203-HE_120924A: 10** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **E350.1**
Analysis Date: **09/24/12 10:14** 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	0.00266	0.050				0	0				

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120924A: 11** SampType: **Method Blank** Sample ID: **MBLK** Method: **E350.1**
Analysis Date: **09/24/12 10:15** 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	0.02									

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120924A: 14** SampType: **Sample Matrix Spike** Sample ID: **H12090214-001EMS** Method: **E350.1**
Analysis Date: **09/24/12 10:19** 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	0.823	0.050	1		82	80	120				

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83158

Run ID :Run Order: **FIA203-HE_120924A: 14** SampType: **Sample Matrix Spike** Sample ID: **H12090214-001EMS** Method: **E350.1**

Analysis Date: **09/24/12 10:19** 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

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120924A: 15** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090214-001EMSD** Method: **E350.1**

Analysis Date: **09/24/12 10:20** 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, Ammonia as N	0.844	0.050	1		84	80	120	0.8226	2.6	10	

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120924A: 19** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E350.1**

Analysis Date: **09/24/12 10:25** 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	0.964	0.050	1		96	90	110				

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120924A: 26** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E350.1**

Analysis Date: **09/24/12 10:33** 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	0.508	0.050	0.5		102	90	110				

Associated samples: **H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E**

Run ID :Run Order: **FIA203-HE_120924A: 28** SampType: **Sample Matrix Spike** Sample ID: **H12090228-009EMS** Method: **E350.1**

Analysis Date: **09/24/12 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, Ammonia as N	0.821	0.050	1		82	80	120				

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83158

Run ID :Run Order: **FIA203-HE_120924A: 29** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-009EMSD** Method: **E350.1**

Analysis Date: **09/24/12 10:37** 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
Nitrogen, Ammonia as N	0.838	0.050	1		84	80	120	0.8208	2.1	10	

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120924A: 40** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E350.1**

Analysis Date: **09/24/12 10:50** 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, Ammonia as N	0.502	0.050	0.5		100	90	110				

Associated samples: **H12090228-019E**

Run ID :Run Order: **FIA203-HE_120924A: 42** SampType: **Sample Matrix Spike** Sample ID: **H12090228-019EMS** Method: **E350.1**

Analysis Date: **09/24/12 10:52** 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	0.924	0.050	1		92	80	120				

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA203-HE_120924A: 43** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12090228-019EMSD** Method: **E350.1**

Analysis Date: **09/24/12 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, Ammonia as N	0.936	0.050	1		94	80	120	0.9243	1.2	10	

Associated samples: **H12090228-001E; H12090228-002E; H12090228-003E; H12090228-004E; H12090228-005E; H12090228-006E; H12090228-007E; H12090228-008E; H12090228-009E; H12090228-010E; H12090228-011E; H12090228-012E; H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: R83193

Date: *29-Oct-12*

Run ID :Run Order: **FIA202-HE_120925A: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E365.1**

Analysis Date: **09/25/12 14:38** 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
Phosphorus, Total as P	0.243	0.010	0.25		97	90	110				

Associated samples: **H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA202-HE_120925A: 11** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **E365.1**

Analysis Date: **09/25/12 14:41** 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	0.251	0.010	0.25		100	90	110				

Associated samples: **H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

Run ID :Run Order: **FIA202-HE_120925A: 13** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **E365.1**

Analysis Date: **09/25/12 14:43** 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	0.000460	0.010				0	0				

Associated samples: **H12090228-013E; H12090228-014E; H12090228-015E; H12090228-016E; H12090228-017E; H12090228-018E; H12090228-019E**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83194

Run ID :Run Order: **FIA203-HE_120925A: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **A4500 N-C**

Analysis Date: **09/25/12 10:56** 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
Nitrogen, Total	1.03	0.10	1		103	90	110				

Associated samples: **H12090228-009B; H12090228-010B; H12090228-011B; H12090228-012B; H12090228-013B; H12090228-014B; H12090228-015B; H12090228-016B; H12090228-017B; H12090228-018B; H12090228-019B**

Run ID :Run Order: **FIA203-HE_120925A: 10** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **A4500 N-C**

Analysis Date: **09/25/12 10:58** 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	0.492	0.10	0.5		99	90	110				

Associated samples: **H12090228-009B; H12090228-010B**

Run ID :Run Order: **FIA203-HE_120925A: 11** SampType: **Initial Calibration Blank, Instrument Blank** Sample ID: **ICB** Method: **A4500 N-C**

Analysis Date: **09/25/12 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
Nitrogen, Total	-0.00503	0.10				0	0				

Associated samples: **H12090228-009B; H12090228-010B; H12090228-011B; H12090228-012B; H12090228-013B; H12090228-014B; H12090228-015B; H12090228-016B; H12090228-017B; H12090228-018B; H12090228-019B**

Run ID :Run Order: **FIA203-HE_120925A: 26** SampType: **Continuing Calibration Verification Standard** Sample ID: **CCV** Method: **A4500 N-C**

Analysis Date: **09/25/12 11:17** 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	0.489	0.10	0.5		98	90	110				

Associated samples: **H12090228-011B; H12090228-012B; H12090228-013B; H12090228-014B; H12090228-015B; H12090228-016B; H12090228-017B; H12090228-018B; H12090228-019B**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83461

Run ID :Run Order: **ICP2-HE_121004B: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**

Analysis Date: **10/04/12 10:01** 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
Cadmium	0.383	0.0010	0.4		96	90	110				
Copper	0.799	0.010	0.8		100	90	110				
Lead	0.795	0.013	0.8		99	90	110				
Zinc	0.791	0.010	0.8		99	90	110				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-034A; H12090228-035A; H12090228-036A; H12090228-037A**

Run ID :Run Order: **ICP2-HE_121004B: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**

Analysis Date: **10/04/12 10:16** 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
Cadmium	0.00198	0.0010				0	0				
Copper	-0.000310	0.010				0	0				
Lead	0.0240	0.013				0	0				
Zinc	0.00687	0.010				0	0				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-034A; H12090228-035A; H12090228-036A; H12090228-037A**

Run ID :Run Order: **ICP2-HE_121004B: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**

Analysis Date: **10/04/12 10:20** 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
Cadmium	0.894	0.0010	1		89	80	120				
Copper	0.501	0.010	0.5		100	80	120				
Lead	0.945	0.013	1		95	80	120				
Zinc	0.986	0.010	1		99	80	120				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-034A; H12090228-035A; H12090228-036A; H12090228-037A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83501

Run ID :Run Order: **ICP2-HE_121005B: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**

Analysis Date: **10/05/12 10:44** 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	0.776	0.0092	0.8		97	90	110				
Cadmium	0.381	0.0010	0.4		95	90	110				
Copper	0.786	0.010	0.8		98	90	110				
Lead	0.771	0.013	0.8		96	90	110				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-043A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A**

Run ID :Run Order: **ICP2-HE_121005B: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**

Analysis Date: **10/05/12 10:59** 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	0.00255	0.0092				0	0				
Cadmium	0.000890	0.0010				0	0				
Copper	-0.00263	0.010				0	0				
Lead	0.0654	0.013				0	0				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-043A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A**

Run ID :Run Order: **ICP2-HE_121005B: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**

Analysis Date: **10/05/12 11:03** 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	0.994	0.0092	1		99	80	120				
Cadmium	0.847	0.0010	1		85	80	120				
Copper	0.491	0.010	0.5		98	80	120				
Lead	0.889	0.013	1		89	80	120				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-043A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83536

Run ID :Run Order: **ICP2-HE_121008B: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**

Analysis Date: **10/08/12 13:26** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.799	0.0092	0.8		100	90	110				
Cadmium	0.383	0.0010	0.4		96	90	110				
Copper	0.792	0.010	0.8		99	90	110				
Lead	0.748	0.013	0.8		93	90	110				
Zinc	0.783	0.010	0.8		98	90	110				

Associated samples: **H12090228-053A; H12090228-054A; H12090228-055A; H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICP2-HE_121008B: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**

Analysis Date: **10/08/12 13:42** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.0114	0.0092				0	0				
Cadmium	0.00126	0.0010				0	0				
Copper	0.00175	0.010				0	0				
Lead	0.0462	0.013				0	0				
Zinc	0.00819	0.010				0	0				

Associated samples: **H12090228-053A; H12090228-054A; H12090228-055A; H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICP2-HE_121008B: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**

Analysis Date: **10/08/12 13:46** Units: **mg/L** **Prep Info:** Prep Date: Prep Method:

Analytes 5	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	1.06	0.0092	1		106	80	120				
Cadmium	0.894	0.0010	1		89	80	120				
Copper	0.499	0.010	0.5		100	80	120				
Lead	0.941	0.013	1		94	80	120				
Zinc	0.979	0.010	1		98	80	120				

Associated samples: **H12090228-053A; H12090228-054A; H12090228-055A; H12090228-056A; H12090228-057A; H12090228-058A; H12090228-059A; H12090228-060A; H12090228-061A; H12090228-062A; H12090228-063A; H12090228-064A; H12090228-065A; H12090228-066A; H12090228-067A; H12090228-068A; H12090228-069A; H12090228-070A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83579

Run ID :Run Order: **ICP2-HE_121009D: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**

Analysis Date: **10/09/12 15:31** 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
Arsenic	0.800	0.0092	0.8		100	90	110				
Lead	0.788	0.013	0.8		98	90	110				

Associated samples: **H12090228-057A; H12090228-058A; H12090228-060A; H12090228-061A; H12090228-063A; H12090228-064A; H12090228-066A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICP2-HE_121009D: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**

Analysis Date: **10/09/12 15:46** 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
Arsenic	0.00259	0.0092				0	0				
Lead	0.0436	0.013				0	0				

Associated samples: **H12090228-057A; H12090228-058A; H12090228-060A; H12090228-061A; H12090228-063A; H12090228-064A; H12090228-066A; H12090228-069A; H12090228-070A**

Run ID :Run Order: **ICP2-HE_121009D: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**

Analysis Date: **10/09/12 15:50** 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
Arsenic	1.08	0.0092	1		108	80	120				
Lead	0.960	0.013	1		96	80	120				

Associated samples: **H12090228-057A; H12090228-058A; H12090228-060A; H12090228-061A; H12090228-063A; H12090228-064A; H12090228-066A; H12090228-069A; H12090228-070A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83594

Run ID :Run Order: **ICPMS204-B_121008B: 8** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **SW6020**

Analysis Date: **10/09/12 19:58** 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
Arsenic	0.0498	0.0010	0.05		100	90	110				
Cadmium	0.0257	0.0010	0.025		103	90	110				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-034A; H12090228-036A; H12090228-038A; H12090228-039A; H12090228-040A; H12090228-042A; H12090228-043A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-054A; H12090228-055A; H12090228-057A; H12090228-058A; H12090228-060A; H12090228-061A; H12090228-063A; H12090228-064A; H12090228-066A; H12090228-067A; H12090228-069A; H12090228-070A**

Client: MT DEQ-Federal Superfund
Work Order: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: R83600

Date: *29-Oct-12*

Run ID :Run Order: **ICP2-HE_121010A: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**
Analysis Date: **10/10/12 11:43** 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
Arsenic	0.773	0.0092	0.8		97	90	110				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-035A; H12090228-036A; H12090228-037A**

Run ID :Run Order: **ICP2-HE_121010A: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**
Analysis Date: **10/10/12 11:58** 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
Arsenic	-0.00109	0.0092				0	0				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-035A; H12090228-036A; H12090228-037A**

Run ID :Run Order: **ICP2-HE_121010A: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**
Analysis Date: **10/10/12 12:02** 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	1.05	0.0092	1		105	80	120				

Associated samples: **H12090228-020A; H12090228-021A; H12090228-022A; H12090228-023A; H12090228-024A; H12090228-025A; H12090228-026A; H12090228-027A; H12090228-028A; H12090228-029A; H12090228-030A; H12090228-031A; H12090228-032A; H12090228-033A; H12090228-035A; H12090228-036A; H12090228-037A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: R83637

Date: *29-Oct-12*

Run ID :Run Order: **ICP2-HE_121011A: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**
Analysis Date: **10/11/12 10:52** 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
Zinc	0.793	0.010	0.8		99	90	110				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121011A: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**
Analysis Date: **10/11/12 11:07** 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
Zinc	0.00638	0.010				0	0				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121011A: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**
Analysis Date: **10/11/12 11:11** 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
Zinc	0.994	0.010	1		99	80	120				

Associated samples: **H12090228-038A; H12090228-039A; H12090228-040A; H12090228-041A; H12090228-042A; H12090228-044A; H12090228-045A; H12090228-046A; H12090228-047A; H12090228-048A; H12090228-049A; H12090228-050A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-055A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83638

Run ID :Run Order: **ICPMS204-B_121010C: 320** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **E200.8**
Analysis Date: **10/10/12 13:39** 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
Zinc	0.0519	0.010	0.05		104	90	110				

Associated samples: **H12090228-019C**

Run ID :Run Order: **ICPMS204-B_121010C: 321** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.8**
Analysis Date: **10/10/12 13:44** 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
Zinc	0.00144	0.010									

Associated samples: **H12090228-019C**

Run ID :Run Order: **ICPMS204-B_121010C: 322** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**
Analysis Date: **10/10/12 13:48** 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
Zinc	0.0115	0.010	0.01		115	70	130				

Associated samples: **H12090228-019C**

Run ID :Run Order: **ICPMS204-B_121010C: 331** SampType: **Method Blank** Sample ID: **ICB** Method: **E200.8**
Analysis Date: **10/10/12 14:28** 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
Zinc	0.0009	0.0004									

Associated samples: **H12090228-019C**

Run ID :Run Order: **ICPMS204-B_121010C: 332** SampType: **Laboratory Fortified Blank** Sample ID: **LFB** Method: **E200.8**
Analysis Date: **10/10/12 14:33** 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
Zinc	0.0485	0.010	0.05	0.0008917	95	85	115				

Associated samples: **H12090228-019C**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83638

Run ID :Run Order: **ICPMS204-B_121010C: 519** SampType: **Sample Matrix Spike** Sample ID: **H12100143-006BMS** Method: **E200.8**
Analysis Date: **10/12/12 07:00** 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
Zinc	0.0844	0.010	0.05	0.02787	113	70	130				

Associated samples: **H12090228-019C**

Run ID :Run Order: **ICPMS204-B_121010C: 520** SampType: **Sample Matrix Spike Duplicate** Sample ID: **H12100143-006BMSD** Method: **E200.8**
Analysis Date: **10/12/12 07:05** 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
Zinc	0.0764	0.010	0.05	0.02787	97	70	130	0.08436	9.9	20	

Associated samples: **H12090228-019C**

Run ID :Run Order: **ICPMS204-B_121010C: 542** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **E200.8**
Analysis Date: **10/12/12 08:51** 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
Zinc	0.0517	0.010	0.05		103	90	110				

Associated samples: **H12090228-019C**

Run ID :Run Order: **ICPMS204-B_121010C: 543** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.8**
Analysis Date: **10/12/12 08:55** 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
Zinc	0.00163	0.010									

Associated samples: **H12090228-019C**

Run ID :Run Order: **ICPMS204-B_121010C: 544** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**
Analysis Date: **10/12/12 09:00** 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
Zinc	0.0115	0.010	0.01		115	70	130				

Associated samples: **H12090228-019C**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: R83638

Date: *29-Oct-12*

Run ID :Run Order: **ICPMS204-B_121010C: 581** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.8**

Analysis Date: **10/12/12 11:50** 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
Zinc	0.00143	0.010									

Associated samples: **H12090228-019C**

Run ID :Run Order: **ICPMS204-B_121010C: 582** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.8**

Analysis Date: **10/12/12 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
Zinc	0.0116	0.010	0.01		116	70	130				

Associated samples: **H12090228-019C**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: R83671

Date: *29-Oct-12*

Run ID :Run Order: **ICP2-HE_121012B: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**
Analysis Date: **10/12/12 09:39** 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	0.801	0.013	0.8		100	90	110				

Associated samples: **H12090228-039A; H12090228-040A; H12090228-048A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-067A**

Run ID :Run Order: **ICP2-HE_121012B: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**
Analysis Date: **10/12/12 09:54** 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
Lead	0.0101	0.013				0	0				

Associated samples: **H12090228-039A; H12090228-040A; H12090228-048A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-067A**

Run ID :Run Order: **ICP2-HE_121012B: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**
Analysis Date: **10/12/12 09:58** 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
Lead	0.959	0.013	1		96	80	120				

Associated samples: **H12090228-039A; H12090228-040A; H12090228-048A; H12090228-051A; H12090228-052A; H12090228-053A; H12090228-054A; H12090228-067A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

Date: *29-Oct-12*

BatchID: R83743

Run ID :Run Order: **ICP2-HE_121016D: 6** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV** Method: **E200.7**

Analysis Date: **10/16/12 12:09** 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	0.792	0.0092	0.8		99	90	110				
Copper	0.801	0.010	0.8		100	90	110				
Lead	0.768	0.013	0.8		96	90	110				
Zinc	0.789	0.010	0.8		99	90	110				

Associated samples: **H12090228-034A; H12090228-037A; H12090228-043A; H12090228-046A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121016D: 10** SampType: **Interference Check Sample A** Sample ID: **ICSA** Method: **E200.7**

Analysis Date: **10/16/12 12:24** 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	0.00754	0.0092				0	0				
Copper	0.00565	0.010				0	0				
Lead	0.0461	0.013				0	0				
Zinc	0.00343	0.010				0	0				

Associated samples: **H12090228-034A; H12090228-037A; H12090228-043A; H12090228-046A; H12090228-055A**

Run ID :Run Order: **ICP2-HE_121016D: 11** SampType: **Interference Check Sample AB** Sample ID: **ICSAB** Method: **E200.7**

Analysis Date: **10/16/12 12:28** 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	1.07	0.0092	1		107	80	120				
Copper	0.505	0.010	0.5		101	80	120				
Lead	0.930	0.013	1		93	80	120				
Zinc	0.989	0.010	1		99	80	120				

Associated samples: **H12090228-034A; H12090228-037A; H12090228-043A; H12090228-046A; H12090228-055A**

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: H12090228
Project: CFR Monitoring-474374

ANALYTICAL QC SUMMARY REPORT

Prepared by Helena, MT Branch

BatchID: R83774

Date: *29-Oct-12*

Run ID :Run Order: **ICPMS204-B_121017B: 7** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **SW6020**

Analysis Date: **10/17/12 11:40** 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
Cadmium	0.0257	0.0010	0.025		103	90	110				

Associated samples: **H12090228-037A**

Run ID :Run Order: **ICPMS204-B_121017B: 86** SampType: **Initial Calibration Verification Standard** Sample ID: **ICV STD** Method: **SW6020**

Analysis Date: **10/18/12 02:58** 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
Cadmium	0.0255	0.0010	0.025		102	90	110				

Associated samples: **H12090228-037A**

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

BROOKS RAND LABS
MEANINGFUL METALS DATA®

October 17, 2012

Energy Laboratories, Inc.
ATTN: Jonathan Dee Hager
PO Box 5688
Helena MT 59604
jhager@energylab.com

RE: Project ENL-HL1201

Dear Jonathan Dee Hager,

This report contains results for the 19 samples received by Brooks Rand Labs (BRL) on September 19, 2012. The samples were logged-in for the contracted analyses according to the chain-of-custody form(s). The samples were received, prepared, analyzed, and stored according to BRL SOPs and EPA methodology.

The results were method blank corrected as described in the calculations section of the relevant BRL SOP(s) and may have been evaluated using reporting limits that have been adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details. All data is reported without qualification (with the exception of concentration qualifiers), and all associated quality control sample results meet the acceptance criteria.

BRL, an accredited laboratory, certifies that the reported results of all analyses for which BRL is NELAP accredited meet all NELAP requirements. For more details, please see the *Report Information* page in your report. Please feel free to contact me if you have any questions regarding this report.

Sincerely,

Lydia Greaves

Lydia Greaves
Project Manager
Lydia@brooksrand.com

3958 6th Avenue NW Seattle WA 98107 · P(206) 632-6206 · F(206) 632-6017 · brl@brooksrand.com · www.brooksrand.com

Report Information

Laboratory Accreditation

BRL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BRL is also certified by many other states to perform environmental analyses. For a current list of our accreditations /certifications, please visit our website at <http://www.brooksrand.com/default.asp?contentID=586>. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

BLK	method blank	**MS**	matrix spike
BRL	Brooks Rand Labs	**MSD**	matrix spike duplicate
BS	laboratory fortified blank	**ND**	non-detect
CAL	calibration standard	**NR**	non-reportable
CCV	continuing calibration verification	**PS**	post preparation spike
COC	chain of custody record	**REC**	percent recovery
CRM	certified reference material	**RPD**	relative percent difference
D	dissolved fraction	**RSD**	relative standard deviation
DUP	duplicate	**SCV**	secondary calibration verification
ICV	initial calibration verification	**SOP**	standard operating procedure
MDL	method detection limit	**SRM**	standard reference material
MRL	method reporting limit	**T**	total recoverable fraction

Definition of Data Qualifiers

(Effective 9/23/09)

B Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
E An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H Holding time and/or preservation requirements not met. Result is estimated.
J Estimated value. A full explanation is presented in the narrative.
J-M Duplicate precision (RPD) for associated QC sample was not within acceptance criteria. Result is estimated.
J-N Spike recovery for associated QC sample was not within acceptance criteria. Result is estimated.
M Duplicate precision (RPD) was not within acceptance criteria. Result is estimated.
N Spike recovery was not within acceptance criteria. Result is estimated.
R Rejected, unusable value. A full explanation is presented in the narrative.
U Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.

These qualifiers are based on those previously utilized by Brooks Rand Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BRL.

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Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
H12090228-001H	1238015-01	Water	Sample	09/11/2012	09/19/2012
H12090228-002H	1238015-02	Water	Sample	09/11/2012	09/19/2012
H12090228-003H	1238015-03	Water	Sample	09/11/2012	09/19/2012
H12090228-004H	1238015-04	Water	Sample	09/11/2012	09/19/2012
H12090228-005H	1238015-05	Water	Sample	09/11/2012	09/19/2012
H12090228-006H	1238015-06	Water	Sample	09/11/2012	09/19/2012
H12090228-007H	1238015-07	Water	Sample	09/11/2012	09/19/2012
H12090228-008H	1238015-08	Water	Sample	09/12/2012	09/19/2012
H12090228-009H	1238015-09	Water	Sample	09/12/2012	09/19/2012
H12090228-010H	1238015-10	Water	Sample	09/12/2012	09/19/2012
H12090228-011H	1238015-11	Water	Sample	09/12/2012	09/19/2012
H12090228-012H	1238015-12	Water	Sample	09/12/2012	09/19/2012
H12090228-013H	1238015-13	Water	Sample	09/12/2012	09/19/2012
H12090228-014H	1238015-14	Water	Sample	09/13/2012	09/19/2012
H12090228-015H	1238015-15	Water	Sample	09/13/2012	09/19/2012
H12090228-016H	1238015-16	Water	Sample	09/13/2012	09/19/2012
H12090228-017H	1238015-17	Water	Sample	09/13/2012	09/19/2012
H12090228-018H	1238015-18	Water	Sample	09/13/2012	09/19/2012
H12090228-019H	1238015-19	Water	Sample	09/13/2012	09/19/2012

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
MeHg	Water	EPA 1630	10/01/2012	10/03/2012	B121782	1200756
MeHg	Water	EPA 1630	10/04/2012	10/05/2012	B121783	1200766

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Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
H12090228-001H										
1238015-01	MeHg	Water	T	0.138		0.019	0.048	ng/L	B121782	1200756
H12090228-002H										
1238015-02	MeHg	Water	T	0.056		0.021	0.051	ng/L	B121782	1200756
H12090228-003H										
1238015-03	MeHg	Water	T	0.263		0.020	0.050	ng/L	B121782	1200756
H12090228-004H										
1238015-04	MeHg	Water	T	0.980		0.020	0.050	ng/L	B121782	1200756
H12090228-005H										
1238015-05	MeHg	Water	T	0.151		0.020	0.050	ng/L	B121782	1200756
H12090228-006H										
1238015-06	MeHg	Water	T	0.157		0.020	0.050	ng/L	B121783	1200766
H12090228-007H										
1238015-07	MeHg	Water	T	0.020	U	0.020	0.050	ng/L	B121783	1200766
H12090228-008H										
1238015-08	MeHg	Water	T	0.153		0.020	0.050	ng/L	B121783	1200766
H12090228-009H										
1238015-09	MeHg	Water	T	0.057		0.020	0.050	ng/L	B121783	1200766
H12090228-010H										
1238015-10	MeHg	Water	T	0.118		0.020	0.050	ng/L	B121783	1200766
H12090228-011H										
1238015-11	MeHg	Water	T	0.061		0.020	0.050	ng/L	B121783	1200766
H12090228-012H										
1238015-12	MeHg	Water	T	0.080		0.020	0.049	ng/L	B121783	1200766

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Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
H12090228-013H										
1238015-13	MeHg	Water	T	0.094		0.021	0.052	ng/L	B121783	1200766
H12090228-014H										
1238015-14	MeHg	Water	T	0.029	B	0.020	0.051	ng/L	B121783	1200766
H12090228-015H										
1238015-15	MeHg	Water	T	0.161		0.020	0.050	ng/L	B121783	1200766
H12090228-016H										
1238015-16	MeHg	Water	T	0.123		0.020	0.050	ng/L	B121783	1200766
H12090228-017H										
1238015-17	MeHg	Water	T	0.123		0.020	0.051	ng/L	B121783	1200766
H12090228-018H										
1238015-18	MeHg	Water	T	0.111		0.020	0.051	ng/L	B121783	1200766
H12090228-019H										
1238015-19	MeHg	Water	T	0.020	U	0.020	0.049	ng/L	B121783	1200766

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Accuracy & Precision Summary

Batch: B121782
Lab Matrix: Water
Method: EPA 1630

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B121782-BS1	**Laboratory Fortified Blank (1238001)**						
	MeHg		0.9777	1.024	ng/L	105% 67-133	
B121782-BS2	**Laboratory Fortified Blank (1238001)**						
	MeHg		0.9655	1.012	ng/L	105% 67-133	
B121782-MS1	**Matrix Spike (1237040-03)**						
	MeHg	0.065	0.8093	0.915	ng/L	105% 65-135	
B121782-MSD1	**Matrix Spike Duplicate (1237040-03)**						
	MeHg	0.065	0.8014	0.901	ng/L	104% 65-135	2% 35

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Accuracy & Precision Summary

Batch: B121783
Lab Matrix: Water
Method: EPA 1630

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B121783-BS1	**Laboratory Fortified Blank (1238001)**						
	MeHg		1.009	1.059	ng/L	105% 67-133	
B121783-BS2	**Laboratory Fortified Blank (1238001)**						
	MeHg		1.001	1.078	ng/L	108% 67-133	
B121783-MS1	**Matrix Spike (1238015-14)**						
	MeHg	0.029	149.8	142.3	ng/L	95% 65-135	
B121783-MSD1	**Matrix Spike Duplicate (1238015-14)**						
	MeHg	0.029	150.2	158.3	ng/L	105% 65-135	11% 35
B121783-MS3	**Matrix Spike (1238026-04)**						
	MeHg	0.156	0.4016	0.583	ng/L	106% 65-135	
B121783-MSD3	**Matrix Spike Duplicate (1238026-04)**						
	MeHg	0.156	0.4035	0.591	ng/L	108% 65-135	1% 35

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Method Blanks & Reporting Limits

Batch: B121782
Matrix: Water
Method: EPA 1630
Analyte: MeHg

Sample	Result	Units
B121782-BLK1	0.005	ng/L
B121782-BLK2	0.007	ng/L
B121782-BLK3	0.004	ng/L
B121782-BLK4	0.003	ng/L

Average: 0.005 **Standard Deviation:** 0.002 **MDL:** 0.020
Limit: 0.045 **Limit:** 0.015 **MRL:** 0.051

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Method Blanks & Reporting Limits

Batch: B121783
Matrix: Water
Method: EPA 1630
Analyte: MeHg

Sample	Result	Units
B121783-BLK1	0.007	ng/L
B121783-BLK2	0.008	ng/L
B121783-BLK3	0.005	ng/L
B121783-BLK4	0.003	ng/L

Average: 0.006 **Standard Deviation:** 0.002 **MDL:** 0.019
Limit: 0.045 **Limit:** 0.015 **MRL:** 0.048

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Sample Containers

Lab ID: 1238015-01 **Report Matrix:** Water **Collected:** 09/11/2012
Sample: H12090228-001H **Sample Type:** Sample **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-02 **Report Matrix:** Water **Collected:** 09/11/2012
Sample: H12090228-002H **Sample Type:** Sample **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-03 **Report Matrix:** Water **Collected:** 09/11/2012
Sample: H12090228-003H **Sample Type:** Sample **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-04 **Report Matrix:** Water **Collected:** 09/11/2012
Sample: H12090228-004H **Sample Type:** Sample **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-05 **Report Matrix:** Water **Collected:** 09/11/2012
Sample: H12090228-005H **Sample Type:** Sample **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-06 **Report Matrix:** Water **Collected:** 09/11/2012
Sample: H12090228-006H **Sample Type:** Sample **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

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Sample Containers

Lab ID: 1238015-07 | **Report Matrix:** Water | **Collected:** 09/11/2012
Sample: H12090228-007H | **Sample Type:** Sample | **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-08 | **Report Matrix:** Water | **Collected:** 09/12/2012
Sample: H12090228-008H | **Sample Type:** Sample | **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-09 | **Report Matrix:** Water | **Collected:** 09/12/2012
Sample: H12090228-009H | **Sample Type:** Sample | **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-10 | **Report Matrix:** Water | **Collected:** 09/12/2012
Sample: H12090228-010H | **Sample Type:** Sample | **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-11 | **Report Matrix:** Water | **Collected:** 09/12/2012
Sample: H12090228-011H | **Sample Type:** Sample | **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-12 | **Report Matrix:** Water | **Collected:** 09/12/2012
Sample: H12090228-012H | **Sample Type:** Sample | **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

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Sample Containers

Lab ID: 1238015-13 **Report Matrix:** Water **Collected:** 09/12/2012
Sample: H12090228-013H **Sample Type:** Sample **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-14 **Report Matrix:** Water **Collected:** 09/13/2012
Sample: H12090228-014H **Sample Type:** Sample **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-15 **Report Matrix:** Water **Collected:** 09/13/2012
Sample: H12090228-015H **Sample Type:** Sample **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-16 **Report Matrix:** Water **Collected:** 09/13/2012
Sample: H12090228-016H **Sample Type:** Sample **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-17 **Report Matrix:** Water **Collected:** 09/13/2012
Sample: H12090228-017H **Sample Type:** Sample **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Lab ID: 1238015-18 **Report Matrix:** Water **Collected:** 09/13/2012
Sample: H12090228-018H **Sample Type:** Sample **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

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Sample Containers

Lab ID: 1238015-19 **Report Matrix:** Water **Collected:** 09/13/2012
Sample: H12090228-019H **Sample Type:** Sample **Received:** 09/19/2012

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Bottle FLPE Hg-SP	250 mL	71659890 20	2 mL 6N HCl (PP)	1232003	<2	Cooler

Shipping Containers

Cooler

Received: September 19, 2012 9:30
Tracking No: 1Z 37E W97 03 4822 6277 via UPS
Coolant Type: Ice
Temperature: 2.1 °C

Description: Cooler
Damaged in transit? No
Returned to client? No

Custody seals present? Yes
Custody seals intact? Yes
COC present? Yes

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1238015

Energy Laboratories Inc

3161 East Lyndale Avenue
Helena, MT 59601
(406) 442-0711

H12090228

CHAIN-OF-CUSTODY RECORD

BRL Report 1238015
Page 1 of 2
17-Sep-12

Custody Seal: Y N
Intacted: Y N
Signature Match: Y N

Shipped By: _____
Receipt Temp: _____

Subcontractor:

Brooks Rand Labs
3958 6th Ave NW
Seattle, WA 98106
TEL: (206) 632-6206 FAX: (206) 632-6017
Acct #:

Subcontractor's Client:

Shipped By: _____

Sample ID	Matrix	Collection Date	Bottle Type	SUB-BROOKSRAN	Requested Tests
H12090228-001H	Aqueous	09/11/12 09:15 A	1-CLIENT-SLD	1	
H12090228-002H	Aqueous	09/11/12 11:00 A	1-CLIENT-SLD	1	
H12090228-003H	Aqueous	09/11/12 01:45 P	1-CLIENT-SLD	1	
H12090228-004H	Aqueous	09/11/12 03:45 P	1-CLIENT-SLD	1	
H12090228-005H	Aqueous	09/11/12 05:45 P	1-CLIENT-SLD	1	
H12090228-006H	Aqueous	09/11/12 06:30 P	1-CLIENT-SLD	1	
H12090228-007H	Aqueous	09/11/12 05:15 P	1-CLIENT-SLD	1	
H12090228-008H	Aqueous	09/12/12 09:30 A	1-CLIENT-SLD	1	
H12090228-009H	Aqueous	09/12/12 11:30 A	1-CLIENT-SLD	1	
H12090228-010H	Aqueous	09/12/12 01:00 P	1-CLIENT-SLD	1	
H12090228-011H	Aqueous	09/12/12 02:15 P	1-CLIENT-SLD	1	
H12090228-012H	Aqueous	09/12/12 04:30 P	1-CLIENT-SLD	1	
H12090228-013H	Aqueous	09/12/12 06:00 P	1-CLIENT-SLD	1	
H12090228-014H	Aqueous	09/13/12 10:00 A	1-CLIENT-SLD	1	
H12090228-015H	Aqueous	09/13/12 11:30 A	1-CLIENT-SLD	1	
H12090228-016H	Aqueous	09/13/12 01:00 P	1-CLIENT-SLD	1	

Comments:

QC Level:
STD

		Date/Time			Date/Time
Relinquished by:	J. Lovash		**Received by:**		9/19/12 0930
Relinquished by:	J. Lovash	9/17/12 15:04	**Received by:**		

1238015

Energy Laboratories Inc
3161 East Lyndale Avenue
Helena, MT 59601
(406) 442-0711

H12090228

CHAIN-OF-CUSTODY RECORD

Custody Seal: Y N
Intacted: Y N
Signature Match: Y N

Shipped By: _____
Receipt Temp: _____

Subcontractor:

Brocks Rand Labs
3958 6th Ave NW
Seattle, WA 98106
TEL: (206) 632-6206 FAX: (206) 632-6017
Acct #:

Subcontractor's Client:

Shipped By:

Sample ID	Matrix	Collection Date	Bottle Type	SUB-BROOKSRAN	Requested Tests
H12090228-017H	Aqueous	09/13/12 03:00 P	1-CLIENT-SLD	1	
H12090228-018H	Aqueous	09/13/12 03:00 P	1-CLIENT-SLD	1	
H12090228-019H	Aqueous	09/13/12 04:00 P	1-CLIENT-SLD	1	

Comments:

QC Level:
STD

		Date/Time			Date/Time
Relinquished by:			**Received by:**		9/19/12 0930
Relinquished by:	J. Frost	9/17/12 15:06	**Received by:**		

Standard Reporting Procedures

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Workorder Receipt Checklist

MT DEQ-Federal Superfund H12090228

Login completed by: Amanda B. Blackburn
Date Received: 9/14/2012

Reviewed by: BL2000\sdull
Received by: elm

Reviewed Date: 9/25/2012
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 ☐	
Temp Blank received?	Yes ☑	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	℃ See Comments		
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:

Sample ID on COC is WSC-CFR - ID on bottles is WSC-SBC. Logged in with ID from COC per Erich Weber. Cooler 1 containing Sediment samples was received at 13.8℃, Cooler 2 at 2.0℃, Cooler 3 at 3.7℃, Cooler 4 at 3.0 and Box containing Sediment samples at 12.2℃. Samples were received on wet ice. Cooler 1 and Box temperatures were not taken from temperature blanks. TI 9/18/12.

Chain of Custody and Analytical Request Record

Page 1 of 4

PLEASE PRINT (Provide as much information as possible.)

Company Name: MT DEQ	Project Name, PWS, Permit, Etc.: CFR OU Monitoring	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: P.O. Box 200901 Helena, MT 59620-0901	Contact Name: Phone/Fax: Joe Griffin 560-6060 (DEQ) Erich Weber 437-9245 (ATKINS) 439-0563 (cell)	Email:	Sampler: (Please Print) G. Ingman E. Weber
Invoice Address:	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order: 624 / 10564

Special Report/Formats:

☐ DW ☐ POTW/WWTP ☐ State: _____ ☐ Other: _____

☐ EDD/EDT (Electronic Data) Format: _____ ☐ LEVEL IV ☐ NELAC

Number of Containers
Sample Type: A Air W Water S Soils/Solids V Vegetation B Bioassay O Other D 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:
DOC unfiltered and unpreserved
Outsource Methyl Hg (prepreserved) (MLL)

Shipped by: Hand
Cooler ID(s): Y
Receipt Temp: See comments
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	TRA's, Cd, Cu, Pb, Zn	Diss As, Cd, Cu, Pb, Zn	TPN	NO_{3+2}, NH_3, TP	TSS, Total Alk., SO_4^{-}	Hardness (CTR Ca + Mg)	DOC	Total Hg (Low Level)	Methyl Mercury	SEE ATTACHED		LABORATORY USE ONLY
1	CFR-116A	9-11-12	0915	TW	x	x	x	x	x	x	x	x	x		TEMP BLANK	L1209228-001
2	RC-CFR	9-11-12	1100											(Sediment)	C1 → 13.8 (NC FB)	-002
3	CFR-84F	9-11-12	1345												C2 → ~~1.0~~ 2.0	-003
4	FC-CFR	9-11-12	1545												C3 → 3.7	-004
5	CFR-53C	9-11-12	1745												C4 → 3.0	-005
6	CFR-53C duplicate	9-11-12	1830											(Sediment)	BOX → 12.2	-006
7	Field Blank #1	9-11-12	1715													-007
8	CFR-42G	9-12-12	0930													-008
9	LBR-CFR	9-12-12	1130													-009
10	CFR-27H	9-12-12	1300		x	x	x	x	x	x	x	x	x			-010

Custody Record MUST be Signed

Relinquished by (print): [illegible]	Date/Time: 9-14-12/1145	Signature: Erich Weber	Received by (print):
Relinquished by (print):	Date/Time:	Signature:	Received by (print):
Sample Disposal: Return to Client: _____	Lab Disposal: _____		Received by Laboratory: Esther Merritt 9/14/12 11:45 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

PLEASE PRINT (Provide as much information as possible.)

Company Name: MT DEQ	Project Name, PWS, Permit, Etc.: CFRON Monitoring	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: P.O. Box 200901 Helena, MT 59620-0901	Contact Name: Phone/Fax: Joe Griffin 560-6060 (DEQ) Erich Weber 437-9245 (ATK INS) 439-0563 (cell)	Email:	Sampler: (Please Print) G. Ingman E. Weber
Invoice Address:	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order: 624/10564

Special Report/Formats:

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

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 EL! prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments: DOC unfiltered and unpreserved
ULL Methyl Hg

Shipped by: Hand
Cooler ID(s): Y
Receipt Temp: See Comments
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)	DOC	Total Hg (Low Level)	Methyl Hg (Low Level)	SEE ATTACHED	
1	RTC-1	9-12-12	1415	SW	X	X	X	X	X	X	X	X	X		Sediment
2	LC-7	9-12-12	1630												Cl → 13.8
3	CFR-03A	9-12-12	1800												Bot → 12.2
4	WSC-CFR	9-13-12	1000												Temp Blank
5	SS-25	9-13-12	1130												C2 → 2.0
6	MWB-SBC	9-13-12	1300												C3 → 3.7
7	MCWC-MWB	9-13-12	1500												C4 → 3.0
8	MCWC-MWB duplicate	9-13-12	1500												
9	Field Blank #2	9-13-12	1600												
10															

LABORATORY USE ONLY: 1209082011 -012 -013 -014 -015 -016 -017 -018 -019

Custody Record MUST be Signed

Relinquished by (print): Erich Weber	Date/Time: 9-14-12/1145	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: Esther Merritt	Date/Time: 9/14/12 11:45 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.

ENERGY

Chain of Custody and Analytical Request Record

PLEASE PRINT (Provide as much information as possible.)

Company Name: MT DEQ	Project Name, PWS, Permit, Etc.: CFROU Monitoring	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: P.O. Box 200901 Helena, MT 59620-0901	Contact Name: Joe Griffin Phone/Fax: 560-6060 (DEQ) Erich Weber 437-9245 (ATKINS) 439-0563 (cell)	Email:	Sampler: (Please Print) G. Ingman E. Weber
Invoice Address:	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order:

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: Sediment to be lab sieved to 3 size fractions as per previous sampling events

Shipped by: Hand
Cooler ID(s): 4
Receipt Temp: See comments
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	Total As, Cd, Cu, Pb, Zn 3 size fractions												
1	CFR116-A	9-11-12	0915	1S	X												Sediment:
2	RC-CFR	9-11-12	1100														C1 → 13.8
3	CFR-84F	9-11-12	1345														Box → 12.2
4	FC-CFR	9-11-12	1545														Temp Blank
5	CFR-53C	9-11-12	1745														C2 → 2.0
6	CFR-42G	9-12-12	0930														C3 → 3.7
7	LBR-CFR	9-12-12	1130														C4 → 3.0
8	CFR-27H	9-12-12	1300														
9	CFR-27H duplicate	9-12-12	1300														
10	RTC-1	9-12-12	1415														

LABORATORY USE ONLY H12090228

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Erich Weber	9-14-12 / 1145	[signature]			
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
			Received by Laboratory: Esther Merritt	Date/Time: 9/14/12 10:45	Signature: [signature]

Sample Disposal: Return to Client: _____ Lab Disposal: _____

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Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

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	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: P.O. Box 200901 Helena, MT 59620-0901	Contact Name: Phone/Fax: Joe Griffin 560-6060 (DEQ) Erich Weber 437-9245 (ATKNS) 439-0563 (cell)	Email:	Sampler: (Please Print) G. Ingman E. Weber
Invoice Address:	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order: 624/10564

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

Total As, Cd, Cu, Pb, Zn 3 size fractions

SEE ATTACHED

Standard Turnaround (TAT)

R U S H

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

Comments: Sediment to be lab sieved to 3 size fractions as per previous sampling events

Shipped by: Hand
Cooler ID(s): 4
Receipt Temp: See comments
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	
1	LC-7	9-12-12	1630	1S	X
2	CFR-03A	9-12-12	1800		
3	WSC-CFR	9-13-12	1000		
4	SS-25	9-13-12	1130		
5	MWB-SBC	9-13-12	1300		
6	MCWC-MWB	9-13-12	1500		
7	MCWC-MWB duplicate	9-13-12	1500	↓	↓
8					
9					
10					

Sediment
C1 → 13.8
Box → 12.2
Temp Blank
C2 → 2.0
C3 → 3.7
C4 → 3.0

LABORATORY USE ONLY H120902288

Custody Record MUST be Signed

Relinquished by (print): Erich Weber	Date/Time: 9-14-12/1145	Signature:	Received by (print):
Relinquished by (print):	Date/Time:	Signature:	Received by (print):
Sample Disposal:	Return to Client: _____	Lab Disposal: _____	Received by Laboratory: Date/Time: 9/14/12 11:45 Signature:

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested.
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Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

APPENDIX B4

SURFACE WATER AND INSTREAM SEDIMENT: ANALYTICAL LABORATORY RESULTS, FOURTH QUARTER

ANALYTICAL SUMMARY REPORT

January 15, 2013

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

Workorder No.: H12120119 Quote ID: H624

Project Name: CFR Monitoring-474374

Energy Laboratories Inc Helena MT received the following 19 samples for MT DEQ-Federal Superfund on 12/6/2012 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H12120119-001	CFR-116A	12/04/12 9:30	12/06/12	Aqueous	Metals by ICP/ICPMS, Dissolved Metals by ICP/ICPMS, Tot. Rec. Alkalinity Carbon, Dissolved Organic Conductivity Mercury, Total Hardness as CaCO3 Anions by Ion Chromatography Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite Nitrogen, Total Persulfate Metals Digestion by EPA 200.2 Digestion, Mercury by CVAA Digestion, Mercury by CVAA Digestion, Total P Water Nitrogen, Total Persulfate Preparation for TSS Phosphorus, Total Solids, Total Suspended
H12120119-002	RC-CFR	12/04/12 11:30	12/06/12	Aqueous	Same As Above
H12120119-003	CFR-84F	12/04/12 13:00	12/06/12	Aqueous	Same As Above
H12120119-004	FC-CFR	12/04/12 14:00	12/06/12	Aqueous	Same As Above
H12120119-005	CFR-53C	12/04/12 15:15	12/06/12	Aqueous	Same As Above
H12120119-006	CFR-53C Dup	12/04/12 15:45	12/06/12	Aqueous	Same As Above
H12120119-007	Field Blank #1	12/04/12 16:30	12/06/12	Aqueous	Same As Above
H12120119-008	CFR-42G	12/05/12 9:00	12/06/12	Aqueous	Same As Above
H12120119-009	LBR-CFR	12/05/12 10:30	12/06/12	Aqueous	Same As Above
H12120119-010	CFR-27H	12/05/12 11:30	12/06/12	Aqueous	Same As Above
H12120119-011	RTC-1	12/05/12 11:30	12/06/12	Aqueous	Same As Above
H12120119-012	LC-7	12/05/12 12:30	12/06/12	Aqueous	Same As Above
H12120119-013	WSC-SBC	12/05/12 14:00	12/06/12	Aqueous	Same As Above
H12120119-014	CFR-03A	12/05/12 15:00	12/06/12	Aqueous	Same As Above
H12120119-015	SS-25	12/06/12 9:15	12/06/12	Aqueous	Same As Above
H12120119-016	MWB-SBC	12/06/12 10:00	12/06/12	Aqueous	Same As Above
H12120119-017	Field Blank #2	12/06/12 10:30	12/06/12	Aqueous	Same As Above

ANALYTICAL SUMMARY REPORT

H12120119-018	MCWC-MWB	12/06/12 11:15 12/06/12	Aqueous	Same As Above
H12120119-019	MCWC-MWB Duplicate	12/06/12 11:15 12/06/12	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 noted. 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: H12120119

Report Date: 01/15/13

CASE NARRATIVE

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, 2393 Salt Creek Hwy., Casper, WY, EPA Number WY00002 and WY00937.

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: MT DEQ-Federal Superfund
Project: CFR Monitoring-474374
Lab ID: H12120119-001
Client Sample ID CFR-116A

Report Date: 01/15/13
Collection Date: 12/04/12 09:30
DateReceived: 12/06/12
Matrix: Aqueous

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	12/07/12 08:50 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	140	mg/L		4		A2320 B	12/13/12 11:02 / cmm
Bicarbonate as HCO3	150	mg/L		4		A2320 B	12/13/12 11:02 / cmm
Sulfate	41	mg/L		1		E300.0	12/07/12 13:48 / cmm
Hardness as CaCO3	167	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	1.7	mg/L		0.1		A5310 C	12/11/12 14:17 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 13:45 / reh
Nitrogen, Nitrate+Nitrite as N	0.09	mg/L		0.05		E353.2	12/07/12 11:17 / reh
Nitrogen, Total	0.24	mg/L		0.05		A4500 N-C	12/11/12 09:41 / reh
Phosphorus, Total as P	0.023	mg/L		0.005		E365.1	12/11/12 10:27 / reh
METALS, DISSOLVED							
Arsenic	0.005	mg/L		0.005		E200.8	12/11/12 20:58 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/11/12 20:58 / dck
Copper	0.002	mg/L		0.001		E200.8	12/11/12 20:58 / dck
Lead	ND	mg/L		0.0005		E200.8	12/11/12 20:58 / dck
Zinc	0.01	mg/L		0.01		E200.8	12/11/12 20:58 / dck
METALS, TOTAL							
Mercury	0.000012	mg/L		0.000010		E245.1	12/12/12 13:33 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	0.006	mg/L		0.005		E200.8	12/11/12 21:03 / dck
Cadmium	0.00009	mg/L		0.00008		E200.8	12/11/12 21:03 / dck
Calcium	47	mg/L		1		E200.7	12/11/12 15:06 / sld
Copper	0.012	mg/L		0.001		E200.8	12/11/12 21:03 / dck
Lead	0.0021	mg/L		0.0005		E200.8	12/11/12 21:03 / dck
Magnesium	12	mg/L		1		E200.7	12/11/12 15:06 / sld
Zinc	0.02	mg/L		0.01		E200.8	12/11/12 21:03 / dck

Report Definitions:
RL - Analyte reporting limit.
MCL - Maximum contaminant level.
QCL - Quality control limit.
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: H12120119-002
Client Sample ID RC-CFR

Report Date: 01/15/13
Collection Date: 12/04/12 11:30
DateReceived: 12/06/12
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	12/07/12 08:50 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	65	mg/L		4		A2320 B	12/13/12 11:09 / cmm
Bicarbonate as HCO3	77	mg/L		4		A2320 B	12/13/12 11:09 / cmm
Sulfate	3	mg/L		1		E300.0	12/07/12 14:01 / cmm
Hardness as CaCO3	59	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	1.7	mg/L		0.1		A5310 C	12/11/12 14:27 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 13:46 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	12/07/12 11:18 / reh
Nitrogen, Total	0.09	mg/L		0.05		A4500 N-C	12/11/12 09:42 / reh
Phosphorus, Total as P	0.010	mg/L		0.005		E365.1	12/11/12 10:30 / reh
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	12/11/12 21:26 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/11/12 21:26 / dck
Copper	ND	mg/L		0.001		E200.8	12/11/12 21:26 / dck
Lead	ND	mg/L		0.0005		E200.8	12/11/12 21:26 / dck
Zinc	0.01	mg/L		0.01		E200.8	12/11/12 21:26 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/11/12 14:52 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	ND	mg/L		0.005		E200.8	12/11/12 21:30 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/11/12 21:30 / dck
Calcium	15	mg/L		1		E200.7	12/11/12 15:09 / sld
Copper	ND	mg/L		0.001		E200.8	12/11/12 21:30 / dck
Lead	ND	mg/L		0.0005		E200.8	12/11/12 21:30 / dck
Magnesium	5	mg/L		1		E200.7	12/11/12 15:09 / sld
Zinc	ND	mg/L		0.01		E200.8	12/11/12 21:30 / 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: H12120119-003
Client Sample ID CFR-84F

Report Date: 01/15/13
Collection Date: 12/04/12 13:00
DateReceived: 12/06/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	20	mg/L		1		A2540 D	12/07/12 08:50 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	170	mg/L		4		A2320 B	12/13/12 11:16 / cmm
Bicarbonate as HCO3	190	mg/L		4		A2320 B	12/13/12 11:16 / cmm
Sulfate	65	mg/L		1		E300.0	12/07/12 14:14 / cmm
Hardness as CaCO3	216	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	1.9	mg/L		0.1		A5310 C	12/11/12 14:37 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 13:47 / reh
Nitrogen, Nitrate+Nitrite as N	0.10	mg/L		0.05		E353.2	12/07/12 11:19 / reh
Nitrogen, Total	0.27	mg/L		0.05		A4500 N-C	12/11/12 09:44 / reh
Phosphorus, Total as P	0.036	mg/L		0.005		E365.1	12/11/12 10:31 / reh
METALS, DISSOLVED							
Arsenic	0.008	mg/L		0.005		E200.8	12/11/12 21:35 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/11/12 21:35 / dck
Copper	0.003	mg/L		0.001		E200.8	12/11/12 21:35 / dck
Lead	ND	mg/L		0.0005		E200.8	12/11/12 21:35 / dck
Zinc	0.01	mg/L		0.01		E200.8	12/11/12 21:35 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/11/12 14:54 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	0.010	mg/L		0.005		E200.8	12/11/12 21:40 / dck
Cadmium	0.00013	mg/L		0.00008		E200.8	12/11/12 21:40 / dck
Calcium	62	mg/L		1		E200.7	12/11/12 15:13 / sld
Copper	0.017	mg/L		0.001		E200.8	12/11/12 21:40 / dck
Lead	0.0028	mg/L		0.0005		E200.8	12/11/12 21:40 / dck
Magnesium	15	mg/L		1		E200.7	12/11/12 15:13 / sld
Zinc	0.02	mg/L		0.01		E200.8	12/11/12 21:40 / 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: H12120119-004
Client Sample ID FC-CFR

Report Date: 01/15/13
Collection Date: 12/04/12 14:00
DateReceived: 12/06/12
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	12/07/12 08:51 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	170	mg/L		4		A2320 B	12/13/12 11:23 / cmm
Bicarbonate as HCO3	190	mg/L		4		A2320 B	12/13/12 11:23 / cmm
Sulfate	14	mg/L		1		E300.0	12/07/12 14:26 / cmm
Hardness as CaCO3	164	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	1.8	mg/L		0.1		A5310 C	12/11/12 14:47 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 13:48 / reh
Nitrogen, Nitrate+Nitrite as N	0.10	mg/L		0.05		E353.2	12/07/12 11:20 / reh
Nitrogen, Total	0.25	mg/L		0.05		A4500 N-C	12/11/12 09:45 / reh
Phosphorus, Total as P	0.034	mg/L		0.005		E365.1	12/11/12 10:32 / reh
METALS, DISSOLVED							
Arsenic	0.006	mg/L		0.005		E200.8	12/11/12 21:44 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/11/12 21:44 / dck
Copper	ND	mg/L		0.001		E200.8	12/11/12 21:44 / dck
Lead	ND	mg/L		0.0005		E200.8	12/11/12 21:44 / dck
Zinc	ND	mg/L		0.01		E200.8	12/11/12 21:44 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/11/12 14:56 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	0.007	mg/L		0.005		E200.8	12/11/12 21:49 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/11/12 21:49 / dck
Calcium	44	mg/L		1		E200.7	12/11/12 15:17 / sld
Copper	0.001	mg/L		0.001		E200.8	12/11/12 21:49 / dck
Lead	0.0022	mg/L		0.0005		E200.8	12/11/12 21:49 / dck
Magnesium	13	mg/L		1		E200.7	12/11/12 15:17 / sld
Zinc	ND	mg/L		0.01		E200.8	12/11/12 21:49 / 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: H12120119-005
Client Sample ID CFR-53C

Report Date: 01/15/13
Collection Date: 12/04/12 15:15
DateReceived: 12/06/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	14	mg/L		1		A2540 D	12/07/12 08:51 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	160	mg/L		4		A2320 B	12/13/12 11:29 / cmm
Bicarbonate as HCO3	180	mg/L		4		A2320 B	12/13/12 11:29 / cmm
Sulfate	61	mg/L		1		E300.0	12/07/12 14:39 / cmm
Hardness as CaCO3	201	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	1.9	mg/L		0.1		A5310 C	12/11/12 14:57 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 13:49 / reh
Nitrogen, Nitrate+Nitrite as N	0.10	mg/L		0.05		E353.2	12/07/12 11:24 / reh
Nitrogen, Total	0.28	mg/L		0.05		A4500 N-C	12/11/12 09:46 / reh
Phosphorus, Total as P	0.026	mg/L		0.005		E365.1	12/11/12 10:33 / reh
METALS, DISSOLVED							
Arsenic	0.009	mg/L		0.005		E200.8	12/11/12 21:53 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/11/12 21:53 / dck
Copper	0.004	mg/L		0.001		E200.8	12/11/12 21:53 / dck
Lead	ND	mg/L		0.0005		E200.8	12/11/12 21:53 / dck
Zinc	ND	mg/L		0.01		E200.8	12/11/12 21:53 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/12/12 13:38 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	0.010	mg/L		0.005		E200.8	12/11/12 21:58 / dck
Cadmium	0.00012	mg/L		0.00008		E200.8	12/11/12 21:58 / dck
Calcium	59	mg/L		1		E200.7	12/11/12 15:21 / sld
Copper	0.018	mg/L		0.001		E200.8	12/11/12 21:58 / dck
Lead	0.0021	mg/L		0.0005		E200.8	12/11/12 21:58 / dck
Magnesium	13	mg/L		1		E200.7	12/11/12 15:21 / sld
Zinc	0.02	mg/L		0.01		E200.8	12/11/12 21:58 / 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: H12120119-006
Client Sample ID CFR-53C Dup

Report Date: 01/15/13
Collection Date: 12/04/12 15:45
DateReceived: 12/06/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	14	mg/L		1		A2540 D	12/07/12 08:51 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	160	mg/L		4		A2320 B	12/13/12 11:44 / cmm
Bicarbonate as HCO3	180	mg/L		4		A2320 B	12/13/12 11:44 / cmm
Sulfate	61	mg/L		1		E300.0	12/07/12 14:51 / cmm
Hardness as CaCO3	201	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	1.9	mg/L		0.1		A5310 C	12/11/12 15:06 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 13:51 / reh
Nitrogen, Nitrate+Nitrite as N	0.11	mg/L		0.05		E353.2	12/07/12 11:28 / reh
Nitrogen, Total	0.33	mg/L		0.05		A4500 N-C	12/11/12 09:47 / reh
Phosphorus, Total as P	0.039	mg/L		0.005		E365.1	12/11/12 10:34 / reh
METALS, DISSOLVED							
Arsenic	0.008	mg/L		0.005		E200.8	12/11/12 22:02 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/11/12 22:02 / dck
Copper	0.004	mg/L		0.001		E200.8	12/11/12 22:02 / dck
Lead	ND	mg/L		0.0005		E200.8	12/11/12 22:02 / dck
Zinc	ND	mg/L		0.01		E200.8	12/11/12 22:02 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/11/12 15:00 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	0.010	mg/L		0.005		E200.8	12/11/12 22:07 / dck
Cadmium	0.00010	mg/L		0.00008		E200.8	12/11/12 22:07 / dck
Calcium	59	mg/L		1		E200.7	12/11/12 15:25 / sld
Copper	0.018	mg/L		0.001		E200.8	12/11/12 22:07 / dck
Lead	0.0021	mg/L		0.0005		E200.8	12/11/12 22:07 / dck
Magnesium	13	mg/L		1		E200.7	12/11/12 15:25 / sld
Zinc	0.02	mg/L		0.01		E200.8	12/11/12 22:07 / 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: H12120119-007
Client Sample ID Field Blank #1

Report Date: 01/15/13
Collection Date: 12/04/12 16:30
DateReceived: 12/06/12
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	12/07/12 08:51 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	ND	mg/L		4		A2320 B	12/13/12 11:47 / cmm
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	12/13/12 11:47 / cmm
Sulfate	ND	mg/L		1		E300.0	12/07/12 15:04 / cmm
Hardness as CaCO3	ND	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	ND	mg/L		0.1		A5310 C	12/11/12 15:15 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 13:54 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	12/07/12 11:29 / reh
Nitrogen, Total	ND	mg/L		0.05		A4500 N-C	12/11/12 09:48 / reh
Phosphorus, Total as P	ND	mg/L		0.005		E365.1	12/27/12 15:02 / reh
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	12/11/12 22:30 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/11/12 22:30 / dck
Copper	ND	mg/L		0.001		E200.8	12/11/12 22:30 / dck
Lead	ND	mg/L		0.0005		E200.8	12/11/12 22:30 / dck
Zinc	ND	mg/L		0.01		E200.8	12/11/12 22:30 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/11/12 15:07 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	ND	mg/L		0.005		E200.8	12/11/12 22:58 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/11/12 22:58 / dck
Calcium	ND	mg/L		1		E200.7	12/11/12 15:58 / sld
Copper	ND	mg/L		0.001		E200.8	12/11/12 22:58 / dck
Lead	ND	mg/L		0.0005		E200.8	12/11/12 22:58 / dck
Magnesium	ND	mg/L		1		E200.7	12/11/12 15:58 / sld
Zinc	ND	mg/L		0.01		E200.8	12/11/12 22:58 / 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: H12120119-008
Client Sample ID CFR-42G

Report Date: 01/15/13
Collection Date: 12/05/12 09:00
DateReceived: 12/06/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	14	mg/L		1		A2540 D	12/07/12 08:51 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	170	mg/L		4		A2320 B	12/13/12 11:54 / cmm
Bicarbonate as HCO3	190	mg/L		4		A2320 B	12/13/12 11:54 / cmm
Sulfate	70	mg/L		1		E300.0	12/10/12 15:11 / cmm
Hardness as CaCO3	223	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	2.1	mg/L		0.1		A5310 C	12/11/12 15:25 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 13:58 / reh
Nitrogen, Nitrate+Nitrite as N	0.22	mg/L		0.05		E353.2	12/07/12 11:30 / reh
Nitrogen, Total	0.43	mg/L		0.05		A4500 N-C	12/11/12 09:52 / reh
Phosphorus, Total as P	0.030	mg/L		0.005		E365.1	12/11/12 10:40 / reh
METALS, DISSOLVED							
Arsenic	0.011	mg/L		0.005		E200.8	12/11/12 23:02 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/11/12 23:02 / dck
Copper	0.005	mg/L		0.001		E200.8	12/11/12 23:02 / dck
Lead	ND	mg/L		0.0005		E200.8	12/11/12 23:02 / dck
Zinc	0.01	mg/L		0.01		E200.8	12/11/12 23:02 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/12/12 13:42 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	0.013	mg/L		0.005		E200.8	12/11/12 23:21 / dck
Cadmium	0.00022	mg/L		0.00008		E200.8	12/11/12 23:21 / dck
Calcium	65	mg/L		1		E200.7	12/11/12 16:02 / sld
Copper	0.032	mg/L		0.001		E200.8	12/11/12 23:21 / dck
Lead	0.0038	mg/L		0.0005		E200.8	12/11/12 23:21 / dck
Magnesium	14	mg/L		1		E200.7	12/11/12 16:02 / sld
Zinc	0.04	mg/L		0.01		E200.8	12/11/12 23:21 / 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: H12120119-009
Client Sample ID LBR-CFR

Report Date: 01/15/13
Collection Date: 12/05/12 10:30
DateReceived: 12/06/12
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	12/07/12 08:51 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	140	mg/L		4		A2320 B	12/13/12 12:01 / cmm
Bicarbonate as HCO3	150	mg/L		4		A2320 B	12/13/12 12:01 / cmm
Sulfate	14	mg/L		1		E300.0	12/10/12 15:23 / cmm
Hardness as CaCO3	134	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	1.7	mg/L		0.1		A5310 C	12/11/12 15:35 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 13:59 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	12/07/12 11:31 / reh
Nitrogen, Total	0.10	mg/L		0.05		A4500 N-C	12/11/12 09:53 / reh
Phosphorus, Total as P	0.021	mg/L		0.005		E365.1	12/11/12 10:41 / reh
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	12/11/12 23:43 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/11/12 23:43 / dck
Copper	ND	mg/L		0.001		E200.8	12/11/12 23:43 / dck
Lead	ND	mg/L		0.0005		E200.8	12/11/12 23:43 / dck
Zinc	ND	mg/L		0.01		E200.8	12/11/12 23:43 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/12/12 13:43 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	ND	mg/L		0.005		E200.8	12/11/12 23:48 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/11/12 23:48 / dck
Calcium	39	mg/L		1		E200.7	12/11/12 16:17 / sld
Copper	ND	mg/L		0.001		E200.8	12/11/12 23:48 / dck
Lead	ND	mg/L		0.0005		E200.8	12/11/12 23:48 / dck
Magnesium	9	mg/L		1		E200.7	12/11/12 16:17 / sld
Zinc	ND	mg/L		0.01		E200.8	12/11/12 23:48 / 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: H12120119-010
Client Sample ID CFR-27H

Report Date: 01/15/13
Collection Date: 12/05/12 11:30
DateReceived: 12/06/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	20	mg/L		1		A2540 D	12/07/12 08:51 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	170	mg/L		4		A2320 B	12/13/12 12:08 / cmm
Bicarbonate as HCO3	180	mg/L		4		A2320 B	12/13/12 12:08 / cmm
Sulfate	74	mg/L		1		E300.0	12/10/12 15:36 / cmm
Hardness as CaCO3	226	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	2.1	mg/L		0.1		A5310 C	12/11/12 15:45 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 14:00 / reh
Nitrogen, Nitrate+Nitrite as N	0.25	mg/L		0.05		E353.2	12/07/12 11:32 / reh
Nitrogen, Total	0.45	mg/L		0.05		A4500 N-C	12/11/12 09:54 / reh
Phosphorus, Total as P	0.027	mg/L		0.005		E365.1	12/11/12 10:42 / reh
METALS, DISSOLVED							
Arsenic	0.011	mg/L		0.005		E200.8	12/12/12 00:11 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 00:11 / dck
Copper	0.005	mg/L		0.001		E200.8	12/12/12 00:11 / dck
Lead	ND	mg/L		0.0005		E200.8	12/12/12 00:11 / dck
Zinc	0.01	mg/L		0.01		E200.8	12/12/12 00:11 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/12/12 13:52 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	0.013	mg/L		0.005		E200.8	12/12/12 00:15 / dck
Cadmium	0.00017	mg/L		0.00008		E200.8	12/12/12 00:15 / dck
Calcium	66	mg/L		1		E200.7	12/11/12 16:21 / sld
Copper	0.027	mg/L		0.001		E200.8	12/12/12 00:15 / dck
Lead	0.0033	mg/L		0.0005		E200.8	12/12/12 00:15 / dck
Magnesium	15	mg/L		1		E200.7	12/11/12 16:21 / sld
Zinc	0.03	mg/L		0.01		E200.8	12/12/12 00:15 / 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: H12120119-011
Client Sample ID RTC-1

Report Date: 01/15/13
Collection Date: 12/05/12 11:30
DateReceived: 12/06/12
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	12/07/12 08:52 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	75	mg/L		4		A2320 B	12/13/12 12:30 / cmm
Bicarbonate as HCO3	88	mg/L		4		A2320 B	12/13/12 12:30 / cmm
Sulfate	6	mg/L		1		E300.0	12/10/12 15:48 / cmm
Hardness as CaCO3	73	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	1.0	mg/L		0.1		A5310 C	12/11/12 16:56 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 14:01 / reh
Nitrogen, Nitrate+Nitrite as N	0.16	mg/L		0.05		E353.2	12/07/12 11:34 / reh
Nitrogen, Total	0.23	mg/L		0.05		A4500 N-C	12/11/12 09:58 / reh
Phosphorus, Total as P	0.007	mg/L		0.005		E365.1	12/11/12 10:43 / reh
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	12/12/12 00:20 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 00:20 / dck
Copper	ND	mg/L		0.001		E200.8	12/12/12 00:20 / dck
Lead	ND	mg/L		0.0005		E200.8	12/12/12 00:20 / dck
Zinc	0.01	mg/L		0.01		E200.8	12/12/12 00:20 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/11/12 15:15 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	ND	mg/L		0.005		E200.8	12/12/12 00:24 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 00:24 / dck
Calcium	22	mg/L		1		E200.7	12/11/12 16:32 / sld
Copper	ND	mg/L		0.001		E200.8	12/12/12 00:24 / dck
Lead	ND	mg/L		0.0005		E200.8	12/12/12 00:24 / dck
Magnesium	4	mg/L		1		E200.7	12/11/12 16:32 / sld
Zinc	ND	mg/L		0.01		E200.8	12/12/12 00:24 / 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: H12120119-012
Client Sample ID LC-7

Report Date: 01/15/13
Collection Date: 12/05/12 12:30
DateReceived: 12/06/12
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	12/07/12 08:52 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	200	mg/L		4		A2320 B	12/13/12 12:37 / cmm
Bicarbonate as HCO3	210	mg/L		4		A2320 B	12/13/12 12:37 / cmm
Sulfate	120	mg/L		1		E300.0	12/10/12 16:01 / cmm
Hardness as CaCO3	299	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	1.5	mg/L		0.1		A5310 C	12/11/12 17:06 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 14:03 / reh
Nitrogen, Nitrate+Nitrite as N	0.51	mg/L		0.05		E353.2	12/07/12 11:35 / reh
Nitrogen, Total	0.65	mg/L		0.05		A4500 N-C	12/11/12 09:59 / reh
Phosphorus, Total as P	0.009	mg/L		0.005		E365.1	12/11/12 10:44 / reh
METALS, DISSOLVED							
Arsenic	0.014	mg/L		0.005		E200.8	12/12/12 00:29 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 00:29 / dck
Copper	0.002	mg/L		0.001		E200.8	12/12/12 00:29 / dck
Lead	ND	mg/L		0.0005		E200.8	12/12/12 00:29 / dck
Zinc	ND	mg/L		0.01		E200.8	12/12/12 00:29 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/11/12 15:16 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	0.014	mg/L		0.005		E200.8	12/12/12 00:34 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 00:34 / dck
Calcium	87	mg/L		1		E200.7	12/11/12 16:36 / sld
Copper	0.004	mg/L		0.001		E200.8	12/12/12 00:34 / dck
Lead	ND	mg/L		0.0005		E200.8	12/12/12 00:34 / dck
Magnesium	20	mg/L		1		E200.7	12/11/12 16:36 / sld
Zinc	ND	mg/L		0.01		E200.8	12/12/12 00:34 / 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: H12120119-013
Client Sample ID WSC-SBC

Report Date: 01/15/13
Collection Date: 12/05/12 14:00
DateReceived: 12/06/12
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	12/07/12 08:52 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	150	mg/L		4		A2320 B	12/13/12 12:44 / cmm
Bicarbonate as HCO3	160	mg/L		4		A2320 B	12/13/12 12:44 / cmm
Sulfate	35	mg/L		1		E300.0	12/10/12 16:14 / cmm
Hardness as CaCO3	173	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	0.8	mg/L		0.1		A5310 C	12/11/12 17:15 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 14:04 / reh
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L		0.05		E353.2	12/07/12 11:36 / reh
Nitrogen, Total	0.11	mg/L		0.05		A4500 N-C	12/11/12 10:00 / reh
Phosphorus, Total as P	0.010	mg/L		0.005		E365.1	12/11/12 10:45 / reh
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	12/12/12 00:38 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 00:38 / dck
Copper	0.002	mg/L		0.001		E200.8	12/12/12 00:38 / dck
Lead	ND	mg/L		0.0005		E200.8	12/12/12 00:38 / dck
Zinc	ND	mg/L		0.01		E200.8	12/12/12 00:38 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/11/12 15:18 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	0.005	mg/L		0.005		E200.8	12/12/12 00:43 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 00:43 / dck
Calcium	52	mg/L		1		E200.7	12/11/12 16:39 / sld
Copper	0.010	mg/L		0.001		E200.8	12/12/12 00:43 / dck
Lead	0.0009	mg/L		0.0005		E200.8	12/12/12 00:43 / dck
Magnesium	11	mg/L		1		E200.7	12/11/12 16:39 / sld
Zinc	ND	mg/L		0.01		E200.8	12/12/12 00:43 / 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: H12120119-014
Client Sample ID CFR-03A

Report Date: 01/15/13
Collection Date: 12/05/12 15:00
DateReceived: 12/06/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	12	mg/L		1		A2540 D	12/07/12 08:52 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	140	mg/L		4		A2320 B	12/13/12 12:51 / cmm
Bicarbonate as HCO3	150	mg/L		4		A2320 B	12/13/12 12:51 / cmm
Sulfate	82	mg/L		1		E300.0	12/10/12 16:26 / cmm
Hardness as CaCO3	206	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	2.7	mg/L		0.1		A5310 C	12/11/12 17:25 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 14:05 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	12/07/12 11:37 / reh
Nitrogen, Total	0.27	mg/L		0.05		A4500 N-C	12/11/12 10:02 / reh
Phosphorus, Total as P	0.033	mg/L		0.005		E365.1	12/11/12 10:46 / reh
METALS, DISSOLVED							
Arsenic	0.011	mg/L		0.005		E200.8	12/12/12 00:47 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 00:47 / dck
Copper	0.003	mg/L		0.001		E200.8	12/12/12 00:47 / dck
Lead	ND	mg/L		0.0005		E200.8	12/12/12 00:47 / dck
Zinc	ND	mg/L		0.01		E200.8	12/12/12 00:47 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/11/12 15:20 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	0.013	mg/L		0.005		E200.8	12/12/12 00:52 / dck
Cadmium	0.00018	mg/L		0.00008		E200.8	12/12/12 00:52 / dck
Calcium	60	mg/L		1		E200.7	12/11/12 16:43 / sld
Copper	0.017	mg/L		0.001		E200.8	12/12/12 00:52 / dck
Lead	0.0027	mg/L		0.0005		E200.8	12/12/12 00:52 / dck
Magnesium	14	mg/L		1		E200.7	12/11/12 16:43 / sld
Zinc	0.03	mg/L		0.01		E200.8	12/12/12 00:52 / 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: H12120119-015
Client Sample ID SS-25

Report Date: 01/15/13
Collection Date: 12/06/12 09:15
DateReceived: 12/06/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	14	mg/L		1		A2540 D	12/07/12 08:52 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	120	mg/L		4		A2320 B	12/13/12 12:58 / cmm
Bicarbonate as HCO3	140	mg/L		4		A2320 B	12/13/12 12:58 / cmm
Sulfate	97	mg/L		1		E300.0	12/10/12 16:39 / cmm
Hardness as CaCO3	202	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	3.4	mg/L		0.1		A5310 C	12/11/12 17:36 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 14:06 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	12/07/12 11:41 / reh
Nitrogen, Total	0.36	mg/L		0.05		A4500 N-C	12/11/12 10:03 / reh
Phosphorus, Total as P	0.047	mg/L		0.005		E365.1	12/11/12 10:47 / reh
METALS, DISSOLVED							
Arsenic	0.013	mg/L		0.005		E200.8	12/12/12 01:15 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 01:15 / dck
Copper	0.003	mg/L		0.001		E200.8	12/12/12 01:15 / dck
Lead	ND	mg/L		0.0005		E200.8	12/12/12 01:15 / dck
Zinc	0.01	mg/L		0.01		E200.8	12/12/12 01:15 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/11/12 15:24 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	0.016	mg/L		0.005		E200.8	12/12/12 01:19 / dck
Cadmium	0.00024	mg/L		0.00008		E200.8	12/12/12 01:19 / dck
Calcium	58	mg/L		1		E200.7	12/11/12 16:47 / sld
Copper	0.017	mg/L		0.001		E200.8	12/12/12 01:19 / dck
Lead	0.0033	mg/L		0.0005		E200.8	12/12/12 01:19 / dck
Magnesium	14	mg/L		1		E200.7	12/11/12 16:47 / sld
Zinc	0.03	mg/L		0.01		E200.8	12/12/12 01:19 / 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: H12120119-016
Client Sample ID MWB-SBC

Report Date: 01/15/13
Collection Date: 12/06/12 10:00
DateReceived: 12/06/12
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	12/07/12 08:53 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	110	mg/L		4		A2320 B	12/13/12 13:05 / cmm
Bicarbonate as HCO3	120	mg/L		4		A2320 B	12/13/12 13:05 / cmm
Sulfate	90	mg/L		1		E300.0	12/10/12 16:51 / cmm
Hardness as CaCO3	185	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	2.4	mg/L		0.1		A5310 C	12/11/12 17:46 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 14:07 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	12/07/12 11:42 / reh
Nitrogen, Total	0.18	mg/L		0.05		A4500 N-C	12/11/12 10:04 / reh
Phosphorus, Total as P	0.054	mg/L		0.005		E365.1	12/11/12 10:48 / reh
METALS, DISSOLVED							
Arsenic	0.014	mg/L		0.005		E200.8	12/12/12 01:24 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 01:24 / dck
Copper	0.002	mg/L		0.001		E200.8	12/12/12 01:24 / dck
Lead	ND	mg/L		0.0005		E200.8	12/12/12 01:24 / dck
Zinc	0.01	mg/L		0.01		E200.8	12/12/12 01:24 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/11/12 15:26 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	0.015	mg/L		0.005		E200.8	12/12/12 01:28 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 01:28 / dck
Calcium	54	mg/L		1		E200.7	12/11/12 16:51 / sld
Copper	0.005	mg/L		0.001		E200.8	12/12/12 01:28 / dck
Lead	0.0006	mg/L		0.0005		E200.8	12/12/12 01:28 / dck
Magnesium	12	mg/L		1		E200.7	12/11/12 16:51 / sld
Zinc	ND	mg/L		0.01		E200.8	12/12/12 01:28 / 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: H12120119-017
Client Sample ID Field Blank #2

Report Date: 01/15/13
Collection Date: 12/06/12 10:30
DateReceived: 12/06/12
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	12/07/12 08:53 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	ND	mg/L		4		A2320 B	12/13/12 13:17 / cmm
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	12/13/12 13:17 / cmm
Sulfate	ND	mg/L		1		E300.0	12/10/12 17:04 / cmm
Hardness as CaCO3	ND	mg/L		1		A2340 B	12/17/12 08:39 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	ND	mg/L		0.1		A5310 C	12/11/12 17:55 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 14:11 / reh
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.05		E353.2	12/07/12 11:43 / reh
Nitrogen, Total	ND	mg/L		0.05		A4500 N-C	12/11/12 10:05 / reh
Phosphorus, Total as P	ND	mg/L		0.005		E365.1	12/11/12 10:53 / reh
METALS, DISSOLVED							
Arsenic	ND	mg/L		0.005		E200.8	12/12/12 01:33 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 01:33 / dck
Copper	ND	mg/L		0.001		E200.8	12/12/12 01:33 / dck
Lead	ND	mg/L		0.0005		E200.8	12/13/12 08:00 / dck
Zinc	ND	mg/L		0.01		E200.8	12/12/12 01:33 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/12/12 13:56 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	ND	mg/L		0.005		E200.8	12/12/12 01:38 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 01:38 / dck
Calcium	ND	mg/L		1		E200.7	12/11/12 16:55 / sld
Copper	ND	mg/L		0.001		E200.8	12/12/12 01:38 / dck
Lead	ND	mg/L		0.0005		E200.8	12/13/12 08:05 / dck
Magnesium	ND	mg/L		1		E200.7	12/11/12 16:55 / sld
Zinc	ND	mg/L		0.01		E200.8	12/12/12 01:38 / 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: H12120119-018
Client Sample ID MCWC-MWB

Report Date: 01/15/13
Collection Date: 12/06/12 11:15
DateReceived: 12/06/12
Matrix: Aqueous

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	12/07/12 08:53 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	93	mg/L		4		A2320 B	12/13/12 13:31 / cmm
Bicarbonate as HCO3	110	mg/L		4		A2320 B	12/13/12 13:31 / cmm
Sulfate	24	mg/L		1		E300.0	12/10/12 17:42 / cmm
Hardness as CaCO3	102	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	2.2	mg/L		0.1		A5310 C	12/11/12 18:05 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 14:15 / reh
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L		0.05		E353.2	12/07/12 11:47 / reh
Nitrogen, Total	0.20	mg/L		0.05		A4500 N-C	12/11/12 10:09 / reh
Phosphorus, Total as P	0.030	mg/L		0.005		E365.1	12/11/12 10:57 / reh
METALS, DISSOLVED							
Arsenic	0.014	mg/L		0.005		E200.8	12/12/12 01:42 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 01:42 / dck
Copper	0.003	mg/L		0.001		E200.8	12/12/12 01:42 / dck
Lead	ND	mg/L		0.0005		E200.8	12/12/12 01:42 / dck
Zinc	0.02	mg/L		0.01		E200.8	12/12/12 01:42 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/12/12 14:01 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	0.019	mg/L		0.005		E200.8	12/12/12 02:14 / dck
Cadmium	0.00024	mg/L		0.00008		E200.8	12/12/12 02:14 / dck
Calcium	29	mg/L		1		E200.7	12/11/12 16:58 / sld
Copper	0.023	mg/L		0.001		E200.8	12/12/12 02:14 / dck
Lead	0.0067	mg/L		0.0005		E200.8	12/12/12 02:14 / dck
Magnesium	7	mg/L		1		E200.7	12/11/12 16:58 / sld
Zinc	0.04	mg/L		0.01		E200.8	12/12/12 02:14 / 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: H12120119-019
Client Sample ID MCWC-MWB Duplicate

Report Date: 01/15/13
Collection Date: 12/06/12 11:15
DateReceived: 12/06/12
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	14	mg/L		1		A2540 D	12/07/12 08:53 / cmm
INORGANICS							
Alkalinity, Total as CaCO3	92	mg/L		4		A2320 B	12/13/12 13:38 / cmm
Bicarbonate as HCO3	110	mg/L		4		A2320 B	12/13/12 13:38 / cmm
Sulfate	24	mg/L		1		E300.0	12/10/12 18:20 / cmm
Hardness as CaCO3	102	mg/L		1		A2340 B	12/13/12 11:17 / sld
AGGREGATE ORGANICS							
Organic Carbon, Dissolved (DOC)	2.3	mg/L		0.1		A5310 C	12/11/12 18:15 / eli-ca
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	12/07/12 14:16 / reh
Nitrogen, Nitrate+Nitrite as N	0.06	mg/L		0.05		E353.2	12/07/12 11:48 / reh
Nitrogen, Total	0.21	mg/L		0.05		A4500 N-C	12/11/12 10:10 / reh
Phosphorus, Total as P	0.033	mg/L		0.005		E365.1	12/11/12 10:58 / reh
METALS, DISSOLVED							
Arsenic	0.014	mg/L		0.005		E200.8	12/12/12 02:32 / dck
Cadmium	ND	mg/L		0.00008		E200.8	12/12/12 02:32 / dck
Copper	0.003	mg/L		0.001		E200.8	12/12/12 02:32 / dck
Lead	ND	mg/L		0.0005		E200.8	12/12/12 02:32 / dck
Zinc	0.02	mg/L		0.01		E200.8	12/12/12 02:32 / dck
METALS, TOTAL							
Mercury	ND	mg/L		0.000010		E245.1	12/11/12 15:35 / eli-b4
METALS, TOTAL RECOVERABLE							
Arsenic	0.019	mg/L		0.005		E200.8	12/12/12 02:37 / dck
Cadmium	0.00023	mg/L		0.00008		E200.8	12/12/12 02:37 / dck
Calcium	29	mg/L		1		E200.7	12/11/12 17:21 / sld
Copper	0.019	mg/L		0.001		E200.8	12/12/12 02:37 / dck
Lead	0.0055	mg/L		0.0005		E200.8	12/12/12 02:37 / dck
Magnesium	7	mg/L		1		E200.7	12/11/12 17:21 / sld
Zinc	0.03	mg/L		0.01		E200.8	12/12/12 02:37 / 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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R85122
Sample ID: MBLK		Method Blank				Run: MAN-TECH_121213A				12/13/12 08:58
Alkalinity, Total as CaCO3		2	mg/L	1						
Sample ID: LCS-12072012		Laboratory Control Sample				Run: MAN-TECH_121213A				12/13/12 09:06
Alkalinity, Total as CaCO3		630	mg/L	4.0	105	90	110			
Sample ID: H12120116-003ADUP	2	Sample Duplicate				Run: MAN-TECH_121213A				12/13/12 10:08
Alkalinity, Total as CaCO3		720	mg/L	4.0				0.5	10	
Bicarbonate as HCO3		800	mg/L	4.0				1.8	10	
Sample ID: H12120116-004AMS		Sample Matrix Spike				Run: MAN-TECH_121213A				12/13/12 10:27
Alkalinity, Total as CaCO3		1200	mg/L	4.0	86	80	120			
Sample ID: H12120119-005ADUP	2	Sample Duplicate				Run: MAN-TECH_121213A				12/13/12 11:37
Alkalinity, Total as CaCO3		160	mg/L	4.0				0.9	10	
Bicarbonate as HCO3		180	mg/L	4.0				0.5	10	
Sample ID: MBLK		Method Blank				Run: MAN-TECH_121213A				12/13/12 12:15
Alkalinity, Total as CaCO3		2	mg/L	1						
Sample ID: LCS-12072012		Laboratory Control Sample				Run: MAN-TECH_121213A				12/13/12 12:23
Alkalinity, Total as CaCO3		630	mg/L	4.0	105	90	110			
Sample ID: H12120119-016ADUP	2	Sample Duplicate				Run: MAN-TECH_121213A				12/13/12 13:13
Alkalinity, Total as CaCO3		110	mg/L	4.0				1.6	10	
Bicarbonate as HCO3		120	mg/L	4.0				1.2	10	
Sample ID: H12120119-017AMS		Sample Matrix Spike				Run: MAN-TECH_121213A				12/13/12 13:24
Alkalinity, Total as CaCO3		590	mg/L	4.0	98	80	120			
Sample ID: H12120120-008ADUP	2	Sample Duplicate				Run: MAN-TECH_121213A				12/13/12 14:45
Alkalinity, Total as CaCO3		600	mg/L	4.0				4.2	10	
Bicarbonate as HCO3		620	mg/L	4.0				1.6	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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 D										Batch: 18932
Sample ID: MB-18932		Method Blank				Run: ACCU-124 (14410200)_121207			12/07/12 08:49	
Solids, Total Suspended TSS @ 105 C		ND	mg/L	2						
Sample ID: LCS-18932		Laboratory Control Sample				Run: ACCU-124 (14410200)_121207			12/07/12 08:49	
Solids, Total Suspended TSS @ 105 C		1910	mg/L	10	96	70	130			
Sample ID: H12120119-003ADUP		Sample Duplicate				Run: ACCU-124 (14410200)_121207			12/07/12 08:50	
Solids, Total Suspended TSS @ 105 C		22.0	mg/L	10				9.5	5	R
Sample ID: H12120119-016ADUP		Sample Duplicate				Run: ACCU-124 (14410200)_121207			12/07/12 08:53	
Solids, Total Suspended TSS @ 105 C		6.00	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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500 N-C									Analytical Run: FIA203-HE_121211A	
Sample ID: ICV		Initial Calibration Verification Standard							12/11/12 09:34	
Nitrogen, Total		0.977	mg/L	0.10	98	90	110			
Sample ID: CCV		Continuing Calibration Verification Standard							12/11/12 09:36	
Nitrogen, Total		0.493	mg/L	0.10	99	90	110			
Sample ID: ICB		Initial Calibration Blank, Instrument Blank							12/11/12 09:38	
Nitrogen, Total		0.00736	mg/L	0.10		0	0			
Sample ID: CCV		Continuing Calibration Verification Standard							12/11/12 09:57	
Nitrogen, Total		0.492	mg/L	0.10	99	90	110			
Method: A4500 N-C									Batch: 18967	
Sample ID: MB-18967		Method Blank				Run: FIA203-HE_121211A			12/11/12 09:39	
Nitrogen, Total		ND	mg/L	0.03						
Sample ID: LCS-18967		Laboratory Control Sample				Run: FIA203-HE_121211A			12/11/12 09:40	
Nitrogen, Total		22.5	mg/L	0.20	99	90	110			
Sample ID: H12120119-007EMS		Sample Matrix Spike				Run: FIA203-HE_121211A			12/11/12 09:50	
Nitrogen, Total		0.983	mg/L	0.10	98	90	110			
Sample ID: H12120119-007EMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_121211A			12/11/12 09:51	
Nitrogen, Total		0.984	mg/L	0.10	98	90	110	0.1	20	
Sample ID: H12120119-017EMS		Sample Matrix Spike				Run: FIA203-HE_121211A			12/11/12 10:06	
Nitrogen, Total		1.03	mg/L	0.10	103	90	110			
Sample ID: H12120119-017EMSD		Sample Matrix Spike Duplicate				Run: FIA203-HE_121211A			12/11/12 10:08	
Nitrogen, Total		1.03	mg/L	0.10	103	90	110	0.1	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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A5310 C									Analytical Run: SUB-C168124	
Sample ID: ICV-6794		Initial Calibration Verification Standard							12/11/12 14:08	
Organic Carbon, Dissolved (DOC)		10.3	mg/L	0.10	103	90	110			
Method: A5310 C									Batch: C_R168124	
Sample ID: MBLK		Method Blank				Run: SUB-C168124			12/11/12 13:41	
Organic Carbon, Dissolved (DOC)		ND	mg/L	0.1						
Sample ID: H12120119-001F		Sample Matrix Spike				Run: SUB-C168124			12/11/12 15:56	
Organic Carbon, Dissolved (DOC)		6.75	mg/L	0.50	101	85	115			
Sample ID: H12120119-001F		Sample Matrix Spike Duplicate				Run: SUB-C168124			12/11/12 16:06	
Organic Carbon, Dissolved (DOC)		6.93	mg/L	0.50	104	85	115	2.6	10	
Sample ID: H12120119-011F		Sample Matrix Spike				Run: SUB-C168124			12/11/12 18:34	
Organic Carbon, Dissolved (DOC)		6.10	mg/L	0.50	102	85	115			
Sample ID: H12120119-011F		Sample Matrix Spike Duplicate				Run: SUB-C168124			12/11/12 18:45	
Organic Carbon, Dissolved (DOC)		6.22	mg/L	0.50	104	85	115	1.9	10	
Sample ID: LCS-6794		Laboratory Control Sample				Run: SUB-C168124			12/11/12 18:56	
Organic Carbon, Dissolved (DOC)		10.3	mg/L	0.10	103	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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: ICP2-HE_121211A	
Sample ID: ICV	2	Initial Calibration Verification Standard							12/11/12 09:48	
Calcium		40.0	mg/L	1.0	100	95	105			
Magnesium		39.8	mg/L	1.0	100	95	105			
Sample ID: CCV-1	2	Continuing Calibration Verification Standard							12/11/12 09:52	
Calcium		24.8	mg/L	1.0	99	95	105			
Magnesium		24.6	mg/L	1.0	99	95	105			
Sample ID: ICSA	2	Interference Check Sample A							12/11/12 10:03	
Calcium		470	mg/L	1.0	94	80	120			
Magnesium		515	mg/L	1.0	103	80	120			
Sample ID: ICSAB	2	Interference Check Sample AB							12/11/12 10:07	
Calcium		476	mg/L	1.0	95	80	120			
Magnesium		516	mg/L	1.0	103	80	120			
Sample ID: CCV	2	Continuing Calibration Verification Standard							12/11/12 14:54	
Calcium		25.1	mg/L	1.0	100	90	110			
Magnesium		24.8	mg/L	1.0	99	90	110			
Sample ID: CCV	2	Continuing Calibration Verification Standard							12/11/12 15:40	
Calcium		25.4	mg/L	1.0	102	90	110			
Magnesium		25.3	mg/L	1.0	101	90	110			
Sample ID: CCV	2	Continuing Calibration Verification Standard							12/11/12 16:25	
Calcium		24.9	mg/L	1.0	100	90	110			
Magnesium		24.6	mg/L	1.0	98	90	110			
Sample ID: CCV	2	Continuing Calibration Verification Standard							12/11/12 17:10	
Calcium		24.7	mg/L	1.0	99	90	110			
Magnesium		24.3	mg/L	1.0	97	90	110			
Method: E200.7									Batch: 18958	
Sample ID: MB-18958	2	Method Blank				Run: ICP2-HE_121211A			12/11/12 13:30	
Calcium		0.03	mg/L	0.01						
Magnesium		ND	mg/L	0.005						
Sample ID: LCS-18958	2	Laboratory Control Sample				Run: ICP2-HE_121211A			12/11/12 13:34	
Calcium		25.5	mg/L	1.0	102	85	115			
Magnesium		26.8	mg/L	1.0	107	85	115			
Sample ID: H12120116-004CMS3	2	Sample Matrix Spike				Run: ICP2-HE_121211A			12/11/12 14:39	
Calcium		176	mg/L	1.0	105	70	130			
Magnesium		143	mg/L	1.0	105	70	130			
Sample ID: H12120116-004CMSD3	2	Sample Matrix Spike Duplicate				Run: ICP2-HE_121211A			12/11/12 14:43	
Calcium		175	mg/L	1.0	104	70	130	0.9	20	
Magnesium		142	mg/L	1.0	104	70	130	0.9	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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7										Batch: 18958
Sample ID: H12120055-001AMS3	2	Sample Matrix Spike				Run: ICP2-HE_121211A				12/11/12 15:36
Calcium		62.9	mg/L	1.0	107	70	130			
Magnesium		34.7	mg/L	1.0	106	70	130			
Sample ID: H12120055-001AMSD3	2	Sample Matrix Spike Duplicate				Run: ICP2-HE_121211A				12/11/12 15:47
Calcium		62.2	mg/L	1.0	104	70	130	1.1	20	
Magnesium		34.8	mg/L	1.0	106	70	130	0.1	20	
Method: E200.7										Batch: 18959
Sample ID: MB-18959	2	Method Blank				Run: ICP2-HE_121211A				12/11/12 15:51
Calcium		0.03	mg/L	0.01						
Magnesium		ND	mg/L	0.005						
Sample ID: LCS-18959	2	Laboratory Control Sample				Run: ICP2-HE_121211A				12/11/12 15:55
Calcium		26.7	mg/L	1.0	107	85	115			
Magnesium		26.6	mg/L	1.0	106	85	115			
Sample ID: H12120119-008CMS3	2	Sample Matrix Spike				Run: ICP2-HE_121211A				12/11/12 16:10
Calcium		90.6	mg/L	1.0	101	70	130			
Magnesium		40.9	mg/L	1.0	106	70	130			
Sample ID: H12120119-008CMSD3	2	Sample Matrix Spike Duplicate				Run: ICP2-HE_121211A				12/11/12 16:13
Calcium		91.6	mg/L	1.0	105	70	130	1.1	20	
Magnesium		41.5	mg/L	1.0	108	70	130	1.6	20	
Sample ID: H12120119-018CMS3	2	Sample Matrix Spike				Run: ICP2-HE_121211A				12/11/12 17:06
Calcium		54.1	mg/L	1.0	101	70	130			
Magnesium		32.8	mg/L	1.0	102	70	130			
Sample ID: H12120119-018CMSD3	2	Sample Matrix Spike Duplicate				Run: ICP2-HE_121211A				12/11/12 17:17
Calcium		54.6	mg/L	1.0	103	70	130	0.9	20	
Magnesium		32.9	mg/L	1.0	103	70	130	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:** 01/15/13

Project: CFR Monitoring-474374 **Work Order:** H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_121210B		
Sample ID: ICV STD	5	Initial Calibration Verification Standard							12/10/12 12:34	
Arsenic		0.0504	mg/L	0.0050	101	90	110			
Cadmium		0.0262	mg/L	0.0010	105	90	110			
Copper		0.0515	mg/L	0.010	103	90	110			
Lead		0.0495	mg/L	0.010	99	90	110			
Zinc		0.0542	mg/L	0.010	108	90	110			
Sample ID: ICSA	5	Interference Check Sample A							12/10/12 12:39	
Arsenic		0.000142	mg/L	0.0050						
Cadmium		0.00107	mg/L	0.0010						
Copper		0.000254	mg/L	0.010						
Lead		0.000160	mg/L	0.010						
Zinc		0.00108	mg/L	0.010						
Sample ID: ICSAB	5	Interference Check Sample AB							12/10/12 12:44	
Arsenic		0.0110	mg/L	0.0050	110	70	130			
Cadmium		0.0111	mg/L	0.0010	111	70	130			
Copper		0.0212	mg/L	0.010	106	70	130			
Lead		0.000260	mg/L	0.010		0	0			
Zinc		0.0115	mg/L	0.010	115	70	130			
Sample ID: ICV STD	5	Initial Calibration Verification Standard							12/11/12 11:44	
Arsenic		0.0499	mg/L	0.0050	100	90	110			
Cadmium		0.0252	mg/L	0.0010	101	90	110			
Copper		0.0516	mg/L	0.010	103	90	110			
Lead		0.0484	mg/L	0.010	97	90	110			
Zinc		0.0532	mg/L	0.010	106	90	110			
Sample ID: ICSA	5	Interference Check Sample A							12/11/12 11:49	
Arsenic		0.000160	mg/L	0.0050						
Cadmium		0.000874	mg/L	0.0010						
Copper		0.000218	mg/L	0.010						
Lead		0.000159	mg/L	0.010						
Zinc		0.000959	mg/L	0.010						
Sample ID: ICSAB	5	Interference Check Sample AB							12/11/12 11:54	
Arsenic		0.0109	mg/L	0.0050	109	70	130			
Cadmium		0.0109	mg/L	0.0010	109	70	130			
Copper		0.0209	mg/L	0.010	105	70	130			
Lead		0.000229	mg/L	0.010		0	0			
Zinc		0.0119	mg/L	0.010	119	70	130			
Sample ID: ICV STD	5	Initial Calibration Verification Standard							12/12/12 03:37	
Arsenic		0.0486	mg/L	0.0050	97	90	110			
Cadmium		0.0252	mg/L	0.0010	101	90	110			
Copper		0.0499	mg/L	0.010	100	90	110			
Lead		0.0476	mg/L	0.010	95	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:** 01/15/13

Project: CFR Monitoring-474374 **Work Order:** H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_121210B		
Sample ID: ICV STD	5	Initial Calibration Verification Standard								12/12/12 03:37
Zinc		0.0509	mg/L	0.010	102	90	110			
Sample ID: ICSA	5	Interference Check Sample A								12/12/12 03:42
Arsenic		0.000117	mg/L	0.0050						
Cadmium		0.00103	mg/L	0.0010						
Copper		0.000206	mg/L	0.010						
Lead		0.000154	mg/L	0.010						
Zinc		0.00113	mg/L	0.010						
Sample ID: ICSAB	5	Interference Check Sample AB								12/12/12 03:46
Arsenic		0.0105	mg/L	0.0050	105	70	130			
Cadmium		0.0108	mg/L	0.0010	107	70	130			
Copper		0.0203	mg/L	0.010	102	70	130			
Lead		0.000227	mg/L	0.010		0	0			
Zinc		0.0112	mg/L	0.010	112	70	130			
Sample ID: ICV STD	5	Initial Calibration Verification Standard								12/12/12 10:49
Arsenic		0.0500	mg/L	0.0050	100	90	110			
Cadmium		0.0266	mg/L	0.0010	106	90	110			
Copper		0.0513	mg/L	0.010	103	90	110			
Lead		0.0502	mg/L	0.010	100	90	110			
Zinc		0.0532	mg/L	0.010	106	90	110			
Sample ID: ICSA	5	Interference Check Sample A								12/12/12 10:53
Arsenic		0.000124	mg/L	0.0050						
Cadmium		0.000992	mg/L	0.0010						
Copper		0.000219	mg/L	0.010						
Lead		0.000178	mg/L	0.010						
Zinc		0.00106	mg/L	0.010						
Sample ID: ICSAB	5	Interference Check Sample AB								12/12/12 10:58
Arsenic		0.0115	mg/L	0.0050	115	70	130			
Cadmium		0.0114	mg/L	0.0010	114	70	130			
Copper		0.0213	mg/L	0.010	107	70	130			
Lead		0.000251	mg/L	0.010		0	0			
Zinc		0.0117	mg/L	0.010	117	70	130			
Sample ID: ICV STD	5	Initial Calibration Verification Standard								12/13/12 04:48
Arsenic		0.0515	mg/L	0.0050	103	90	110			
Cadmium		0.0260	mg/L	0.0010	104	90	110			
Copper		0.0529	mg/L	0.010	106	90	110			
Lead		0.0498	mg/L	0.010	100	90	110			
Zinc		0.0537	mg/L	0.010	107	90	110			
Sample ID: ICSA	5	Interference Check Sample A								12/13/12 07:32
Arsenic		0.000164	mg/L	0.0050						

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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Analytical Run: ICPMS204-B_121210B	
Sample ID: ICSA	5	Interference Check Sample A							12/13/12 07:32	
Cadmium		0.000958	mg/L	0.0010						
Copper		0.000215	mg/L	0.010						
Lead		0.000133	mg/L	0.010						
Zinc		0.000954	mg/L	0.010						
Sample ID: ICSAB	5	Interference Check Sample AB							12/13/12 07:37	
Arsenic		0.0106	mg/L	0.0050	106	70	130			
Cadmium		0.0105	mg/L	0.0010	105	70	130			
Copper		0.0210	mg/L	0.010	105	70	130			
Lead		0.000209	mg/L	0.010		0	0			
Zinc		0.0110	mg/L	0.010	110	70	130			
Sample ID: ICV STD	5	Initial Calibration Verification Standard							12/14/12 01:49	
Arsenic		0.0494	mg/L	0.0050	99	90	110			
Cadmium		0.0260	mg/L	0.0010	104	90	110			
Copper		0.0516	mg/L	0.010	103	90	110			
Lead		0.0499	mg/L	0.010	100	90	110			
Zinc		0.0529	mg/L	0.010	106	90	110			
Sample ID: ICSA	5	Interference Check Sample A							12/14/12 01:54	
Arsenic		0.000108	mg/L	0.0050						
Cadmium		0.000831	mg/L	0.0010						
Copper		0.000181	mg/L	0.010						
Lead		0.000153	mg/L	0.010						
Zinc		0.00102	mg/L	0.010						
Sample ID: ICSAB	5	Interference Check Sample AB							12/14/12 01:59	
Arsenic		0.0104	mg/L	0.0050	104	70	130			
Cadmium		0.0105	mg/L	0.0010	105	70	130			
Copper		0.0198	mg/L	0.010	99	70	130			
Lead		0.000218	mg/L	0.010		0	0			
Zinc		0.0110	mg/L	0.010	110	70	130			
Sample ID: ICV STD	5	Initial Calibration Verification Standard							12/14/12 18:44	
Arsenic		0.0503	mg/L	0.0050	101	90	110			
Cadmium		0.0263	mg/L	0.0010	105	90	110			
Copper		0.0513	mg/L	0.010	103	90	110			
Lead		0.0497	mg/L	0.010	99	90	110			
Zinc		0.0508	mg/L	0.010	102	90	110			
Sample ID: ICSA	5	Interference Check Sample A							12/14/12 18:49	
Arsenic		8.10E-05	mg/L	0.0050						
Cadmium		0.000837	mg/L	0.0010						
Copper		0.000186	mg/L	0.010						
Lead		0.000137	mg/L	0.010						
Zinc		0.000903	mg/L	0.010						

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:** 01/15/13

Project: CFR Monitoring-474374 **Work Order:** H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Analytical Run: ICPMS204-B_121210B	
Sample ID: ICSAB	5	Interference Check Sample AB							12/14/12 18:53	
Arsenic		0.0106	mg/L	0.0050	106	70	130			
Cadmium		0.0102	mg/L	0.0010	102	70	130			
Copper		0.0201	mg/L	0.010	100	70	130			
Lead		0.000214	mg/L	0.010		0	0			
Zinc		0.0109	mg/L	0.010	109	70	130			
Method: E200.8									Batch: 18958	
Sample ID: MB-18958	5	Method Blank				Run: ICPMS204-B_121210B			12/11/12 19:03	
Arsenic		ND	mg/L	3E-05						
Cadmium		ND	mg/L	2E-05						
Copper		ND	mg/L	0.0003						
Lead		ND	mg/L	2E-05						
Zinc		0.002	mg/L	0.0007						
Sample ID: LCS-18958	5	Laboratory Control Sample				Run: ICPMS204-B_121210B			12/11/12 19:08	
Arsenic		0.519	mg/L	0.0010	104	85	115			
Cadmium		0.269	mg/L	0.0010	108	85	115			
Copper		0.506	mg/L	0.0050	101	85	115			
Lead		0.504	mg/L	0.0010	101	85	115			
Zinc		0.536	mg/L	0.010	107	85	115			
Sample ID: H12120055-001AMS3	5	Sample Matrix Spike				Run: ICPMS204-B_121210B			12/11/12 19:26	
Arsenic		0.522	mg/L	0.0010	104	70	130			
Cadmium		0.269	mg/L	0.0010	108	70	130			
Copper		1.27	mg/L	0.0050	95	70	130			
Lead		0.519	mg/L	0.0010	102	70	130			
Zinc		0.667	mg/L	0.010	105	70	130			
Sample ID: H12120055-001AMSD3	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_121210B			12/11/12 19:30	
Arsenic		0.516	mg/L	0.0010	103	70	130	1.1	20	
Cadmium		0.266	mg/L	0.0010	106	70	130	1.3	20	
Copper		1.27	mg/L	0.0050	94	70	130	0.2	20	
Lead		0.515	mg/L	0.0010	101	70	130	0.7	20	
Zinc		0.663	mg/L	0.010	104	70	130	0.7	20	
Sample ID: H12120116-004CMS3	5	Sample Matrix Spike				Run: ICPMS204-B_121210B			12/12/12 22:08	
Arsenic		2.60	mg/L	0.0010	104	70	130			
Cadmium		1.33	mg/L	0.0010	106	70	130			
Copper		2.63	mg/L	0.0050	105	70	130			
Lead		2.81	mg/L	0.0010	113	70	130			
Zinc		2.49	mg/L	0.010	98	70	130			
Sample ID: H12120116-004CMSD3	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_121210B			12/12/12 22:13	
Arsenic		2.57	mg/L	0.0010	103	70	130	1.2	20	
Cadmium		1.30	mg/L	0.0010	104	70	130	2.1	20	
Copper		2.61	mg/L	0.0050	104	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:** 01/15/13

Project: CFR Monitoring-474374 **Work Order:** H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: 18958
Sample ID: H12120116-004CMSD3	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_121210B				12/12/12 22:13
Lead		2.79	mg/L	0.0010	112	70	130	0.7	20	
Zinc		2.42	mg/L	0.010	96	70	130	2.7	20	
Method: E200.8										Batch: 18959
Sample ID: MB-18959	5	Method Blank				Run: ICPMS204-B_121210B				12/11/12 22:39
Arsenic		8E-05	mg/L	3E-05						
Cadmium		ND	mg/L	2E-05						
Copper		0.0004	mg/L	0.0003						
Lead		ND	mg/L	2E-05						
Zinc		0.001	mg/L	0.0007						
Sample ID: LCS-18959	5	Laboratory Control Sample				Run: ICPMS204-B_121210B				12/11/12 22:44
Arsenic		0.530	mg/L	0.0010	106	85	115			
Cadmium		0.276	mg/L	0.0010	110	85	115			
Copper		0.525	mg/L	0.0050	105	85	115			
Lead		0.525	mg/L	0.0010	105	85	115			
Zinc		0.541	mg/L	0.010	108	85	115			
Sample ID: H12120119-008CMS3	5	Sample Matrix Spike				Run: ICPMS204-B_121210B				12/11/12 23:25
Arsenic		0.535	mg/L	0.0010	104	70	130			
Cadmium		0.272	mg/L	0.0010	109	70	130			
Copper		0.544	mg/L	0.0050	103	70	130			
Lead		0.534	mg/L	0.0010	106	70	130			
Zinc		0.552	mg/L	0.010	103	70	130			
Sample ID: H12120119-008CMSD3	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_121210B				12/11/12 23:29
Arsenic		0.546	mg/L	0.0010	107	70	130	2.1	20	
Cadmium		0.272	mg/L	0.0010	109	70	130	0.3	20	
Copper		0.554	mg/L	0.0050	105	70	130	1.8	20	
Lead		0.534	mg/L	0.0010	106	70	130	0.1	20	
Zinc		0.564	mg/L	0.010	105	70	130	2.2	20	
Sample ID: H12120119-018CMS3	5	Sample Matrix Spike				Run: ICPMS204-B_121210B				12/12/12 02:19
Arsenic		0.548	mg/L	0.0010	106	70	130			
Cadmium		0.276	mg/L	0.0010	110	70	130			
Copper		0.538	mg/L	0.0050	103	70	130			
Lead		0.525	mg/L	0.0010	104	70	130			
Zinc		0.560	mg/L	0.010	105	70	130			
Sample ID: H12120119-018CMSD3	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_121210B				12/12/12 02:23
Arsenic		0.539	mg/L	0.0010	104	70	130	1.6	20	
Cadmium		0.271	mg/L	0.0010	108	70	130	1.8	20	
Copper		0.526	mg/L	0.0050	100	70	130	2.3	20	
Lead		0.520	mg/L	0.0010	103	70	130	1.0	20	
Zinc		0.552	mg/L	0.010	103	70	130	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:** 01/15/13

Project: CFR Monitoring-474374 **Work Order:** H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R85054
Sample ID: ICB	5	Method Blank				Run: ICPMS204-B_121210B				12/10/12 13:42
Arsenic		ND	mg/L	5E-05						
Cadmium		ND	mg/L	5E-06						
Copper		ND	mg/L	2E-05						
Lead		ND	mg/L	1E-05						
Zinc		0.0008	mg/L	0.0004						
Sample ID: LFB	5	Laboratory Fortified Blank				Run: ICPMS204-B_121210B				12/10/12 13:46
Arsenic		0.0512	mg/L	0.0050	102	85	115			
Cadmium		0.0491	mg/L	0.0010	98	85	115			
Copper		0.0495	mg/L	0.010	99	85	115			
Lead		0.0512	mg/L	0.010	102	85	115			
Zinc		0.0511	mg/L	0.010	101	85	115			
Sample ID: LFB	5	Laboratory Fortified Blank				Run: ICPMS204-B_121210B				12/11/12 12:36
Arsenic		0.0491	mg/L	0.0050	98	85	115			
Cadmium		0.0481	mg/L	0.0010	96	85	115			
Copper		0.0493	mg/L	0.010	99	85	115			
Lead		0.0486	mg/L	0.010	97	85	115			
Zinc		0.0507	mg/L	0.010	100	85	115			
Sample ID: H12120119-008BMS	5	Sample Matrix Spike				Run: ICPMS204-B_121210B				12/11/12 23:07
Arsenic		0.0599	mg/L	0.0010	98	70	130			
Cadmium		0.0503	mg/L	0.0010	101	70	130			
Copper		0.0522	mg/L	0.0050	94	70	130			
Lead		0.0508	mg/L	0.0010	101	70	130			
Zinc		0.0623	mg/L	0.010	96	70	130			
Sample ID: H12120119-008BMSD	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_121210B				12/11/12 23:11
Arsenic		0.0615	mg/L	0.0010	101	70	130	2.6	20	
Cadmium		0.0499	mg/L	0.0010	100	70	130	0.9	20	
Copper		0.0534	mg/L	0.0050	96	70	130	2.3	20	
Lead		0.0504	mg/L	0.0010	100	70	130	0.9	20	
Zinc		0.0634	mg/L	0.010	98	70	130	1.6	20	
Sample ID: H12120119-018BMS	5	Sample Matrix Spike				Run: ICPMS204-B_121210B				12/12/12 01:47
Arsenic		0.0645	mg/L	0.0010	102	70	130			
Cadmium		0.0505	mg/L	0.0010	101	70	130			
Copper		0.0508	mg/L	0.0050	97	70	130			
Lead		0.0504	mg/L	0.0010	100	70	130			
Zinc		0.0665	mg/L	0.010	102	70	130			
Sample ID: H12120119-018BMSD	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_121210B				12/12/12 01:51
Arsenic		0.0659	mg/L	0.0010	104	70	130	2.0	20	
Cadmium		0.0509	mg/L	0.0010	102	70	130	0.7	20	
Copper		0.0513	mg/L	0.0050	98	70	130	1.0	20	
Lead		0.0507	mg/L	0.0010	101	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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R85054
Sample ID: H12120119-018BMSD	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_121210B				12/12/12 01:51
Zinc		0.0656	mg/L	0.010	100	70	130	1.3	20	
Sample ID: H12120095-002AMS	5	Sample Matrix Spike				Run: ICPMS204-B_121210B				12/13/12 06:44
Arsenic		0.104	mg/L	0.0010	103	70	130			
Cadmium		0.0955	mg/L	0.0010	95	70	130			
Copper		0.103	mg/L	0.0050	102	70	130			
Lead		0.0980	mg/L	0.0010	97	70	130			
Zinc		0.102	mg/L	0.010	98	70	130			
Sample ID: H12120095-002AMSD	5	Sample Matrix Spike Duplicate				Run: ICPMS204-B_121210B				12/13/12 06:48
Arsenic		0.102	mg/L	0.0010	102	70	130	1.4	20	
Cadmium		0.0940	mg/L	0.0010	94	70	130	1.6	20	
Copper		0.103	mg/L	0.0050	101	70	130	0.7	20	
Lead		0.0976	mg/L	0.0010	97	70	130	0.4	20	
Zinc		0.0995	mg/L	0.010	95	70	130	2.7	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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E245.1									Analytical Run: SUB-B196591	
Sample ID: QCS		Initial Calibration Verification Standard							12/11/12 12:40	
Mercury		0.00021	mg/L	1.0E-05	107	90	110			
Method: E245.1									Batch: B_67706	
Sample ID: MB-67706		Method Blank				Run: SUB-B196591			12/11/12 14:43	
Mercury		4E-06	mg/L	1E-06						
Sample ID: LCS-66706		Laboratory Control Sample				Run: SUB-B196591			12/11/12 14:45	
Mercury		0.00019	mg/L	1.0E-05	93	85	115			
Sample ID: H12120119-001C		Sample Matrix Spike				Run: SUB-B196591			12/11/12 14:48	
Mercury		0.00018	mg/L	1.0E-05	85	70	130			
Sample ID: H12120119-001C		Sample Matrix Spike Duplicate				Run: SUB-B196591			12/11/12 14:50	
Mercury		0.00019	mg/L	1.0E-05	88	70	130	3.8	30	
Sample ID: H12120119-019C		Sample Matrix Spike				Run: SUB-B196591			12/11/12 15:37	
Mercury		0.00020	mg/L	1.0E-05	96	70	130			
Sample ID: H12120119-019C		Sample Matrix Spike Duplicate				Run: SUB-B196591			12/11/12 15:39	
Mercury		0.00019	mg/L	1.0E-05	93	70	130	3.5	30	
Method: E245.1									Analytical Run: SUB-B196682	
Sample ID: QCS		Initial Calibration Verification Standard							12/12/12 13:19	
Mercury		0.00021	mg/L	1.0E-05	106	90	110			
Method: E245.1									Batch: B_67734	
Sample ID: MB-67734		Method Blank				Run: SUB-B196682			12/12/12 13:29	
Mercury		4E-06	mg/L	1E-06						
Sample ID: LCS-67734		Laboratory Control Sample				Run: SUB-B196682			12/12/12 13:31	
Mercury		0.00018	mg/L	1.0E-05	89	85	115			
Sample ID: B12120902-020CMS		Sample Matrix Spike				Run: SUB-B196682			12/12/12 14:08	
Mercury		0.00021	mg/L	1.0E-05	94	70	130			
Sample ID: B12120902-020CMSD		Sample Matrix Spike Duplicate				Run: SUB-B196682			12/12/12 14:10	
Mercury		0.00021	mg/L	1.0E-05	95	70	130	0.5	30	

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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC101-H_121210A	
Sample ID: CCV121012-15		Continuing Calibration Verification Standard							12/10/12 14:29	
Sulfate		380	mg/L	1.0	95	90	110			
Sample ID: ICV121012-12		Initial Calibration Verification Standard							12/10/12 14:45	
Sulfate		380	mg/L	1.0	94	90	110			
Sample ID: CCV121012-30		Continuing Calibration Verification Standard							12/10/12 17:54	
Sulfate		380	mg/L	1.0	96	90	110			
Method: E300.0									Batch: R85036	
Sample ID: ICB121012-13		Method Blank				Run: IC101-H_121210A			12/10/12 13:33	
Sulfate		0.1	mg/L	0.1						
Sample ID: LFB121012-14		Laboratory Fortified Blank				Run: IC101-H_121210A			12/10/12 13:46	
Sulfate		180	mg/L	1.0	92	90	110			
Sample ID: H12120119-017AMS		Sample Matrix Spike				Run: IC101-H_121210A			12/10/12 17:17	
Sulfate		180	mg/L	1.0	89	90	110			S
Sample ID: H12120119-017AMSD		Sample Matrix Spike Duplicate				Run: IC101-H_121210A			12/10/12 17:29	
Sulfate		190	mg/L	1.0	94	90	110	5.4	20	
Sample ID: H12120119-019AMS		Sample Matrix Spike				Run: IC101-H_121210A			12/10/12 18:32	
Sulfate		220	mg/L	1.0	96	90	110			
Sample ID: H12120119-019AMSD		Sample Matrix Spike Duplicate				Run: IC101-H_121210A			12/10/12 18:45	
Sulfate		220	mg/L	1.0	98	90	110	1.5	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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC102-H_121207A	
Sample ID: ICV120712-12		Initial Calibration Verification Standard							12/07/12 08:59	
Sulfate		380	mg/L	1.0	96	90	110			
Sample ID: CCV120712-30		Continuing Calibration Verification Standard							12/07/12 12:45	
Sulfate		380	mg/L	1.0	96	90	110			
Method: E300.0									Batch: R85007	
Sample ID: ICB120712-13		Method Blank				Run: IC102-H_121207A			12/07/12 09:11	
Sulfate		ND	mg/L	0.1						
Sample ID: LFB120712-14		Laboratory Fortified Blank				Run: IC102-H_121207A			12/07/12 09:24	
Sulfate		190	mg/L	1.0	95	90	110			
Sample ID: H12120116-004AMS		Sample Matrix Spike				Run: IC102-H_121207A			12/07/12 12:20	
Sulfate		22000	mg/L	11	99	90	110			
Sample ID: H12120116-004AMSD		Sample Matrix Spike Duplicate				Run: IC102-H_121207A			12/07/12 12:33	
Sulfate		22000	mg/L	11	98	90	110	0.5	20	
Sample ID: H12120119-007AMS		Sample Matrix Spike				Run: IC102-H_121207A			12/07/12 15:17	
Sulfate		190	mg/L	1.0	96	90	110			
Sample ID: H12120119-007AMSD		Sample Matrix Spike Duplicate				Run: IC102-H_121207A			12/07/12 15:29	
Sulfate		190	mg/L	1.0	95	90	110	1.4	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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E350.1									Analytical Run: FIA203-HE_121207C	
Sample ID: ICV	Initial Calibration Verification Standard								12/07/12 13:14	
Nitrogen, Ammonia as N		5.76	mg/L	0.25	102	90	110			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								12/07/12 13:17	
Nitrogen, Ammonia as N		0.0112	mg/L	0.050		0	0			
Sample ID: CCV	Continuing Calibration Verification Standard								12/07/12 13:36	
Nitrogen, Ammonia as N		0.504	mg/L	0.050	101	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								12/07/12 13:53	
Nitrogen, Ammonia as N		0.499	mg/L	0.050	100	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								12/07/12 14:10	
Nitrogen, Ammonia as N		0.492	mg/L	0.050	98	90	110			
Method: E350.1									Batch: R84993	
Sample ID: LFB	Laboratory Fortified Blank					Run: FIA203-HE_121207C			12/07/12 13:15	
Nitrogen, Ammonia as N		1.05	mg/L	0.050	105	90	110			
Sample ID: MBLK	Method Blank					Run: FIA203-HE_121207C			12/07/12 13:30	
Nitrogen, Ammonia as N		ND	mg/L	0.02						
Sample ID: H12120118-001CMS	Sample Matrix Spike					Run: FIA203-HE_121207C			12/07/12 13:42	
Nitrogen, Ammonia as N		0.943	mg/L	0.050	94	80	120			
Sample ID: H12120118-001CMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_121207C			12/07/12 13:44	
Nitrogen, Ammonia as N		0.932	mg/L	0.050	93	80	120	1.2	10	
Sample ID: H12120119-007DMS	Sample Matrix Spike					Run: FIA203-HE_121207C			12/07/12 13:55	
Nitrogen, Ammonia as N		0.982	mg/L	0.050	98	80	120			
Sample ID: H12120119-007DMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_121207C			12/07/12 13:57	
Nitrogen, Ammonia as N		0.996	mg/L	0.050	100	80	120	1.4	10	
Sample ID: H12120119-017DMS	Sample Matrix Spike					Run: FIA203-HE_121207C			12/07/12 14:12	
Nitrogen, Ammonia as N		0.954	mg/L	0.050	95	80	120			
Sample ID: H12120119-017DMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_121207C			12/07/12 14:13	
Nitrogen, Ammonia as N		0.959	mg/L	0.050	96	80	120	0.5	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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2									Analytical Run: FIA203-HE_121207B	
Sample ID: ICV	Initial Calibration Verification Standard								12/07/12 10:25	
Nitrogen, Nitrate+Nitrite as N		1.03	mg/L	0.010	103	90	110			
Sample ID: ICB	Initial Calibration Blank, Instrument Blank								12/07/12 10:30	
Nitrogen, Nitrate+Nitrite as N		-0.0114	mg/L	0.010		0	0			
Sample ID: CCV	Continuing Calibration Verification Standard								12/07/12 11:06	
Nitrogen, Nitrate+Nitrite as N		0.466	mg/L	0.010	93	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								12/07/12 11:23	
Nitrogen, Nitrate+Nitrite as N		0.474	mg/L	0.010	95	90	110			
Sample ID: CCV	Continuing Calibration Verification Standard								12/07/12 11:40	
Nitrogen, Nitrate+Nitrite as N		0.486	mg/L	0.010	97	90	110			
Method: E353.2									Batch: R84990	
Sample ID: LFB	Laboratory Fortified Blank					Run: FIA203-HE_121207B			12/07/12 10:26	
Nitrogen, Nitrate+Nitrite as N		1.01	mg/L	0.010	101	90	110			
Sample ID: MBLK	Method Blank					Run: FIA203-HE_121207B			12/07/12 10:31	
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.002						
Sample ID: H12120116-003DMS	Sample Matrix Spike					Run: FIA203-HE_121207B			12/07/12 11:08	
Nitrogen, Nitrate+Nitrite as N		0.949	mg/L	0.010	88	90	110			S
Sample ID: H12120116-003DMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_121207B			12/07/12 11:10	
Nitrogen, Nitrate+Nitrite as N		0.953	mg/L	0.010	88	90	110	0.4	20	S
Sample ID: H12120119-005DMS	Sample Matrix Spike					Run: FIA203-HE_121207B			12/07/12 11:25	
Nitrogen, Nitrate+Nitrite as N		1.04	mg/L	0.010	94	90	110			
Sample ID: H12120119-005DMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_121207B			12/07/12 11:26	
Nitrogen, Nitrate+Nitrite as N		1.04	mg/L	0.010	94	90	110	0.2	20	
Sample ID: H12120119-017DMS	Sample Matrix Spike					Run: FIA203-HE_121207B			12/07/12 11:44	
Nitrogen, Nitrate+Nitrite as N		0.941	mg/L	0.010	94	90	110			
Sample ID: H12120119-017DMSD	Sample Matrix Spike Duplicate					Run: FIA203-HE_121207B			12/07/12 11:46	
Nitrogen, Nitrate+Nitrite as N		0.950	mg/L	0.010	95	90	110	0.9	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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E365.1									Analytical Run: FIA202-HE_121211A	
Sample ID: ICV		Initial Calibration Verification Standard							12/11/12 10:17	
Phosphorus, Total as P		0.246	mg/L	0.010	98	90	110			
Sample ID: ICB		Initial Calibration Blank, Instrument Blank							12/11/12 10:18	
Phosphorus, Total as P		0.00260	mg/L	0.010		0	0			
Sample ID: CCV		Continuing Calibration Verification Standard							12/11/12 10:19	
Phosphorus, Total as P		0.0902	mg/L	0.010	90	90	110			
Sample ID: CCV		Continuing Calibration Verification Standard							12/11/12 10:36	
Phosphorus, Total as P		0.0899	mg/L	0.010	90	90	110			
Sample ID: CCV		Continuing Calibration Verification Standard							12/11/12 10:50	
Phosphorus, Total as P		0.0916	mg/L	0.010	92	90	110			
Method: E365.1									Batch: 18965	
Sample ID: MB-18965		Method Blank				Run: FIA202-HE_121211A			12/11/12 10:21	
Phosphorus, Total as P		0.001	mg/L	0.0009						
Sample ID: LCS-18965		Laboratory Control Sample				Run: FIA202-HE_121211A			12/11/12 10:22	
Phosphorus, Total as P		0.394	mg/L	0.010	98	90	110			
Sample ID: H12120119-001DMS		Sample Matrix Spike				Run: FIA202-HE_121211A			12/11/12 10:28	
Phosphorus, Total as P		0.233	mg/L	0.010	105	90	110			
Sample ID: H12120119-001DMSD		Sample Matrix Spike Duplicate				Run: FIA202-HE_121211A			12/11/12 10:29	
Phosphorus, Total as P		0.232	mg/L	0.010	105	90	110	0.3	20	
Sample ID: H12120119-007DMS		Sample Matrix Spike				Run: FIA202-HE_121211A			12/11/12 10:38	
Phosphorus, Total as P		0.195	mg/L	0.010	92	90	110			
Sample ID: H12120119-007DMSD		Sample Matrix Spike Duplicate				Run: FIA202-HE_121211A			12/11/12 10:39	
Phosphorus, Total as P		0.199	mg/L	0.010	94	90	110	1.9	20	
Method: E365.1									Batch: 18966	
Sample ID: LCS-18966		Laboratory Control Sample				Run: FIA202-HE_121211A			12/11/12 10:51	
Phosphorus, Total as P		0.404	mg/L	0.010	101	90	110			
Sample ID: MB-18966		Method Blank				Run: FIA202-HE_121211A			12/11/12 10:52	
Phosphorus, Total as P		ND	mg/L	0.0009						
Sample ID: H12120119-017DMS		Sample Matrix Spike				Run: FIA202-HE_121211A			12/11/12 10:55	
Phosphorus, Total as P		0.196	mg/L	0.010	98	90	110			
Sample ID: H12120119-017DMSD		Sample Matrix Spike Duplicate				Run: FIA202-HE_121211A			12/11/12 10:56	
Phosphorus, Total as P		0.202	mg/L	0.010	101	90	110	2.8	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: 01/15/13
Project: CFR Monitoring-474374
Work Order: H12120119

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E365.1									Analytical Run: FIA202-HE_121227A	
Sample ID: ICV		Initial Calibration Verification Standard							12/27/12 14:47	
Phosphorus, Total as P		0.264	mg/L	0.010	106	90	110			
Sample ID: ICB		Initial Calibration Blank, Instrument Blank							12/27/12 14:48	
Phosphorus, Total as P		-0.000340	mg/L	0.010		0	0			
Sample ID: CCV		Continuing Calibration Verification Standard							12/27/12 14:49	
Phosphorus, Total as P		0.0900	mg/L	0.010	90	90	110			
Method: E365.1									Batch: 19117	
Sample ID: MB-19117		Method Blank				Run: FIA202-HE_121227A			12/27/12 14:51	
Phosphorus, Total as P		ND	mg/L	0.0009						
Sample ID: LCS-19117		Laboratory Control Sample				Run: FIA202-HE_121227A			12/27/12 14:52	
Phosphorus, Total as P		0.440	mg/L	0.010	110	90	110			
Sample ID: H12120119-007DMS		Sample Matrix Spike				Run: FIA202-HE_121227A			12/27/12 15:03	
Phosphorus, Total as P		0.210	mg/L	0.010	105	90	110			
Sample ID: H12120119-007DMSD		Sample Matrix Spike Duplicate				Run: FIA202-HE_121227A			12/27/12 15:04	
Phosphorus, Total as P		0.214	mg/L	0.010	107	90	110	2.1	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

Standard Reporting Procedures

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Workorder Receipt Checklist

MT DEQ-Federal Superfund H12120119

Login completed by: Wanda Johnson
Date Received: 12/6/2012

Reviewed by: BL2000\sdull
Received by: wjj

Reviewed Date: 12/18/2012
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 ☐	
Temp Blank received?	Yes ☑	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	℃ See Comments		
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:

Cooler 1 was received at 2.0℃, Cooler 2 at 5.7℃, Cooler 3 at 2.7℃. All samples received on ice and all temperatures taken from temperature blanks. Sample CFR-27H both unpreserved bottles unable to read writing due to smearing; however, they were in with the other samples labeled as CFR-27H. The Total Persulfate Nitrogen bottle for CFR-27H had a small pin hole in bottle, which leaked over night on the cart. Contacted E. Weber and he stated to go ahead and take sample from the unpreserved bottle for the Total Persulfate Nitrogen.

Workorder Receipt Checklist - Continued

MT DEQ-Federal Superfund H12120119

Sample RTC-1 the DOC bottle unable to read label due to smearing; however, it was in with the other samples labeled as RTC-1. MCWC-MWB Duplicate no time on COC, but all bottles state 11:15. Used time from bottles. Sample SS-25 unable to read time & date on the 500 mL unpreserved container. Used the sample time as the others in the sample bag with SS-25. wj 12/6/12 Do not analyze for Chloride per E. Weber. Time on the COC when client relinquished the COC does not match time received by laboratory. Samples were relinquished at 15:46 not 13:45. Wj 12/7/12

ENERGY LABORATORIES

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 OU Monitoring	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address:	Contact Name: Joe Griffin Phone/Fax: 560-6060 (DEQ) Erich Weber 437-9245 erich.weber@atkinsglobal.com	Email:	Sampler: (Please Print) E. Weber G. Ingman
Invoice Address:	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order: 624/11012

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: DOC samples were field filtered and preserved H_3PO_4 TB

Shipped by: handdel.
Cooler ID(s): Y
Receipt Temp: see comment
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	TR As, Cd, Cu, Pb, Zn	Total Hg (low level)	TPN	NO_{3+2}, NH_3, TP	TSS	Total Alk, SO_4^-	DOC	Hardness (TR Ca & Mg)	SEE ATTACHED	Comments
(2) 1	CFR-116A	12-4-2012	0930	6 W											Cooler #1 = 2.0
(2) 2	RC-CFR	12-4-2012	1130	6 W											Cooler #2 = 5.7
(2) 3	CFR-84F	12-4-2012	1300	6 W											Cooler #3 = 2.7
(2) 4	FC-CFR	12-4-2012	1400	6 W											
(2) 5	CFR-53C	12-4-2012	1515	6 W											
(2) 6	CFR-53C dup.	12-4-2012	1545	6 W											
(2) 7	Field Blank #1	12-4-2012	1630	6 W											
(1) 8	CFR-42G	12-5-2012	0900	6 W											
(1) 9	LBR-CFR	12-5-2012	1030	6 W											
(1) 10	CFR-27H	12-5-2012	1130	6 W											

LABORATORY USE ONLY H12120119

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Erich Weber	12-6-2012 1345	[signature]			

Sample Disposal: Return to Client: _____ Lab Disposal: _____

Received by Laboratory: Wanda Johnson Date/Time: 12-6-12 15:45 Signature: [signature]

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

PLEASE PRINT (Provide as much information as possible.)

Company Name: MT DEQ

Report Mail Address:

Invoice Address:

Project Name, PWS, Permit, Etc.: CFR OU Monitoring

Contact Name: Phone/Fax: Joe Griffin 560-6060 (DEQ)

Email: Erich Weber 437-9245 erich.weber@atkinsglobal.com

Invoice Contact & Phone:

Sample Origin: State: MT

EPA/State Compliance: Yes ☐ No ☐

Sampler: (Please Print) E. Weber G. Ivaman

Purchase Order:

Quote/Bottle Order: 624 / 11012

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	Diss As, Cd, Cu, Pb, Zn	TR As, Cd, Cu, Pb, Zn	Total Hg (Low Level)	TPN	NO_3+2, NH_3, TP	TSS	Total Alk., $SO_4^{=}$	DOC	Hardness (TR Ca & Mg)	SEE ATTACHED
1 RTC-1	12-5-2012	1130	GW										
2 LC-7	12-5-2012	1230	GW										
3 WSC-SBC	12-5-2012	1400	GW										
4 CFR-03A	12-5-2012	1500	GW										
5 SS-25	12-6-2012	0915	GW										
6 MWB-SBC	12-6-2012	1000	GW										
7 Field Blank #2	12-6-2012	1030	GW										
8 MCWC-MWB	12-6-2012	1115	GW										
9 MCWC-MWB Duplicate	12-6-2012												
10													

(5) (1) (2) (1) (3)

Standard Turnaround (TAT)

R U S H

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

Comments:
DOC samples were field filtered and preserved H_3PO_4
TDS
cooler #1 2.0
cooler #2 5.7
cooler #3 2.7

Shipped by: hand del

Cooler ID(s): 1

Receipt Temp: See Comments

On Ice: Y N

Custody Seal: On Bottle Y N; On Cooler Y N

Intact: Y N

Signature Match: Y N

H12120119

LABORATORY USE ONLY

Custody Record MUST be Signed

	Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
	Erich Weber	12-6-2012 1345				
	Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
				Received by Laboratory: Wanda	Date/Time: 12-6-12 15	Signature:

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 C

SURFACE WATER: DATA

Table C1. Surface water field parameter data in the Clark Fork River Operable Unit, 2012.

SITE ID	Date	Time	Air temp (Deg F)	pH	Water Temp (Deg C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Sat)	EC (uS/cm)	Turbidity (NTU)	Flow, Instantaneous (CFS, Gauged)	Flow, Daily Mean (CFS, USGS)	Weather	Field Observations
MCWC-MWB	4/11/2012	1215	60(E)	8.04	8.70	10.49	90.0	156.9	4.08	37.30		Sunny, warm, calm	
MWB-SBC	4/11/2012	1115	50(E)	8.36	7.40	11.52	96.0	256.0	3.01	41.94		Thin cloud cover, breezy	
SS-25	4/11/2012	1030	50(E)	8.79	7.90	11.01	92.9	295.0	4.74		120 (A)	Hazy clouds, light breeze, cool	
WSC-SBC	4/11/2012	915	45(E)	8.19	6.10	10.52	84.8	218.9	1.98		71 (A)	Thin clouds, light breeze	
CFR-03A	4/10/2012	1445	60(E)	8.74	8.90	11.49	99.2	288.0	5.62		188 (A)	Sunny, warm	
LC-7	4/10/2012	1400	60(E)	8.33	9.40	11.23	98.2	419.4	6.90	49.83		Sunny and warm	
RTC-1	4/10/2012	1230	55(E)	7.94	6.60	11.29	92.2	94.5	2.23	21.13		Sunny, calm, warm	
CFR-27H	4/10/2012	1100	50(E)	8.26	7.10	10.82	89.5	301.1	10.20		327 (A)	Sunny, warm, light cloud cover	
CFR-42G	4/10/2012	830	40(E)	8.13	6.30	10.48	84.9	294.7	14.90		352 (A)	Thin clouds, cool, calm	
LBR-CFR	4/10/2012	945	40(E)	8.19	4.70	11.77	91.4	140.2	6.73		256 (A)	Thin clouds, light breeze	

CFR-53C	4/9/2012	1715	55(E)	8.41	9.20	10.80	93.7	258.8	12.00		720 (A)	Hazy clouds, cooling off, breezy	
FC-CFR	4/9/2012	1515	60(E)	8.63	9.10	11.57	100.5	186.4	10.90		174 (A)	Hazy clouds, breezy	
CFR-84F	4/9/2012	1330	55(E)	8.27	8.30	11.61	98.8	271.0	13.50		995 (A)	Sunny, warm, light breeze	
RC-CFR	4/9/2012	1200	50(E)	8.33	5.40	12.50	98.8	67.0	3.03		494 (A)	Light hazy cloud cover, breezy	
CFR-116A	4/9/2012	945	45(E)	8.26	6.10	11.87	95.6	192.5	11.10		1700 (A)		
MCWC-MWB	6/7/2012	1230	65(E)	7.88	8.64	10.01	85.8	92.0	5.47	123.93		Clear, breezy, sunny	Bankfull flow, slight turbidity. Duplicate sample collected here.
MWB-SBC	6/7/2012	1030	60(E)	8.27	7.44	10.53	87.7	144.0	6.14	140.76		Clear, sunny, warming up	Bankfull flow, slight turbidity. pH in Pond 2 discharge = 9.55!
SS-25	6/7/2012	945	55(E)	9.07	8.80	9.88	85.1	205.0	4.99		238 (A)		Channel not completely wadeable for cross sectional sampling. Waded about 85% of channel. Mixing may not be entirely complete here.
WSC-SBC	6/7/2012	845	40(E)	8.10	4.99	10.72	83.9	127.0	10.50		238 (A)	Clear, cool, breezy	Bankfull stage, moderately high turbidity.
CFR-03A	6/6/2012	1615	50(E)	8.54	9.84	9.71	85.6	177.0	14.70		554 (A)	Mostly cloudy, very windy	Bankfull stage, moderate turbidity.
LC-7	6/6/2012	1500	60(E)	8.53	13.40	10.68	102.4	472.0	4.60	27.93		Windy, mostly cloudy, cool	Slight turbidity.

RTC-1	6/6/2012	1345	60(E)	7.92	6.95	9.98	82.0	56.0	13.10	126.42		Mostly cloudy, breezy, cool	Moderate turbidity. Sampled at bridge. No diversion to irrigation pipeline.
CFR-27H	6/6/2012	1215	60(E)	7.99	11.09	8.99	81.7	189.0	50.80		781 (A)	Mostly cloudy, mild, breezy	Bankfull stage, very high turbidity.
CFR-42G	6/6/2012	900	55(E)	7.86	11.04	8.49	77.1	215.0	54.80		999 (A)	Mostly cloudy, breezy, cool, recent rain	Bankfull stage, rising hydrograph with heavy rain last night. Very high turbidity.
LBR-CFR	6/6/2012	1045	60(E)	7.89	9.42	9.45	82.6	167.0	21.80		516 (A)	Cloudy, cool, light breeze, heavy rain last night	Bankfull stage. Flow peaking? Very turbid.
CFR-53C	6/5/2012	1445	70(E)	8.23	15.30	8.85	88.2	210.9	19.10		1380 (A)	Thunderheads building, warm, breezy	Moderately high turbidity. L kely increasing stage and approaching peak May-June flow.
FC-CFR	6/5/2012	1630	75(E)	8.02	13.50	8.51	81.7	138.7	50.80		321 (A)	Windy, mostly cloudy	
CFR-84F	6/5/2012	1315	70(E)	7.85	14.20	8.51	84.2	228.1	29.70		1710 (A)	Mostly clear, breezy, warm	High flow, possibly rising stage. Very high turbidity and TSS. Algal particulate in water column.
RC-CFR	6/5/2012	1130	60(E)	7.71	10.40	9.72	86.7	47.0	4.29		2110 (A)	Partly cloudy, warm	
CFR-116A	6/5/2012	930	55(E)	7.64	12.40	8.59	80.4	138.3	17.60		3880 (A)	Cloudy	Flow is up due to recent rain.
MCWC-MWB	9/13/2012	1500	75(E)	8.43	12.55	10.75	101.1	245.0	2.10	8.93		Sunny, smoky air.	
MWB-SBC	9/13/2012	1300	70(E)	8.06	12.17	10.83	101.1	501.0	1.47	12.47		Smoky, light breeze, mild.	Low and clear. Heavy diatom and moderate filamentous algae growth present.

SS-25	9/13/2012	1130	65(E)	8.62	11.68	11.97	110.4	454.0	1.95		29 (A)	Smoky, light breeze, mild.	Low and clear. Choked with Cladophora and diatom algae growth. Lots of foam on water surface.
WSC-SBC	9/13/2012	1000	45(E)	7.76	6.42	10.98	89.2	291.0	1.13		29 (A)	Very smoky, light breeze, mild.	Creek is low and clear. Moderate periphyton growth present on bottom rocks.
CFR-03A	9/12/2012	1800	70(E)	8.79	13.47	10.95	105.0	368.0	1.78		50 (A)	Clear, sunny, cool, light breeze.	River is low and clear. Heavy algae coverage.
LC-7	9/12/2012	1630	75(E)	8.22	13.55	12.05	115.9	577.0	1.92	3.35		Mostly clear skies, sunny, some smoke.	Grab sampled due to very low flow.
RTC-1	9/12/2012	1415	75(E)	8.18	11.63	10.61	97.8	378.0	1.57	3.39		Clear, sunny.	Sampled below irrigation diversion. Very low flow and clear below diversion ditch. Grab sampled.
CFR-27H	9/12/2012	1300	65(E)	8.00	11.61	12.28	113.0	419.0	2.78		98 (A)	Clear and sunny.	River is low and clear. Heavy algae growth present.
CFR-42G	9/12/2012	930	50(E)	7.83	8.43	10.51	89.8	427.0	3.71		101 (A)	Clear skies, smoky, cool, light breeze.	River is low and generally clear but with slight turbid cast from suspended algal particulate.
LBR-CFR	9/12/2012	1130	55(E)	7.64	10.60	9.89	89.0	300.0	1.17		24 (A)	Clear, sunny, cool.	River very low and clear. Heavy filamentous and diatom algae present.
CFR-53C	9/11/2012	1745	70(E)	8.52	14.31	10.64	104.0	403.0	3.76		176 (A)	Cloudless but smoky, breezy, cool.	River is low. Slightly turbid from suspended algal particulate. Heavy periphyton growth.
FC-CFR	9/11/2012	1545	70(E)	8.35	14.29	10.53	103.0	438.0	3.45		35 (A)	Clear, breezy, smoky.	Creek has a hint of turbidity. Low flow.

CFR-84F	9/11/2012	1345	70(E)	8.41	14.70	12.93	127.5	512.0	2.11		275 (A)	Clear, sunny, less fire smoke today.	River is very low and clear. Heavy Cladophora present, mostly past maturity, sloughing in water column.
RC-CFR	9/11/2012	1100	60(E)	7.87	10.07	10.82	DNA	136.0	1.56		219 (A)	Smoky, decreasing clouds, warming up.	Creek is low and clear. Visible organic particulate in water column.
CFR-116A	9/11/2012	915	45(E)	7.64	11.06	10.27	93.4	328.0	2.76		539 (A)	Smoky, cool (cold front), partly cloudy.	Fine organic particulate in water column. Water stage very low.
MCWC-MWB	12/6/2012	1115	29 (E)	7.93	0.90	13.68	96.0	220.7	8.98	17.22		Partly cloudy, cool, light breeze.	Slight turbidity, fine TSS present. Upstream cleanup activity is occurring.
MWB-SBC	12/6/2012	1000	22 (E)	8.04	0.60	14.04	98.3	386.1	2.05	28.00		Partly cloudy, breezy, cold.	Low flow and clear. Beaver activity present. No snow or ice present in immediate area.
SS-25	12/6/2012	915	22 (E)	8.08	0.60	14.05	98.4	437.8	5.35		62 (A)	Thin clouds, light breeze, sunny.	EC ranged from 435 to 487 from left bank to right bank. Heavy diatom and some filamentous algae growth present. Fine VSS in water column. No snow or ice present.
WSC-SBC	12/5/2012	1400	40 (E)	8.41	5.00	11.26	87.6	318.2	2.03		48 (A)	Windy, partly cloudy, cold.	Moderate flow, very clear. No snow or ice in floodplain. Some fine VSS present in water column.
CFR-03A	12/5/2012	1500	40 (E)	8.69	4.00	13.16	100.4	421.6	5.38		114 (A)	Windy, cold, partly cloudy, cooling trend.	Moderately low flow. Hint of turbidity due to algal particulate in water column. No snow or ice in immediate floodplain.
LC-7	12/5/2012	1230	35 (E)	8.37	4.30	11.64	89.7	555.7	1.68	59.49		Partly cloudy, cool, breezy.	Moderate flow, clear water. No ice or snow in immediate floodplain.

RTC-1	12/5/2012	1130	30 (E)	8.10	3.80	11.42	86.0	135.2	0.80	21.63		Rain showers, cool.	Very clear water. No irrigation diversion in place. Monitored at culvert outfall.
CFR-27H	12/5/2012	1100	30 (E)	8.23	3.70	11.45	86.9	452.8	7.08		264 (A)	Cloudy, calm, rain showers imminent.	Moderate flow. No ice or snow present along river. Slight turbidity from sloughing periphyton.
CFR-42G	12/5/2012	900	25 (E)	8.16	3.50	11.16	84.2	455.5	8.04		273 (A)	Moslty cloudy, breezy, cool.	Heavy diatom algae present and organic particulate present in the water column causing slight turbidity. Moderate flow, no snow or ice present.
LBR-CFR	12/5/2012	1030	25 (E)	8.22	4.50	11.27	86.5	261.6	2.54		91 (A)	Cloudy, breezy, cool.	Low and clear. No ice or snow in floodplain. Depth integrated upstream of HW bridge by wading with DH-81.
CFR-53C	12/4/2012	1515	40 (E)	8.64	2.70	13.01	96.0	405.3	6.33		411 (A)	Overcast, calm.	Good flow.
FC-CFR	12/4/2012	1400	40 (E)	8.54	3.30	12.63	94.7	233.8	5.96		128 (A)	Overcast, breezy.	Flow higher than during Q3 run. Sampled by wading with DH-81 50 m upstream of bridge.
CFR-84F	12/4/2012	1300	40 (E)	8.28	4.20	11.81	90.5	431.0	8.88		636 (A)	Overcast, calm, dry.	Sampled with bridge crane. Flow down slightly in last couple of days?
RC-CFR	12/4/2012	1130	35 (E)	8.11	2.40	12.68	92.8	116.8	1.82		297 (A)	Overcast, calm, no precip.	Wadeable at sample section below bridge. Stream is ice and snow-free.
CFR-116A	12/4/2012	930	30 (E)	8.19	3.40	11.83	89.0	324.4	8.38		1080 (A)	Overcast, calm, very light snow showers.	Flow up over past few days due to rain. Water very slightly off color.

1. *E = estimated value.*
2. *A = actual measured value.*

Table C2. Surface water nutrient concentrations in the Clark Fork River Operable Unit, 2012.

SampleID	ClientSampID	Date	Time	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	Organic Carbon, Dissolved (DOC), mg/L	Nitrogen, Ammonia as N, mg/L	NO3+NO2 as N, mg/L	N-Total, mg/L	Phosphorus, Total as P, mg/L
H12040177-018	MCWC-MWB	4/11/12	12:15	4[J]	89	110	25	97	3.0[B]	<0.05	<0.05	0.07[J]	0.024
H12040177-019	MCWC-MWB Duplicate	4/11/12	12:45	10[J]	89	110	26	95	3.0[B]	<0.05	<0.05	0.08[J]	0.023
H12040177-017	Field Blank #2	4/11/12	12:00	2	<4	<4	<1	<1	0.4[B]	<0.05	<0.05	0.06	<0.005
H12040177-016	MWB-SBC	4/11/12	11:15	8[J]	100	120	91	169	3.0[B]	<0.05	<0.05	0.37[J]	0.019
H12040177-015	SS-25	4/11/12	10:30	6[J]	110	130	96	181	4.1[B]	<0.05	<0.05	0.41[J]	0.024
H12040177-014	WSC-SBC	4/11/12	9:15	4[J]	140	170	39	171	1.3[B]	<0.05	0.07	0.18[J]	0.008
H12040177-013	CFR-03A	4/10/12	14:45	14[J]	120	150	84	185	3.1[B]	<0.05	0.05	0.29[J]	0.024
H12040177-012	LC-7	4/10/12	14:00	16[J]	190	230	140	302	1.9[B]	<0.05	0.48	0.54[J]	0.015
H12040177-011	RTC-1	4/10/12	12:30	<1[J]	72	88	7	72	1.8[B]	<0.05	0.14	0.18[J]	0.008
H12040177-008	CFR-27H	4/10/12	11:00	24[J]	150	180	83	206	2.9[B]	<0.05	0.21	1.71[J]	0.033
H12040177-009	CFR-27H Duplicate	4/10/12	11:30	22[J]	150	180	83	210	2.9[B]	<0.05	0.21	0.44[J]	0.031
H12040177-010	Field Blank #1	4/10/12	12:00	<1	<4	<4	<1	<1	0.5[B]	<0.05	<0.05	<0.05	<0.005
H12040177-006	CFR-42G	4/10/12	8:30	44[J]	150	180	76	206	2.8[B]	<0.05	0.19	0.42[J]	0.042
H12040177-007	LBR-CFR	4/10/12	9:45	8[J]	110	130	14	105	3.6[B]	<0.05	<0.05	0.11[J]	0.026
H12040177-005	CFR-53C	4/9/12	17:15	24[J]	140	170	52	168	3.1[B]	<0.05	0.09	0.37[J]	0.040
H12040177-004	FC-CFR	4/9/12	15:15	18[J]	130	160	12	131	3.1[B]	<0.05	<0.05	0.19[J]	0.032
H12040177-003	CFR-84F	4/9/12	13:30	32[J]	150	180	57	177	2.9[B]	<0.05	0.09	0.25[J]	0.046

H12040177-002	RC-CFR	4/9/12	12:00	<1[J]	52	63	4	48	3.4[B]	<0.05	<0.05	0.07[J]	0.012
H12040177-001	CFR-116A	4/9/12	9:45	22[J]	120	140	37	138	2.7[B]	<0.05	0.06	0.25[J]	0.031
H12060167-018	MCWC-MWB	6/7/12	12:30	20[J]	62	75	7	50	3.5[B]	<0.05	<0.05	0.2[B]	0.029
H12060167-019	MCWC-MWB Duplicate	6/7/12	12:30	10[J]	61	75	7	49	3.6[B]	<0.05	<0.05	0.17[B]	0.027
H12060167-017	Field Blank #2	6/7/12	11:30	<1	<4[B]	<4[B]	<1	<1	0.6[B]	<0.05	<0.05	<0.05[B]	<0.005
H12060167-016	MWB-SBC	6/7/12	10:30	6[J]	67	82	28	84	3.7[B]	<0.05	<0.05	0.16[B]	0.028
H12060167-015	SS-25	6/7/12	9:45	14[J]	86	83	43	113	4.9[B]	<0.05	<0.05	0.25[B]	0.067
H12060167-014	WSC-SBC	6/7/12	8:45	30[J]	81	98	11	83	2.2[B]	<0.05	<0.05	0.09[B]	0.021
H12060167-013	CFR-03A	6/6/12	16:15	40[J]	84	100	37	111	4.1[B]	<0.05	<0.05	0.26[B]	0.068
H12060167-012	LC-7	6/6/12	15:00	14[J]	190	200	150	321	2.8[B]	<0.05	0.18	0.35[B]	0.013
H12060167-011	RTC-1	6/6/12	13:45	26[J]	43[B]	53[B]	3	34	4.4[B]	<0.05	<0.05	0.18[B]	0.031
H12060167-010	CFR-27H	6/6/12	12:15	146[J]	91	110	31	120	3.9[B]	<0.05	0.06	0.25[B]	0.172
H12060167-008	CFR-42G	6/6/12	9:00	184[J]	110	140	28	135	5.1[B]	<0.05	0.06	0.39[B]	0.177
H12060167-009	LBR-CFR	6/6/12	10:45	74[J]	110	140	9	106	5.3[B]	<0.05	<0.05	0.27[B]	0.112
H12060167-004	CFR-53C	6/5/12	14:45	68[J]	130	160	24	123	4.1[B]	<0.05	<0.05	0.23[B]	0.085
H12060167-006	FC-CFR	6/5/12	16:30	146[J]	99	120	6	97	4.8[B]	<0.05	<0.05	0.34[B]	0.114
H12060167-007	FC-CFR duplicate	6/5/12	16:30	174[J]	99	120	6	96	4.8[B]	<0.05	<0.05	0.29[B]	0.121
H12060167-005	Field Blank #1	6/5/12	16:00	<1	5	6	<1	<1	0.4[B]	<0.05	<0.05	0.16[B]	<0.005
H12060167-003	CFR-84F	6/5/12	13:15	92[J]	120	150	30	139	4.0[B]	<0.05	<0.05	0.31[B]	0.098
H12060167-002	RC-CFR	6/5/12	11:30	6[J]	36[B]	43[B]	1	32	3.5[B]	<0.05	<0.05	0.1[B]	0.017

H12060167-001	CFR-116A	6/5/12	9:30	44[J]	90	110	15	90	3.2[B]	<0.05	<0.05	0.21[B]	0.048
H12090228-017	MCWC-MWB	9/13/12	15:00	4[J]	120	130	27	127	2.0[B]	<0.05	<0.05	0.11[J]	0.013[J]
H12090228-018	MCWC-MWB duplicate	9/13/12	15:00	2[J]	120	130	27	128	1.8[B]	<0.05	<0.05	0.11[J]	0.015[J]
H12090228-019	Field Blank #2	9/13/12	16:00	2[J]	<4	<4	<1	<1	0.5[B]	<0.05	<0.05	<0.05[J]	<0.005[J]
H12090228-016	MWB-SBC	9/13/12	13:00	4[J]	130	150	160	277	2.5[B]	<0.05	<0.05	0.16[J]	0.008[J]
H12090228-015	SS-25	9/13/12	11:30	4[J]	120	96	130	221	5.0[B]	<0.05	<0.05	0.48[J]	0.079[J]
H12090228-014	WSC-CFR	9/13/12	10:00	<1[J]	140	160	33	165	1.0[B]	<0.05	<0.05	0.09[J]	<0.005[J]
H12090228-013	CFR-03A	9/12/12	18:00	2[J]	130	120	83	194	2.9[B]	<0.05	<0.05	0.25[J]	0.035[J]
H12090228-012	LC-7	9/12/12	16:30	<1[J]	210	230	150	312	2.5[B]	<0.05	<0.05	0.19[J]	0.015[J]
H12090228-011	RTC-1	9/12/12	14:15	2[J]	160	180	65	202	2.6[B]	<0.05	0.31	0.50[J]	0.027[J]
H12090228-010	CFR-27H	9/12/12	13:00	4[J]	180	200	69	212	2.8[B]	<0.05	0.07	0.28[J]	0.019[J]
H12090228-008	CFR-42G	9/12/12	9:30	14[J]	180	210	64	218	3.2[B]	<0.05	<0.05	0.23[J]	0.022[J]
H12090228-009	LBR-CFR	9/12/12	11:30	<1[J]	170	200	11	168	-	<0.05	<0.05	0.12[J]	0.028[J]
H12090228-005	CFR-53C	9/11/12	17:45	12[J]	160	170	58	192	2.7[B]	<0.05	<0.05	0.18[J]	0.024[J]
H12090228-006	CFR-53C duplicate	9/11/12	18:30	10[J]	160	180	58	192	2.8[B]	<0.05	<0.05	0.19[J]	0.025[J]
H12090228-007	Field Blank #1	9/11/12	17:15	<1[J]	<4	<4	<1	<1	0.5[B]	<0.05	<0.05	<0.05[J]	<0.005[J]
H12090228-004	FC-CFR	9/11/12	15:45	10[J]	240	250	21	221	3.4[B]	<0.05	<0.05	0.26[J]	0.060[J]
H12090228-003	CFR-84F	9/11/12	13:45	2[J]	190	210	89	250	2.6[B]	<0.05	<0.05	0.17[J]	0.023[J]
H12090228-002	RC-CFR	9/11/12	11:00	2[J]	73	87	3	65	1.2[B]	<0.05	<0.05	0.09[J]	0.014[J]
H12090228-001	CFR-116A	9/11/12	9:15	<1[J]	130	150	43	163	1.9[B]	<0.05	<0.05	0.14[J]	0.015[J]

H12120119-018	MCWC-MWB	12/6/12	11:15	18[J]	93	110	24	102	2.2	<0.05	0.06	0.20	0.030[J]
H12120119-019	MCWC-MWB Duplicate	12/6/12	11:15	14[J]	92	110	24	102	2.3	<0.05	0.06	0.21	0.033[J]
H12120119-017	Field Blank #2	12/6/12	10:30	<1[J]	<4	<4	<1	<1	<0.1	<0.05	<0.05	<0.05	<0.005[J]
H12120119-016	MWB-SBC	12/6/12	10:00	4[J]	110	120	90	185	2.4	<0.05	<0.05	0.18	0.054[J]
H12120119-015	SS-25	12/6/12	9:15	14[J]	120	140	97	202	3.4	<0.05	<0.05	0.36	0.047[J]
H12120119-013	WSC-SBC	12/5/12	14:00	4[J]	150	160	35	173	0.8	<0.05	0.06	0.11	0.010[J]
H12120119-014	CFR-03A	12/5/12	15:00	12[J]	140	150	82	206	2.7	<0.05	<0.05	0.27	0.033[J]
H12120119-012	LC-7	12/5/12	12:30	<1[J]	200	210	120	299	1.5	<0.05	0.51	0.65	0.009[J]
H12120119-011	RTC-1	12/5/12	11:30	4[J]	75	88	6	73	1.0	<0.05	0.16	0.23	0.007[J]
H12120119-010	CFR-27H	12/5/12	11:30	20[J]	170	180	74	226	2.1	<0.05	0.25	0.45	0.027[J]
H12120119-008	CFR-42G	12/5/12	9:00	14[J]	170	190	70	223	2.1	<0.05	0.22	0.43	0.030[J]
H12120119-009	LBR-CFR	12/5/12	10:30	6[J]	140	150	14	134	1.7	<0.05	<0.05	0.10	0.021[J]
H12120119-005	CFR-53C	12/4/12	15:15	14[J]	160	180	61	201	1.9	<0.05	0.10	0.28	0.026[J]
H12120119-006	CFR-53C Duplicate	12/4/12	15:45	14[J]	160	180	61	201	1.9	<0.05	0.11	0.33	0.039[J]
H12120119-007	Field Blank #1	12/4/12	16:30	<1[J]	<4	<4	<1	<1	<0.1	<0.05	<0.05	<0.05	<0.005[J]
H12120119-004	FC-CFR	12/4/12	14:00	6[J]	170	190	14	164	1.8	<0.05	0.10	0.25	0.034[J]
H12120119-003	CFR-84F	12/4/12	13:00	20[J]	170	190	65	216	1.9	<0.05	0.10	0.27	0.036[J]
H12120119-002	RC-CFR	12/4/12	11:30	<1[J]	65	77	3	59	1.7	<0.05	<0.05	0.09	0.010[J]
H12120119-001	CFR-116A	12/4/12	9:30	18[J]	140	150	41	167	1.7	<0.05	0.09	0.24	0.023[J]

[B] *Analyte detected in field blank (associated data <10X the blank value are flagged)*
[J] *Estimated: The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.= estimated value.*

Table C3. Surface water dissolved metal concentrations in the Clark Fork River Operable Unit, 2012.

SampleID	ClientSampID	Date	Time	As-D, mg/L	Cd-D, mg/L	Cu-D, mg/L	Pb-D, mg/L	Zn-D, mg/L
H12040177-018	MCWC-MWB	4/11/12	12:15	0.016	<0.00008	0.003	<0.0005	<0.01[B]
H12040177-019	MCWC-MWB Duplicate	4/11/12	12:45	0.017	<0.00008	0.003	<0.0005	0.02[B]
H12040177-017	Field Blank #2	4/11/12	12:00	<0.005	<0.00008	<0.001	<0.0005	0.03[B]
H12040177-016	MWB-SBC	4/11/12	11:15	0.017	<0.00008	0.003	<0.0005	0.02[B]
H12040177-015	SS-25	4/11/12	10:30	0.013	<0.00008	0.004	<0.0005	<0.01[B]
H12040177-014	WSC-SBC	4/11/12	9:15	<0.005	<0.00008	0.002	<0.0005	0.01[B]
H12040177-013	CFR-03A	4/10/12	14:45	0.011	<0.00008	0.004	<0.0005	<0.01[B]
H12040177-012	LC-7	4/10/12	14:00	0.013	<0.00008	0.002	<0.0005	<0.01[B]
H12040177-011	RTC-1	4/10/12	12:30	<0.005	<0.00008	<0.001	<0.0005	0.02[B]
H12040177-008	CFR-27H	4/10/12	11:00	0.010	<0.00008	0.006	<0.0005	0.01[B]
H12040177-009	CFR-27H Duplicate	4/10/12	11:30	0.010	<0.00008	0.007	<0.0005	0.02[B]
H12040177-010	Field Blank #1	4/10/12	12:00	<0.005	<0.00008	<0.001	<0.0005	<0.01[B]
H12040177-006	CFR-42G	4/10/12	8:30	0.010	<0.00008	0.007	<0.0005	0.02[B]
H12040177-007	LBR-CFR	4/10/12	9:45	<0.005	<0.00008	<0.001	<0.0005	0.02[B]
H12040177-005	CFR-53C	4/9/12	17:15	0.007	<0.00008	0.005	<0.0005	0.02[B]
H12040177-004	FC-CFR	4/9/12	15:15	0.006	<0.00008	0.001	<0.0005	0.01[B]
H12040177-003	CFR-84F	4/9/12	13:30	0.007	<0.00008	0.005	<0.0005	0.01[B]
H12040177-002	RC-CFR	4/9/12	12:00	<0.005	<0.00008	<0.001	<0.0005	0.02[B]
H12040177-001	CFR-116A	4/9/12	9:45	<0.005	<0.00008	0.004	<0.0005	0.01[B]
H12060167-018	MCWC-MWB	6/7/12	12:30	0.023	<0.00008	0.004	<0.0005	0.02
H12060167-019	MCWC-MWB Duplicate	6/7/12	12:30	0.022	<0.00008	0.004	<0.0005	0.02
H12060167-017	Field Blank #2	6/7/12	11:30	<0.005	<0.00008	<0.001	<0.0005	<0.01
H12060167-016	MWB-SBC	6/7/12	10:30	0.022	<0.00008	0.004	<0.0005	0.02
H12060167-015	SS-25	6/7/12	9:45	0.024	<0.00008	0.005	<0.0005	<0.01
H12060167-014	WSC-SBC	6/7/12	8:45	<0.005	<0.00008	0.003	<0.0005	0.01
H12060167-013	CFR-03A	6/6/12	16:15	0.016	<0.00008	0.007	<0.0005	0.01
H12060167-012	LC-7	6/6/12	15:00	0.015	<0.00008	0.003	<0.0005	<0.01
H12060167-011	RTC-1	6/6/12	13:45	<0.005	<0.00008	0.002	<0.0005	0.02
H12060167-010	CFR-27H	6/6/12	12:15	0.014	<0.00008	0.015	<0.0005	0.02
H12060167-008	CFR-42G	6/6/12	9:00	0.016	<0.00008	0.018	<0.0005	0.02
H12060167-009	LBR-CFR	6/6/12	10:45	0.005	<0.00008	0.001	<0.0005	0.02
H12060167-004	CFR-53C	6/5/12	14:45	0.01	<0.00008	0.009	<0.0005	0.01
H12060167-006	FC-CFR	6/5/12	16:30	0.009	<0.00008	0.002	<0.0005	0.02
H12060167-007	FC-CFR duplicate	6/5/12	16:30	0.009	<0.00008	0.002	<0.0005	0.02
H12060167-005	Field Blank #1	6/5/12	16:00	<0.005	<0.00008	<0.001	<0.0005	0.02
H12060167-003	CFR-84F	6/5/12	13:15	0.01	<0.00008	0.009	<0.0005	0.02

H12060167-002	RC-CFR	6/5/12	11:30	<0.005	<0.00008	<0.001	<0.0005	0.02
H12060167-001	CFR-116A	6/5/12	9:30	0.005	<0.00008	0.005	<0.0005	0.02
H12090228-017	MCWC-MWB	9/13/12	15:00	0.012	<0.00008	0.002	<0.0005	<0.01
H12090228-018	MCWC-MWB duplicate	9/13/12	15:00	0.012	<0.00008	0.002	<0.0005	<0.01
H12090228-019	Field Blank #2	9/13/12	16:00	<0.005	<0.00008	<0.001	<0.0005	<0.01
H12090228-016	MWB-SBC	9/13/12	13:00	0.015	<0.00008	0.002	<0.0005	<0.01
H12090228-015	SS-25	9/13/12	11:30	0.034	<0.00008	0.003	<0.0005	<0.01
H12090228-014	WSC-CFR	9/13/12	10:00	<0.005	<0.00008	0.002	<0.0005	<0.01
H12090228-013	CFR-03A	9/12/12	18:00	0.020	<0.00008	0.004	<0.0005	<0.01
H12090228-012	LC-7	9/12/12	16:30	0.010	<0.00008	0.002	<0.0005	<0.01
H12090228-011	RTC-1	9/12/12	14:15	0.013	<0.00008	0.004	<0.0005	<0.01
H12090228-010	CFR-27H	9/12/12	13:00	0.014	<0.00008	0.007	<0.0005	<0.01
H12090228-008	CFR-42G	9/12/12	9:30	0.014	<0.00008	0.008	<0.0005	0.01
H12090228-009	LBR-CFR	9/12/12	11:30	<0.005	<0.00008	<0.001	<0.0005	0.01
H12090228-005	CFR-53C	9/11/12	17:45	0.010	<0.00008	0.005	<0.0005	<0.01
H12090228-006	CFR-53C duplicate	9/11/12	18:30	0.010	<0.00008	0.005	<0.0005	<0.01
H12090228-007	Field Blank #1	9/11/12	17:15	<0.005	<0.00008	<0.001	<0.0005	0.02
H12090228-004	FC-CFR	9/11/12	15:45	0.009	<0.00008	0.001	<0.0005	<0.01
H12090228-003	CFR-84F	9/11/12	13:45	0.010	<0.00008	0.004	<0.0005	<0.01
H12090228-002	RC-CFR	9/11/12	11:00	<0.005	<0.00008	0.006	<0.0005	0.02
H12090228-001	CFR-116A	9/11/12	9:15	0.005	<0.00008	0.002	<0.0005	0.01
H12120119-018	MCWC-MWB	12/6/12	11:15	0.014	<0.00008	0.003	<0.0005	0.02
H12120119-019	MCWC-MWB Duplicate	12/6/12	11:15	0.014	<0.00008	0.003	<0.0005	0.02
H12120119-017	Field Blank #2	12/6/12	10:30	<0.005	<0.00008	<0.001	<0.0005	<0.01
H12120119-016	MWB-SBC	12/6/12	10:00	0.014	<0.00008	0.002	<0.0005	0.01
H12120119-015	SS-25	12/6/12	9:15	0.013	<0.00008	0.003	<0.0005	0.01
H12120119-013	WSC-SBC	12/5/12	14:00	<0.005	<0.00008	0.002	<0.0005	<0.01
H12120119-014	CFR-03A	12/5/12	15:00	0.011	<0.00008	0.003	<0.0005	<0.01
H12120119-012	LC-7	12/5/12	12:30	0.014	<0.00008	0.002	<0.0005	<0.01
H12120119-011	RTC-1	12/5/12	11:30	<0.005	<0.00008	<0.001	<0.0005	0.01
H12120119-010	CFR-27H	12/5/12	11:30	0.011	<0.00008	0.005	<0.0005	0.01
H12120119-008	CFR-42G	12/5/12	9:00	0.011	<0.00008	0.005	<0.0005	0.01
H12120119-009	LBR-CFR	12/5/12	10:30	<0.005	<0.00008	<0.001	<0.0005	<0.01
H12120119-005	CFR-53C	12/4/12	15:15	0.009	<0.00008	0.004	<0.0005	<0.01
H12120119-006	CFR-53C Duplicate	12/4/12	15:45	0.008	<0.00008	0.004	<0.0005	<0.01
H12120119-007	Field Blank #1	12/4/12	16:30	<0.005	<0.00008	<0.001	<0.0005	<0.01
H12120119-004	FC-CFR	12/4/12	14:00	0.006	<0.00008	<0.001	<0.0005	<0.01
H12120119-003	CFR-84F	12/4/12	13:00	0.008	<0.00008	0.003	<0.0005	0.01
H12120119-002	RC-CFR	12/4/12	11:30	<0.005	<0.00008	<0.001	<0.0005	0.01
H12120119-001	CFR-116A	12/4/12	9:30	0.005	<0.00008	0.002	<0.0005	0.01

[B] *Analyte detected in field blank (associated data <10X the blank value are flagged)*
[J] *Estimated: The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.*

Table C4. Surface water total recoverable metal concentrations in the Clark Fork River Operable Unit, 2012.

SampleID	ClientSampID	Date	Time	Hg-T, mg/L	As-TR, mg/L	Cd-TR, mg/L	Ca-TR, mg/L	Cu-TR, mg/L	Pb-TR, mg/L	Mg-TR, mg/L	Zn-TR, mg/L
H12040177-018	MCWC-MWB	4/11/12	12:15	0.00001	0.020	0.00010	28	0.008	0.0017	7	0.01
H12040177-019	MCWC-MWB Duplicate	4/11/12	12:45	0.00001	0.019	0.00009	27	0.007	0.0014	7	0.01
H12040177-017	Field Blank #2	4/11/12	12:00	<0.00001	<0.005	<0.00008	<1	<0.001	<0.0005	<1	<0.01
H12040177-016	MWB-SBC	4/11/12	11:15	<0.00001	0.019	<0.00008	49	0.006	0.0011	11	0.01
H12040177-015	SS-25	4/11/12	10:30	0.00001	0.015	0.00012	53	0.010	0.0024	12	0.02
H12040177-014	WSC-SBC	4/11/12	9:15	<0.00001	<0.005	0.00009	51	0.007	<0.0005	10	<0.01
H12040177-013	CFR-03A	4/10/12	14:45	0.00001	0.013	0.00015	54	0.015	0.0025	12	0.02
H12040177-012	LC-7	4/10/12	14:00	<0.00001	0.015	0.00009	88	0.010	0.0013	20	<0.01
H12040177-011	RTC-1	4/10/12	12:30	<0.00001	<0.005	<0.00008	22	0.002	<0.0005	4	<0.01
H12040177-008	CFR-27H	4/10/12	11:00	0.00003	0.015	0.00021	61	0.036	0.0047	13	0.03
H12040177-009	CFR-27H Duplicate	4/10/12	11:30	0.00001	0.015	0.00023	62	0.041	0.0050	13	0.04
H12040177-010	Field Blank #1	4/10/12	12:00	<0.00001	<0.005	<0.00008	<1	<0.001	<0.0005	<1	<0.01
H12040177-006	CFR-42G	4/10/12	8:30	0.00005	0.016	0.00029	61	0.055	0.0068	13	0.05
H12040177-007	LBR-CFR	4/10/12	9:45	<0.00001	<0.005	<0.00008	30	0.002	0.0007	7	<0.01
H12040177-005	CFR-53C	4/9/12	17:15	0.00001	0.010	0.00017	50	0.028	0.0038	11	0.03
H12040177-004	FC-CFR	4/9/12	15:15	0.00010	0.008	<0.00008	35	0.003	0.0029	11	0.01
H12040177-003	CFR-84F	4/9/12	13:30	0.00005	0.010	0.00017	51	0.028	0.0043	12	0.04
H12040177-002	RC-CFR	4/9/12	12:00	0.00001	<0.005	<0.00008	12	<0.001	<0.0005	4	<0.01
H12040177-001	CFR-116A	4/9/12	9:45	0.00004	0.007	0.00012	39	0.017	0.0027	10	0.03
H12060167-018	MCWC-MWB	6/7/12	12:30	<0.00001	0.027	0.0001	15	0.009	0.0019	3	0.01
H12060167-019	MCWC-MWB Duplicate	6/7/12	12:30	<0.00001	0.026	0.0001	14	0.009	0.0018	3	<0.01
H12060167-017	Field Blank #2	6/7/12	11:30	<0.00001	<0.005	<0.00008	<1	<0.001	<0.0005	<1	<0.01
H12060167-016	MWB-SBC	6/7/12	10:30	<0.00001	0.026	0.00012	24	0.01	0.0018	6	0.01
H12060167-015	SS-25	6/7/12	9:45	<0.00001	0.027	0.00011	33	0.01	0.0017	8	0.01
H12060167-014	WSC-SBC	6/7/12	8:45	<0.00001	0.006	0.00012	25	0.025	0.0025	5	0.01
H12060167-013	CFR-03A	6/6/12	16:15	0.00001	0.025	0.00028	33	0.063	0.008	7	0.05
H12060167-012	LC-7	6/6/12	15:00	<0.00001	0.017	<0.00008	93	0.011	0.0012	22	<0.01
H12060167-011	RTC-1	6/6/12	13:45	<0.00001	<0.005	0.00009	10	0.007	0.0015	2	<0.01
H12060167-010	CFR-27H	6/6/12	12:15	0.0001	0.044	0.00081	35	0.252	0.0332	8	0.18
H12060167-008	CFR-42G	6/6/12	9:00	0.00015	0.048	0.00095	38	0.272	0.0366	10	0.22
H12060167-009	LBR-CFR	6/6/12	10:45	<0.00001	0.008	0.00012	30	0.005	0.0036	7	0.02
H12060167-004	CFR-53C	6/5/12	14:45	<0.00001	0.018	0.0003	36	0.069	0.0098	8	0.06
H12060167-006	FC-CFR	6/5/12	16:30	0.0015	0.044	0.00039	27	0.016	0.0416	7	0.12
H12060167-007	FC-CFR duplicate	6/5/12	16:30	0.0015	0.042	0.00039	26	0.015	0.0405	7	0.12
H12060167-005	Field Blank #1	6/5/12	16:00	<0.00001	<0.005	<0.00008	<1	<0.001	<0.0005	<1	<0.01
H12060167-003	CFR-84F	6/5/12	13:15	0.00012	0.02	0.00037	40	0.072	0.0126	9	0.09
H12060167-002	RC-CFR	6/5/12	11:30	<0.00001	<0.005	<0.00008	8	0.001	<0.0005	3	<0.01
H12060167-001	CFR-116A	6/5/12	9:30	0.00002	0.009	0.00022	25	0.037	0.0055	7	0.05

H12090228-017	MCWC-MWB	9/13/12	15:00	<0.00001	0.013	<0.00008	36	0.007[J]	0.0010[J]	9	<0.01
H12090228-018	MCWC-MWB duplicate	9/13/12	15:00	<0.00001	0.013	<0.00008	36	0.005[J]	0.0011[J]	9	<0.01
H12090228-019	Field Blank #2	9/13/12	16:00	<0.00001	<0.005	<0.00008	<1	<0.001[J]	<0.0005[J]	<1	<0.01
H12090228-016	MWB-SBC	9/13/12	13:00	<0.00001	0.016	<0.00008	81	0.003[J]	<0.0005[J]	18	<0.01
H12090228-015	SS-25	9/13/12	11:30	<0.00001	0.034	<0.00008	64	0.004J	<0.0005[J]	14	<0.01
H12090228-014	WSC-CFR	9/13/12	10:00	<0.00001	<0.005	<0.00008	50	0.006[J]	<0.0005	10	<0.01
H12090228-013	CFR-03A	9/12/12	18:00	<0.00001	0.021	<0.00008	57	0.008[J]	0.0008[J]	12	<0.01
H12090228-012	LC-7	9/12/12	16:30	<0.00001	0.010	<0.00008	87	0.004[J]	<0.0005[J]	23	<0.01
H12090228-011	RTC-1	9/12/12	14:15	<0.00001	0.013	<0.00008	60	0.007[J]	<0.0005[J]	13	<0.01
H12090228-010	CFR-27H	9/12/12	13:00	<0.00001	0.014	<0.00008	64	0.013[J]	0.0010[J]	13	0.01
H12090228-008	CFR-42G	9/12/12	9:30	<0.00001	0.014	<0.00008	64	0.016[J]	0.0011[J]	14	0.01
H12090228-009	LBR-CFR	9/12/12	11:30	0.000040	<0.005	<0.00008	50	0.003[J]	<0.0005[J]	11	<0.01
H12090228-005	CFR-53C	9/11/12	17:45	<0.00001	0.010	<0.00008	56	0.009[J]	0.0006[J]	13	<0.01
H12090228-006	CFR-53C duplicate	9/11/12	18:30	<0.00001	0.011	<0.00008	57	0.009[J]	0.0006[J]	12	<0.01
H12090228-007	Field Blank #1	9/11/12	17:15	<0.00001	<0.005	<0.00008	<1	<0.001[J]	<0.0005[J]	<1	<0.01
H12090228-004	FC-CFR	9/11/12	15:45	<0.00001	0.009	<0.00008	60	0.002[J]	0.0010[J]	17	<0.01
H12090228-003	CFR-84F	9/11/12	13:45	<0.00001	0.010	<0.00008	70	0.006[J]	<0.0005[J]	18	<0.01
H12090228-002	RC-CFR	9/11/12	11:00	<0.00001	<0.005	<0.00008	17	<0.001[J]	<0.0005[J]	6	<0.01
H12090228-001	CFR-116A	9/11/12	9:15	<0.00001	0.005	<0.00008	44	0.004[J]	<0.0005[J]	13	<0.01
H12120119-018	MCWC-MWB	12/6/12	11:15	<0.00001	0.019	0.00024	29	0.023	0.0067	7	0.04
H12120119-019	MCWC-MWB Duplicate	12/6/12	11:15	<0.00001	0.019	0.00023	29	0.019	0.0055	7	0.03
H12120119-017	Field Blank #2	12/6/12	10:30	<0.00001	<0.005	<0.00008	<1	<0.001	<0.0005	<1	<0.01
H12120119-016	MWB-SBC	12/6/12	10:00	<0.00001	0.015	<0.00008	54	0.005	0.0006	12	<0.01
H12120119-015	SS-25	12/6/12	9:15	<0.00001	0.016	0.00024	58	0.017	0.0033	14	0.03
H12120119-013	WSC-SBC	12/5/12	14:00	<0.00001	0.005	<0.00008	52	0.010	0.0009	11	<0.01
H12120119-014	CFR-03A	12/5/12	15:00	<0.00001	0.013	0.00018	60	0.017	0.0027	14	0.03
H12120119-012	LC-7	12/5/12	12:30	<0.00001	0.014	<0.00008	87	0.004	<0.0005	20	<0.01
H12120119-011	RTC-1	12/5/12	11:30	<0.00001	<0.005	<0.00008	22	<0.001	<0.0005	4	<0.01
H12120119-010	CFR-27H	12/5/12	11:30	<0.00001	0.013	0.00017	66	0.027	0.0033	15	0.03
H12120119-008	CFR-42G	12/5/12	9:00	<0.00001	0.013	0.00022	65	0.032	0.0038	14	0.04
H12120119-009	LBR-CFR	12/5/12	10:30	<0.00001	<0.005	<0.00008	39	<0.001	<0.0005	9	<0.01
H12120119-005	CFR-53C	12/4/12	15:15	<0.00001	0.010	0.00012	59	0.018	0.0021	13	0.02
H12120119-006	CFR-53C Duplicate	12/4/12	15:45	<0.00001	0.010	0.00010	59	0.018	0.0021	13	0.02
H12120119-007	Field Blank #1	12/4/12	16:30	<0.00001	<0.005	<0.00008	<1	<0.001	<0.0005	<1	<0.01
H12120119-004	FC-CFR	12/4/12	14:00	<0.00001	0.007	<0.00008	44	0.001	0.0022	13	<0.01
H12120119-003	CFR-84F	12/4/12	13:00	<0.00001	0.010	0.00013	62	0.017	0.0028	15	0.02
H12120119-002	RC-CFR	12/4/12	11:30	<0.00001	<0.005	<0.00008	15	<0.001	<0.0005	5	<0.01
H12120119-001	CFR-116A	12/4/12	9:30	0.000012	0.006	0.00009	47	0.012	0.0021	12	0.02

[B] *Analyte detected in field blank (associated data <10X the blank value are flagged).*
[J] *Estimated: The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.*

APPENDIX D

INSTREAM SEDIMENT: DATA

Table D1. Instream sediment metal concentrations in the Clark Fork River Operable Unit, 2012.

SampleID	ClientSamplD	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
H12090228-065	MCWC-MWB Sediment Sieve <0.065mm	9/13/12	15:00		1.9		48	2.1	193	141	255
H12090228-066	MCWC-MWB Sediment Sieve 0.065-1mm	9/13/12	15:00			56.4	11	<0.2	18	10	41
H12090228-067	MCWC-MWB Sediment Sieve 1-2mm	9/13/12	15:00	22.8			9	<0.2	6	8	19[J]
H12090228-068	MCWC-MWB Duplicate Sediment Sieve <0.065mm	9/13/12	15:00		1.7		51	2.3	195	159	248
H12090228-069	MCWC-MWB Duplicate Sediment Sieve 0.065-1mm	9/13/12	15:00			52.4	11	0.2	19	12	45
H12090228-070	MCWC-MWB Duplicate Sediment Sieve 1-2mm	9/13/12	15:00	26.1			7	<0.2	6	9	20[J]
H12090228-062	MWB-SBC Sediment Sieve <0.065mm	9/13/12	13:00		1.4		78	2.1	123	115	328
H12090228-063	MWB-SBC Sediment Sieve 0.065-1mm	9/13/12	13:00			38.6	9	0.3	12	9	57
H12090228-064	MWB-SBC Sediment Sieve 1-2mm	9/13/12	13:00	29.6			12	<0.2	11	9	41[J]
H12090228-059	SS-25 Sediment Sieve <0.065mm	9/13/12	11:30		0.9		37	2.4	138	141	425
H12090228-060	SS-25 Sediment Sieve 0.065-1mm	9/13/12	11:30			28.3	11	0.5	33	15	130
H12090228-061	SS-25 Sediment Sieve 1-2mm	9/13/12	11:30	21.2			14	0.3	26	11	92[J]
H12090228-056	WSC-CFR Sediment Sieve <0.065mm	9/13/12	10:00		12.5		36	1.3	475	67	158
H12090228-057	WSC-CFR Sediment Sieve 0.065-1mm	9/13/12	10:00			72.7	15	0.4	166	25	111
H12090228-058	WSC-CFR Sediment Sieve 1-2mm	9/13/12	10:00	3.3			14	0.2	95	11	57[J]
H12090228-053	CFR-03A Sediment Sieve <0.065mm	9/12/12	18:00		6.1		73	2.5	519	120	540
H12090228-054	CFR-03A Sediment Sieve 0.065-1mm	9/12/12	18:00			50.4	40	0.6	172	34	276
H12090228-055	CFR-03A Sediment Sieve 1-2mm	9/12/12	18:00	33.0			22	<0.2	65	14	217[J]
H12090228-050	LC-7 Sediment Sieve <0.065mm	9/12/12	16:30		11.2		28	1.0	202	54	129
H12090228-051	LC-7 Sediment Sieve 0.065-1mm	9/12/12	16:30			43.1	9	0.3	52	12	42
H12090228-052	LC-7 Sediment Sieve 1-2mm	9/12/12	16:30	9.4			7	<0.2	26	10	24[J]
H12090228-047	RTC-1 Sediment Sieve <0.065mm	9/12/12	14:15		3.1		20	1.1	145	79	234
H12090228-048	RTC-1 Sediment Sieve 0.065-1mm	9/12/12	14:15			55.4	3	<0.2	11	6	24
H12090228-049	RTC-1 Sediment Sieve 1-2mm	9/12/12	14:15	26.7			3	<0.2	<5	<5	16[J]

H12090228-041	CFR-27H Sediment Sieve <0.065mm	9/12/12	13:00		11.0		32	2.0	437	82	373
H12090228-042	CFR-27H Sediment Sieve 0.065-1mm	9/12/12	13:00			44.2	19	0.6	132	35	210
H12090228-043	CFR-27H Sediment Sieve 1-2mm	9/12/12	13:00	29.5			8	0.3	87	26	68[J]
H12090228-044	CFR-27H Duplicate Sediment Sieve <0.065mm	9/12/12	13:00		12.3		37	2.5	472	91	412
H12090228-045	CFR-27H Duplicate Sediment Sieve 0.065-1mm	9/12/12	13:00			54.0	19	0.6	142	35	196
H12090228-046	CFR-27H Duplicate Sediment Sieve 1-2mm	9/12/12	13:00	23.7			10	0.5	116	21	110[J]
H12090228-035	CFR-42G Sediment Sieve <0.065mm	9/12/12	9:30		2.8		25	2.7	367	70	458
H12090228-036	CFR-42G Sediment Sieve 0.065-1mm	9/12/12	9:30			52.6	12	0.5	88	25	183
H12090228-037	CFR-42G Sediment Sieve 1-2mm	9/12/12	9:30	37.8			13	0.6	73	18	366[J]
H12090228-038	LBR-CFR Sediment Sieve <0.065mm	9/12/12	11:30		14.2		8	0.3	18	34	50
H12090228-039	LBR-CFR Sediment Sieve 0.065-1mm	9/12/12	11:30			71.8	7	<0.2	9	12	38
H12090228-040	LBR-CFR Sediment Sieve 1-2mm	9/12/12	11:30	9.9			9	<0.2	10	10	32[J]
H12090228-032	CFR-53C Sediment Sieve <0.065mm	9/11/12	17:45		31.8		10	0.8	93	20	139
H12090228-033	CFR-53C Sediment Sieve 0.065-1mm	9/11/12	17:45			63.9	7	0.6	62	12	101
H12090228-034	CFR-53C Sediment Sieve 1-2mm	9/11/12	17:45	3.3			3	0.3	30	<5	43[J]
H12090228-029	FC-CFR Sediment Sieve <0.065mm	9/11/12	15:45		27.5		17	0.5	14	37	119
H12090228-030	FC-CFR Sediment Sieve 0.065-1mm	9/11/12	15:45			59.8	19	0.4	12	31	112
H12090228-031	FC-CFR Sediment Sieve 1-2mm	9/11/12	15:45	4.9			24	0.2	9	13	74[J]
H12090228-026	CFR-84F Sediment Sieve <0.065mm	9/11/12	13:45		5.2		10	1.1	89	29	200
H12090228-027	CFR-84F Sediment Sieve 0.065-1mm	9/11/12	13:45			66.8	7	0.4	49	15	162
H12090228-028	CFR-84F Sediment Sieve 1-2mm	9/11/12	13:45	27.3			7	0.3	37	13	132[J]
H12090228-023	RC-CFR Sediment Sieve <0.065mm	9/11/12	11:00		13.5		1	<0.2	6	15	10
H12090228-024	RC-CFR Sediment Sieve 0.065-1mm	9/11/12	11:00			71.7	3	<0.2	<5	6	5
H12090228-025	RC-CFR Sediment Sieve 1-2mm	9/11/12	11:00	2.9			2	<0.2	<5	7	9[J]
H12090228-020	CFR116-A Sediment Sieve <0.065mm	9/11/12	9:15		7.7		6	1.2	92	73	206
H12090228-021	CFR116-A Sediment Sieve 0.065-1mm	9/11/12	9:15			78.6	4	0.3	38	17	119
H12090228-022	CFR116-A Sediment Sieve 1-2mm	9/11/12	9:15	3.1			5	0.3	36	11	96[J]

[J] *Estimated: The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.*

APPENDIX E

MACROINVERTEBRATES: QUALITY ASSURANCE/QUALITY CONTROL PARAMETERS AND BIOASSESSMENT SCORES

Table E-1. Results of internal quality control procedures for subsampling and taxonomy for macroinvertebrate samples. Rhithron internal quality standards, consistent with industry norms are: for sorting efficiency, ≥95%; for Bray-Curtis similarity, ≥95%; for Percent Taxonomic Disagreement (PTD), ≤5%; and for Percent Difference in Enumeration (PDE), ≤5%. Clark Fork River basin samples, 2012.

Rhithron Sample ID	Site ID	Sorting efficiency	Bray-Curtis similarity for taxonomy and enumeration	PTD	PDE
PBSJ12CFR001	SS-25	98.98%			
PBSJ12CFR002	SS-25	98.34%			
PBSJ12CFR003	SS-25	98.75%			
PBSJ12CFR004	SS-25	98.84%			
PBSJ12CFR005	CFR-03A	99.13%			
PBSJ12CFR006	CFR-03A	90.10%			
PBSJ12CFR007	CFR-03A	98.30%			
PBSJ12CFR008	CFR-03A	95.90%			
PBSJ12CFR009	CFR-27H	99.12%			
PBSJ12CFR010	CFR-27H	95.22%			
PBSJ12CFR011	CFR-27H	99.45%			
PBSJ12CFR012	CFR-27H	99.12%			
PBSJ12CFR013	CFR-42G	94.92%			
PBSJ12CFR014	CFR-42G	99.76%			
PBSJ12CFR015	CFR-42G	100%			
PBSJ12CFR016	CFR-42G				
PBSJ12CFR017	CFR-53C				
PBSJ12CFR018	CFR-53C				
PBSJ12CFR019	CFR-53C				
PBSJ12CFR020	CFR-53C				
PBSJ12CFR021	CFR-84F				
PBSJ12CFR022	CFR-84F		100.00%	0	0
PBSJ12CFR023	CFR-84F		98.70%	2.56	1.3
PBSJ12CFR024	CFR-84F				
PBSJ12CFR025	CFR-116A				
PBSJ12CFR026	CFR-116A				
PBSJ12CFR027	CFR-116A				
PBSJ12CFR028	CFR-116A				
PBSJ12CFR029	MCWC-MWB				
PBSJ12CFR030	MCWC-MWB				

Table E-2. Scores from individual macroinvertebrate bioindices for Clark Fork River monitoring, 2012.

Index		McGuire biointegrity metrics (McGuire 2010)		McGuire nutrient-sensitive subset (McGuire 2010)		McGuire metals-sensitive subset (McGuire 2010)	
Site ID	replicate	score	impairment class	score	impairment class	score	impairment class
MCWC-MWB	1	87.88	Slight	88.89	None	88.89	None
MCWC-MWB	2	93.94	None	88.89	None	94.44	None
MCWC-MWB	3	96.97	None	94.44	None	100	None
MCWC-MWB	4	100	None	100	None	100	None
MWB-SBC	1	78.79	Slight	72.22	Slight	77.78	Slight
MWB-SBC	2	71.21	Slight	72.22	Slight	72.22	Slight
MWB-SBC	3	81.82	Slight	77.78	Slight	88.89	None
MWB-SBC	4	75.76	Slight	72.22	Slight	88.89	None
WSC-SBC	1	83.33	Slight	83.33	None	83.33	None
WSC-SBC	2	84.85	Slight	88.89	None	83.33	None
WSC-SBC	3	80.3	Slight	72.22	Slight	88.89	None
WSC-SBC	4	86.36	Slight	61.11	Slight	94.44	None
SS-25	1	69.7	Moderate	66.67	Slight	44.44	Moderate
SS-25	2	65.15	Moderate	61.11	Slight	61.11	Slight
SS-25	3	75.76	Slight	72.22	Slight	50	Moderate
SS-25	4	77.27	Slight	72.22	Slight	44.44	Moderate
CFR-03A	1	74.24	Slight	77.78	Slight	83.33	None
CFR-03A	2	93.94	None	88.89	None	100	None
CFR-03A	3	93.94	None	88.89	None	100	None
CFR-03A	4	90.91	None	83.33	None	94.44	None
LC-7	1	74.24	Slight	61.11	Slight	77.78	Slight
LC-7	2	66.67	Moderate	72.22	Slight	66.67	Slight
LC-7	3	71.21	Slight	66.67	Slight	72.22	Slight
LC-7	4	75.76	Slight	72.22	Slight	83.33	None
RTC-1	1	77.27	Slight	50	Moderate	94.44	None
RTC-1	2	90.91	None	83.33	None	94.44	None
RTC-1	3	87.88	Slight	72.22	Slight	100	None
RTC-1	4	81.82	Slight	55.56	Moderate	100	None
CFR-27H	1	89.39	Slight	83.33	None	77.78	Slight
CFR-27H	2	81.82	Slight	77.78	Slight	83.33	None
CFR-27H	3	83.33	Slight	77.78	Slight	66.67	Slight
CFR-27H	4	87.88	Slight	83.33	None	88.89	None
CFR-42G	1	89.39	Slight	83.33	None	100	None
CFR-42G	2	93.94	None	88.89	None	94.44	None
CFR-42G	3	95.45	None	94.44	None	94.44	None
CFR-42G	4	92.42	None	88.89	None	88.89	None
LBR-CFR	1	80.3	Slight	77.78	Slight	83.33	None
LBR-CFR	2	71.21	Slight	83.33	None	38.89	Severe
LBR-CFR	3	93.94	None	88.89	None	94.44	None
LBR-CFR	4	92.42	None	94.44	None	83.33	None
CFR-53C	1	92.42	None	88.89	None	88.89	None

CFR-53C	2	92.42	None	88.89	None	88.89	None
CFR-53C	3	92.42	None	88.89	None	88.89	None
CFR-53C	4	86.36	Slight	83.33	None	83.33	None
FC-CFR	1	95.45	None	88.89	None	100	None
FC-CFR	2	98.48	None	94.44	None	100	None
FC-CFR	3	100	None	100	None	100	None
FC-CFR	4	95.45	None	94.44	None	100	None
CFR-84F	1	89.39	Slight	83.33	None	88.89	None
CFR-84F	2	81.82	Slight	77.78	Slight	77.78	Slight
CFR-84F	3	86.36	Slight	77.78	Slight	83.33	None
CFR-84F	4	83.33	Slight	88.89	None	72.22	Slight
RC-CFR	1	77.27	Slight	88.89	None	66.67	Slight
RC-CFR	2	90.91	None	88.89	None	88.89	None
RC-CFR	3	89.39	Slight	100	None	83.33	None
RC-CFR	4	86.36	Slight	94.44	None	72.22	Slight
CFR-116A	1	87.88	Slight	94.44	None	88.89	None
CFR-116A	2	92.42	None	88.89	None	100	None
CFR-116A	3	84.85	Slight	94.44	None	77.78	Slight
CFR-116A	4	92.42	None	94.44	None	100	None

APPENDIX F

MACROINVERTEBRATES: ADDITIONAL BIOASSESSMENT INDICES

METHODS

Analysis of the project data included calculation and scoring of 4 additional macroinvertebrate indices: the MMI (Jessup et al. 2006), the Montana RIVPACS model (Hawkins 2005 and Jessup et al. 2006), the MVFP index (Bollman 1998), and the historic Montana DEQ index for valley streams (Bukantis 1998).

MMI (Jessup et al. 2006)

The MMI index 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 5 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 F-1 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 F-2.

Table F-1. MMI metrics and the expected response to environmental stress (Jessup et al. 2006).

Metric	Expected response to environmental stress
% EPT excluding Hydropsychidae and Baetidae	decrease
% Chironomidae	decrease
% Crustacea and Mollusca	increase
Shredder taxa	increase
% Predator	decrease

RIVPACS (Hawkins 2005, and Jessup et al. 2006)

Similar to the MMI, the RIVPACS model used in this study was developed by MT DEQ 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 F-2.

Table F-2. MMI and RIVPACS scoring criteria for impairment classifications (MDEQ 2006).

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

MVFP index (Bollman 1998)

The MVFP index is based on the performance of 6 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 3rd order. Three of the 6 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 (PBS&J 2010).

Bukantis 1998

This index is composed of 8 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 (PBS&J 2010).

RESULTS

Mean bioassessment scores over all replicates and their associated impairment classifications, are given in Table F-3. Boxplots of mean scores, ranges, and 95% confidence intervals are given in Figures F-1, F-2, F-3 and F-4. Raw scores for each macroinvertebrate replicate sample are given in Table F-4.

MMI (Jessup et al. 2006)

Mean scores for the MMI (Table F-3) indicated unimpaired conditions at all headwaters and mainstem sites; impairment was indicated at the tributary sites Lost Creek (LC-7) and Flint Creek (FC-CFR), where impairment was severe and moderate, respectively. Variability in MMI scores (as percent of maximum score) among replicates was low: the mean CV among samples was 0.08. Mean, maximum and minimum scores, with 95% confidence intervals are graphed in Figure F-1.

RIVPACS (Hawkins 2005, and Jessup et al. 2006)

Of all 7 indices used in this analysis, the RIVPACS model produced the most highly-varying scores among replicate samples: the mean CV for RIVPACS scores (actual scores, scaled between 0 and 1.0) was 0.22. Mean, maximum and minimum scores, with 95% confidence intervals are graphed in Figure F-2. The model indicated moderate impairment at the Mill-Willow Creek (MCWC-MWB) site; severe impairment was indicated at all other headwaters sites. RIVPACS scores suggest a continuous pattern of diminishing biological integrity among the headwaters sites the nearer they are to the Silver Bow Creek – Warm Springs Creek confluence. Among the Clark Fork River mainstem sites, severe impairment was indicated near Galen (CFR-03A), and at Turah (CFR-116A). All other mainstem Clark Fork River sites were rated as unimpaired. Among the tributaries, sites on Lost Creek (LC-7) and Racetrack Creek (RTC-1) were rated as severely impaired; all other tributary sites were unimpaired, using the

RIVPACS assessment model. The RIVPACS scores suggest increasing biologic integrity among tributary sites in an upstream-to-downstream direction relative to the Clark Fork River flow. When MMI and RIVPACS impairment classifications did not agree, MT DEQ procedures required evaluation of scores to determine which score falls furthest from its respective impairment threshold. Table F-3 summarizes these rectifications: MT DEQ classifications are highlighted.

MVFP index

The MVFP index scores (Table F-3) indicated severe impairment at the Warm Springs Creek site: all of the other tributary sites were moderately impaired, according to this assessment model. On the mainstem, sites on the Clark Fork River above the Little Blackfoot (CFR-42G) and at Gold Creek (CFR-53C) were rated as severely impaired. The MVFP index indicated unimpaired conditions at the mainstem site at Turah (CFR-116A). The 3 remaining Clark Fork River sites were moderately impaired. Tributary sites were all moderately impaired except for the Little Blackfoot River site (LBR-CFR), which achieved an unimpaired rating. Scores (as percent of maximum score) exhibited a relatively high amount of variability: the mean CV among samples was 0.11. Mean, maximum and minimum scores, with 95% confidence intervals are graphed in Figure F-3.

Bukantis 1998

Using this historic MT DEQ index (Table F-3), Mill-Willow Creek (MCWC-MWB) was rated as unimpaired, while the 3 other headwaters sites were slightly impaired. Mainstem sites on the Clark Fork River near Drummond (CFR-84F) and at Turah (CFR-116A) were rated as slightly impaired: scores for all other Clark Fork River sites indicated unimpaired conditions. Among the tributaries, sites on Racetrack Creek (RTC-1) and Flint Creek (FC-CFR) were unimpaired, while sites on the Little Blackfoot (LBR-CFR) and Rock Creek (RC-CFR) were slightly impaired, and the site on Lost Creek (LC-1) was severely impaired. Variability of scores among replicates was relatively high: the mean CV of scores (as percent of maximum score) was 0.13. Mean, maximum and minimum scores, with 95% confidence intervals are graphed in Figure F-4.

Table F-3. Mean macroinvertebrate bioassessment scores and impairment classifications: MDEQ MMI, MDEQ RIVPACS, MVFP, and Historic MT DEQ indices. Classifications highlighted in red are rectified MDEQ classifications for cases where MMI and RIVPACS results do not agree. Scores are mean values over 4 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 River basin, September 11-13, 2012.

Site name	Site identifier	Index							
		MMI (Jessup et al. 2006)		RIVPACS (Hawkins 2005)		MVFP (Bollman 1998)		Historic MT DEQ (Bukantis 1998)	
		score	impairment class	score	impairment class	score	impairment class	score	impairment class
Mill -Willow Creek	MCWC-MWB	57.00	None	0.54	Moderate	56.95	Moderate	93.75	None
Mill -Willow Bypass near mouth	MWB-SBC	55.90	None	0.30	Severe	56.95	Moderate	67.71	Slight
Warm Springs Creek near mouth	WSC-SBC	62.70	None	0.39	Severe	38.89	Severe	73.96	Slight
Silver Bow Creek at Warm Springs	SS-25	59.65	None	0.19	Severe	52.78	Moderate	59.38	Slight
Clark Fork near Galen	CFR-03A	56.70	None	0.26	Severe	61.11	Moderate	87.50	None
Lost Creek near mouth	LC-7	24.20	Severe	0.09	Severe	52.78	Moderate	43.75	Moderate
Racetrack Creek near mouth	RTC-1	63.93	None	0.41	Severe	70.83	Moderate	81.25	None
Clark Fork at Deer Lodge	CFR-27H	59.70	None	0.85	None	55.56	Moderate	86.46	None
Clark Fork above Little Blackfoot River near Garrison	CFR-42G	58.83	None	1.07	None	51.39	Severe	92.71	None
Little Blackfoot River near Garrison	LBR-CFR	56.60	None	0.85	None	86.11	None	75.00	Slight
Clark Fork at Gold Creek	CFR-53C	65.33	None	0.82	None	40.28	Severe	86.46	None
Flint Creek near mouth	FC-CFR	45.90	Moderate	0.97	None	70.84	Moderate	88.54	None
Clark Fork near Drummond	CFR-84F	78.53	None	0.97	None	69.44	Moderate	75.00	Slight

Clark Fork at Turah	CFR-116A	52.08	None	0.40	Severe	88.89	None	75.00	Slight

Table F-4. Raw scores for replicate samples: additional bioassessment indices.

Site identifier	Replicate number	Index							
		MMI (Jessup et al. 2006)		RIVPACS (Hawkins 2005)		MVFP (Bollman 1998)		Historic MT DEQ (Bukantis 1998)	
		score	Impair-ment class	score	Impair-ment class	score	Impair-ment class	score	Impair-ment class
MCWC-MWB	1	57.5	None	0.41	Severe	55.56	Slight	87.50	None
MCWC-MWB	2	51.0	None	0.62	Moderate	61.11	Slight	91.67	None
MCWC-MWB	3	57.8	None	0.52	Moderate	61.11	Slight	100.00	None
MCWC-MWB	4	61.7	None	0.62	Moderate	50.00	Moderate	95.83	None
MWB-SBC	1	55.3	None	0.20	Severe	55.56	Slight	70.83	Slight
MWB-SBC	2	52.0	None	0.30	Severe	55.56	Slight	58.33	Slight
MWB-SBC	3	60.1	None	0.40	Severe	61.11	Slight	75.00	Slight
MWB-SBC	4	56.2	None	0.30	Severe	55.56	Slight	66.67	Slight
WSC-SBC	1	61.4	None	0.31	Severe	38.89	Moderate	79.17	Slight
WSC-SBC	2	58.5	None	0.52	Moderate	38.89	Moderate	70.83	Slight
WSC-SBC	3	63.8	None	0.42	Severe	33.33	Moderate	70.83	Slight
WSC-SBC	4	67.1	None	0.31	Severe	44.44	Moderate	75.00	Slight
SS-25	1	57.5	None	0.14	Severe	44.44	Moderate	50.00	Moderate
SS-25	2	65.9	None	0.28	Severe	44.44	Moderate	66.67	Slight
SS-25	3	58.8	None	0.21	Severe	61.11	Slight	50.00	Moderate
SS-25	4	56.4	None	0.14	Severe	61.11	Slight	70.83	Slight
CFR-03A	1	58.9	None	0.23	Severe	44.44	Moderate	62.50	Slight
CFR-03A	2	53.6	None	0.35	Severe	61.11	Slight	100.00	None
CFR-03A	3	59.5	None	0.23	Severe	66.67	Slight	95.83	None
CFR-03A	4	54.8	None	0.23	Severe	72.22	Slight	91.67	None
LC-7	1	32.0	Severe	0.09	Severe	61.11	Slight	58.33	Slight
LC-7	2	20.7	Severe	0.00	Severe	55.56	Slight	33.33	Moderate
LC-7	3	21.5	Severe	0.09	Severe	38.89	Moderate	33.33	Moderate
LC-7	4	22.6	Severe	0.17	Severe	55.56	Slight	50.00	Moderate
RTC-1	1	68.4	None	0.18	Severe	77.78	Slight	66.67	Slight
RTC-1	2	65.9	None	0.46	Moderate	61.11	Slight	87.50	None
RTC-1	3	71.3	None	0.55	Moderate	72.22	Slight	87.50	None
RTC-1	4	50.1	None	0.46	Moderate	72.22	Slight	83.33	None
CFR-27H	1	67.0	None	0.99	None	44.44	Moderate	95.83	None
CFR-27H	2	60.2	None	0.71	Moderate	61.11	Slight	75.00	Slight
CFR-27H	3	57.5	None	0.99	None	61.11	Slight	75.00	Slight
CFR-27H	4	54.1	None	0.71	Moderate	55.56	Slight	100.00	None
CFR-42G	1	47.7	Moderate	1.07	None	55.56	Slight	87.50	None
CFR-42G	2	57.0	None	0.76	Moderate	50.00	Moderate	91.67	None
CFR-42G	3	61.8	None	1.22	None	55.56	Slight	100.00	None
CFR-42G	4	68.8	None	1.22	None	44.44	Moderate	91.67	None
LBR-CFR	1	54.0	None	0.62	Moderate	88.89	None	70.83	Slight
LBR-CFR	2	54.5	None	0.92	None	88.89	None	50.00	Moderate
LBR-CFR	3	55.1	None	0.77	Moderate	83.33	None	91.67	None
LBR-CFR	4	62.8	None	1.08	None	83.33	None	87.50	None
CFR-53C	1	63.1	None	0.99	None	33.33	Moderate	83.33	None

CFR-53C	2	61.0	None	0.71	Moderate	44.44	Moderate	91.67	None
CFR-53C	3	62.0	None	0.99	None	44.44	Moderate	95.83	None
CFR-53C	4	75.2	None	0.57	Moderate	38.89	Moderate	75.00	Slight
FC-CFR	1	41.4	Moderate	1.04	None	55.56	Slight	87.50	None
FC-CFR	2	51.1	None	1.04	None	83.33	None	100.00	None
FC-CFR	3	46.7	Moderate	0.90	None	77.78	Slight	87.50	None
FC-CFR	4	44.4	Moderate	0.90	None	66.67	Slight	79.17	Slight
CFR-84F	1	75.0	None	1.04	None	61.11	Slight	87.50	None
CFR-84F	2	83.7	None	0.89	None	83.33	None	70.83	Slight
CFR-84F	3	76.6	None	1.04	None	61.11	Slight	79.17	Slight
CFR-84F	4	78.8	None	0.89	None	72.22	Slight	62.50	Slight
RC-CFR	1	61.9	None	1.06	None	61.11	Slight	37.50	Moderate
RC-CFR	2	69.8	None	0.93	None	61.11	Slight	66.67	Slight
RC-CFR	3	74.3	None	1.06	None	66.67	Slight	62.50	Slight
RC-CFR	4	67.0	None	1.33	None	55.56	Slight	58.33	Slight
CFR-116A	1	50.9	None	0.44	Moderate	94.44	None	70.83	Slight
CFR-116A	2	54.8	None	0.29	Severe	77.78	Slight	87.50	None
CFR-116A	3	47.4	Moderate	0.44	Moderate	94.44	None	62.50	Slight
CFR-116A	4	55.2	None	0.44	Moderate	88.89	None	79.17	Slight

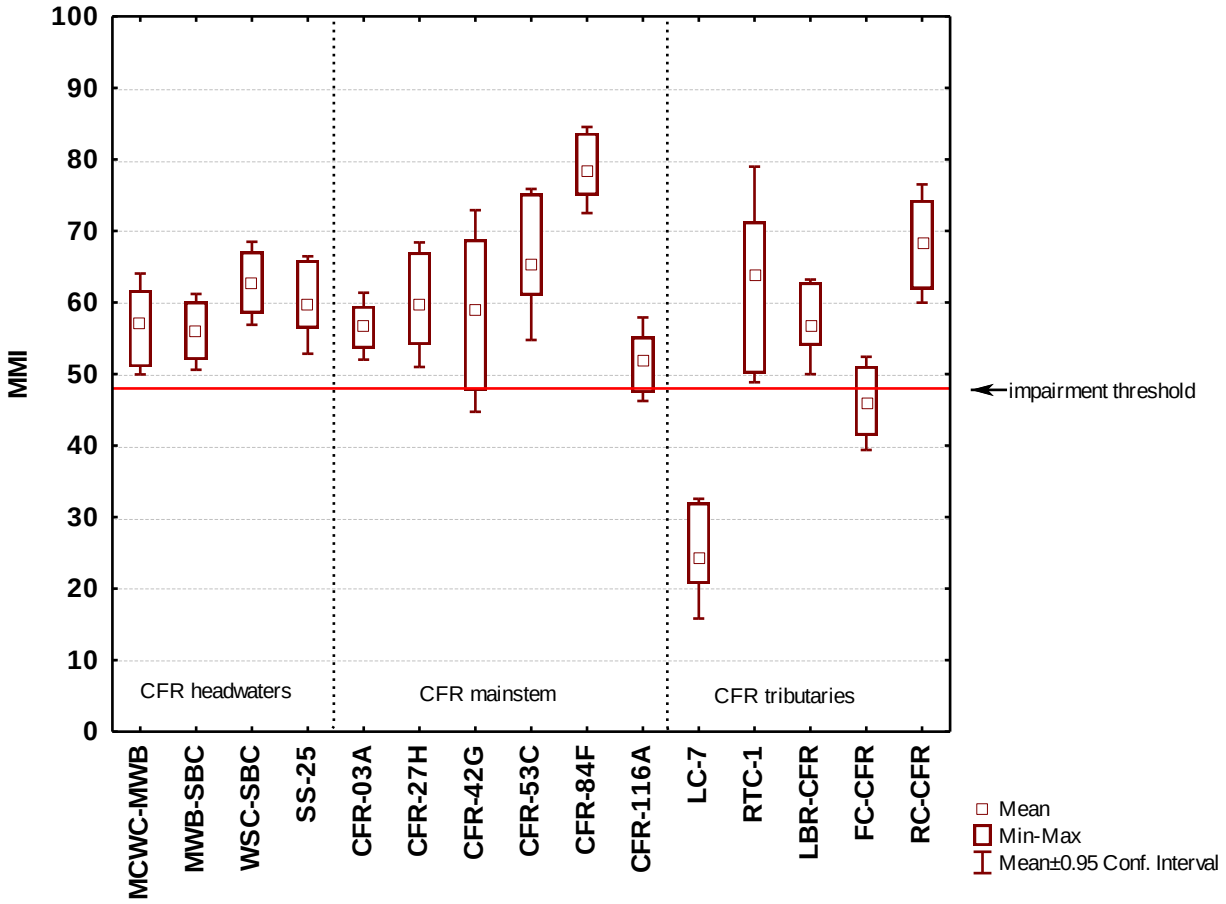

Figure F-1. Variability among replicates: mean scores, maximum and minimum scores, and 95% confidence intervals for MT DEQ's MMI. Clark Fork River basin, September 11-13, 2012.

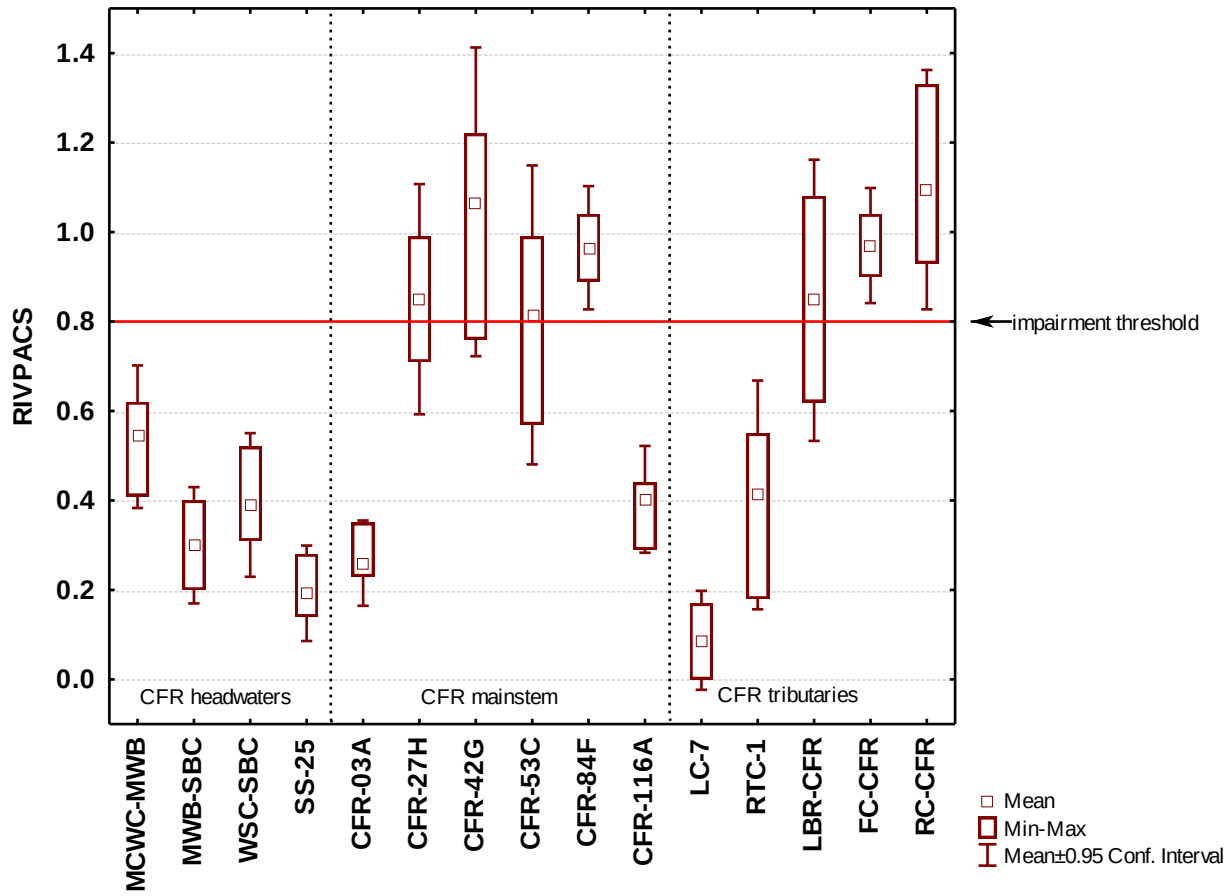

Figure F-2. Variability among replicates: mean scores, maximum and minimum scores, and 95% confidence intervals for MT DEQ's RIVPACS model. Clark Fork River basin, September 11-13, 2012.

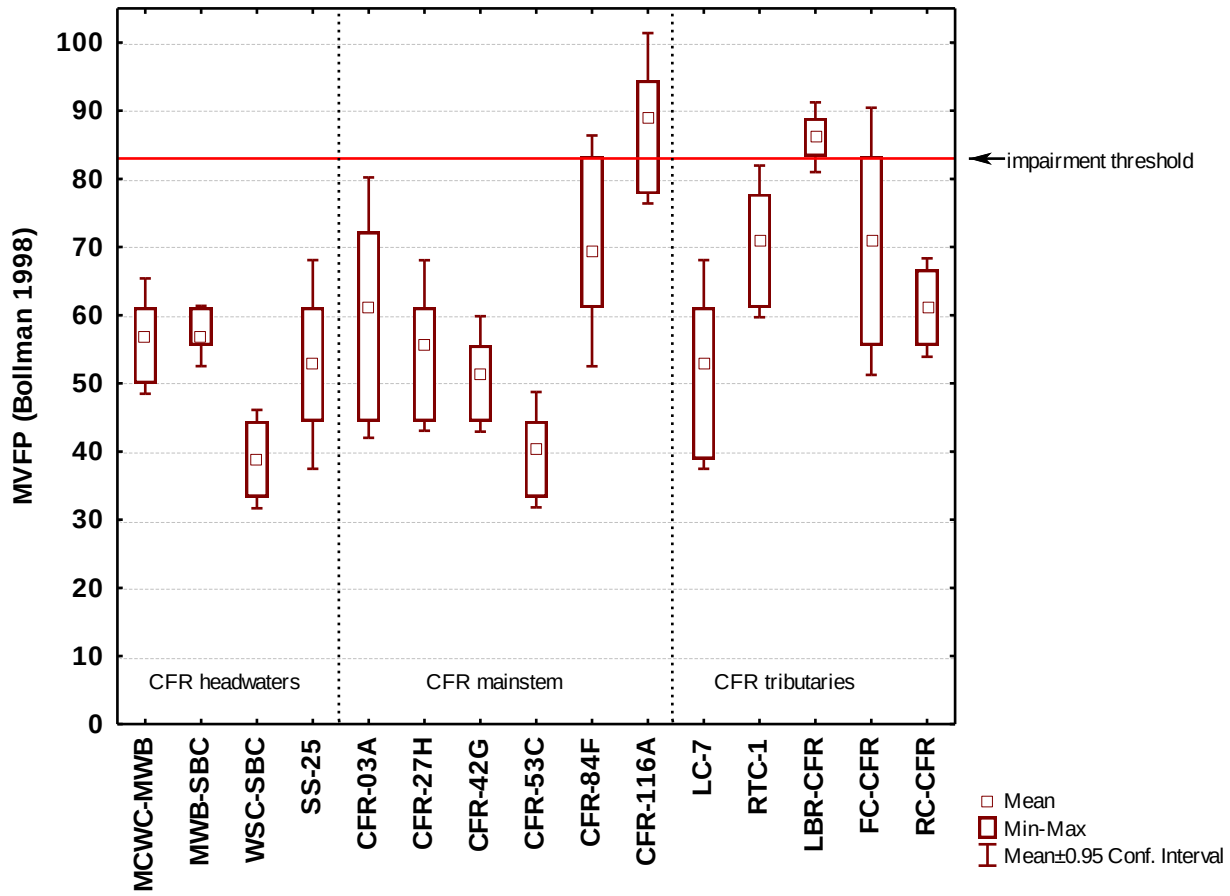

Figure F-3. Variability among replicates: mean scores, maximum and minimum scores, and 95% confidence intervals for the MVFP index. Clark Fork River basin, September 11-13, 2012.

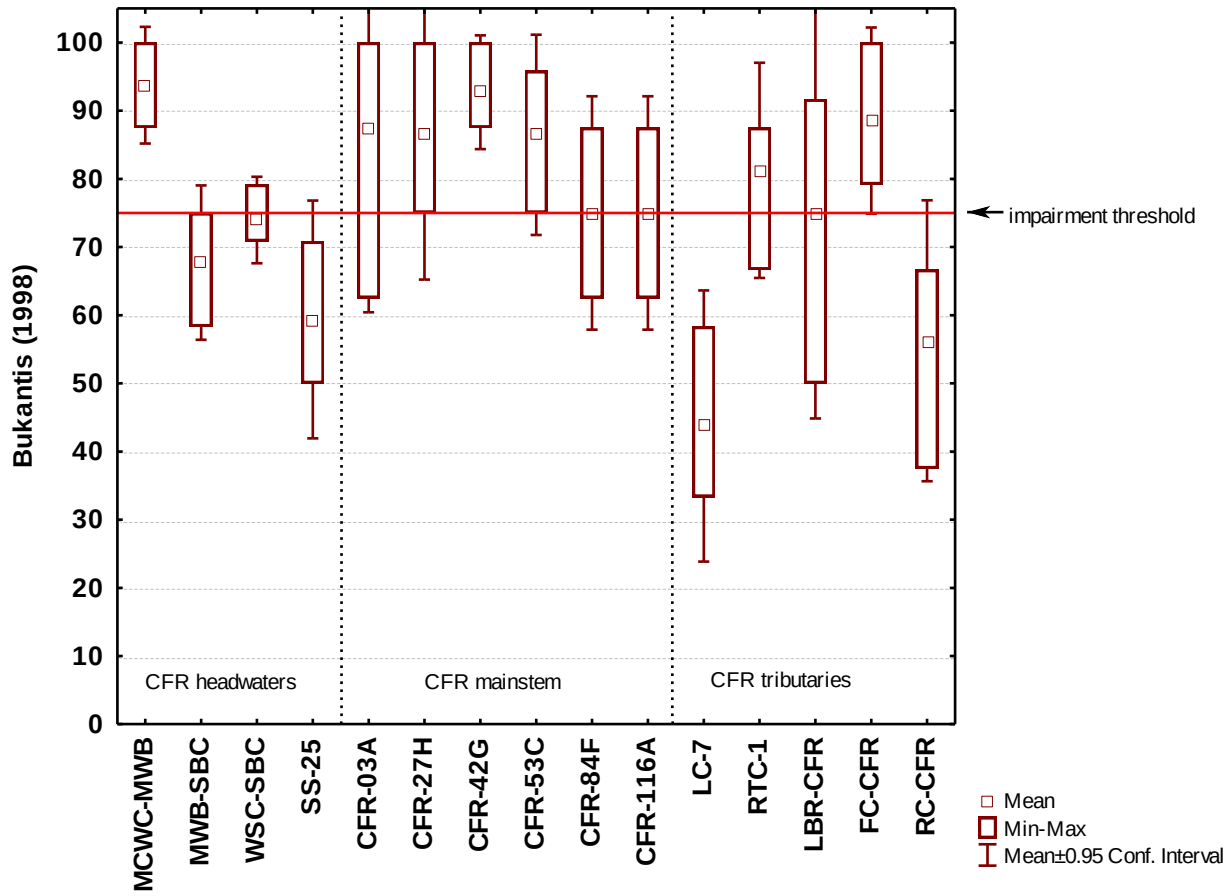

Figure F-4. Variability among replicates: mean scores, maximum and minimum scores, and 95% confidence intervals for the Bukantis (1998) index. Clark Fork River basin, September 11-13, 2012.

APPENDIX G

MACROINVERTEBRATES: A COMPARISON STUDY OF BIOASSESSMENT RESULTS FOLLOWING ALTERNATIVE PROCESSING METHODS FROM CLARK FORK RIVER SAMPLES

Introduction

This appendix reports on a comparison of taxonomic data and bioassessment outcomes for Clark Fork River (CFR) benthic macroinvertebrate analysis. The 2 laboratories used different sample processing procedures, and the data were explored to determine whether these procedures and/or any discernible differences in taxonomic resolution or concepts influenced subsequent bioassessment results.

Methods

For both analyses, samples were collected using modified Hess samplers (0.09 m^2 sampling area). Samples were collected in 2010 from 3 sites on the Clark Fork River: site locations and descriptions are summarized in Table G-1. Collections consisted of 4 Hess sample replicates taken from each site. Collections were made by Dan McGuire (McGuire Consulting) on August 20 and 21; Atkins personnel collected samples on September 8 and 9. A total of 24 sample replicates comprised the data.

Procedures for sample processing in the 2 laboratories differed in the approach to samples with high organism density: Rhithron fully sorted each sample regardless of invertebrate density, removing all organisms from substrate, identifying all organisms to the lowest practical taxonomic resolution (genus/species), and enumerating each taxon. McGuire evaluated invertebrate density for each sample, and if total organism abundance was estimated to exceed 1000 organisms, selected abundant taxa, for example Simuliidae and Hydropsychidae, were subsampled. These abundant taxa were represented by partial counts, which were extrapolated to whole-sample density estimates by multiplying the subsample count by appropriate factors, based on the proportion of the whole sample used to produce the subsample.

Other aspects of sample processing were essentially the same between the laboratories: preservative was rinsed from samples in a U.S. Standard #30 sieve, and sorting of organisms from substrate was done under stereomicroscopy. It is assumed that the concept of lowest practical taxonomic resolution was reasonably consistent between the 2 laboratories.

Table G-1. Site locations for samples used in the comparative analysis.

Clark Fork River Site description	McGuire Site ID	McGuire sampling date	Atkins Site ID	Atkins sampling date	USGS Site Number	Latitude	Longitude
Deer Lodge	9	Aug. 20	CFR-27H	Sept. 9	12324200	46º23’52”	-112º44’31”
Gold Creek	11	Aug. 20	CFR-53C	Sept. 8	12324680	46º35’26”	-112º55’40”
Turah	13	Aug. 21	CFR-116A	Sept. 8	12334550	46º49’34”	-113º48’48”

Data analysis

Data consisted of taxonomic identification and enumeration of benthic invertebrates from the 3 sampled locations, processed by either McGuire or by Rhithron. Database applications were used to calculate constituent metrics for McGuire’s Biointegrity Indices (McGuire 2010) for each replicate sample. Other applications were used to calculate the Montana RIVPACS model (Hawkins 2005) and the MMI (Jessup et al. 2006).

To analyze variance between samples processed by the 2 laboratories while accounting for spatial variation in invertebrate assemblages, independent-sample Kruskal-Wallis tests were used to compare median index scores (as percent of maximum) and metric scores calculated for each site. The multivariate ANOSIM test (ANalysis Of SIMilarity: Clarke 1993) was applied to the taxonomic/enumeration data, to test for a significant difference in species composition (determinations and relative abundances) between data produced by "laboratory" as the grouping variable. This test was performed on a dissimilarity matrix, using Bray-Curtis distances. To explore differences detected by the analyses, an ordination procedure (Principal Components Analysis = PCA) was used to identify taxa and/or metric results that may have contributed to the differences.

Results

Table G-2 summarizes *p*-values for Kruskal-Wallis tests comparing index scores at each site.

Table G-2. Significance (*p*-values) of differences between index scores obtained from 2 sample sets collected on the Clark Fork River in 2010, and analyzed by 2 laboratories: McGuire Consulting and Rhithron. Significant values at the 0.05 level are highlighted in the table.

	Clark Fork River sites sampled		
	Deer Lodge	Gold Creek	Turah
Index tested	*p*-value		
McGuire overall biointegrity	0.19	1.00	0.03
McGuire metals subset	0.15	1.00	0.14
McGuire organic/nutrient subset	0.14	0.04	0.13
MMI	0.15	1.00	0.14
RIVPACS	0.02	0.02	0.55

Significant differences among individual metric contributors to the McGuire indices were confined to the Hydropsychinae/Trichoptera metric. Kruskal-Wallis tests were significant for this metric when all sites were tested, and when CFR at Deer Lodge and CFR at Turah samples were tested separately.

A significant difference in relative abundances and occurrences of taxa in data produced by the 2 laboratories was demonstrated by the ANOSIM test ($R = 0.53$, $p = 0.001$). Differences are largely driven by the relative abundance of 6 taxa: *Cladotanytarsus* sp., *Psychomyia flavida*, *Diphetor hageni* (identified more often by McGuire), *Atherix* sp., *Hydropsyche cockerelli*, and Turbellaria (identified more often by Rhithron).

Figures G-2 through G-6 illustrate the variability among replicates for the McGuire indices and for the Montana MMI and RIVPACS results.

Principal Components Analysis (PCA), graphed in Figure G-1, illustrates the differences between the sample results produced by the 2 laboratories. Laboratory treatments separate along the vertical axis of the ordination, which explains 11.85% of the variance in sample composition. Metrics influenced by these differences are Hydropsychinae/Trichoptera, Taxa richness, and EPT richness. The ordination also illustrates a spatial gradient of increasing alpha diversity with increasing river miles, and decreasing contribution of filterers with increasing river

miles. Longitudinal effects, separated along the horizontal axis of the ordination, explain 12.76% of the variance in sample composition.

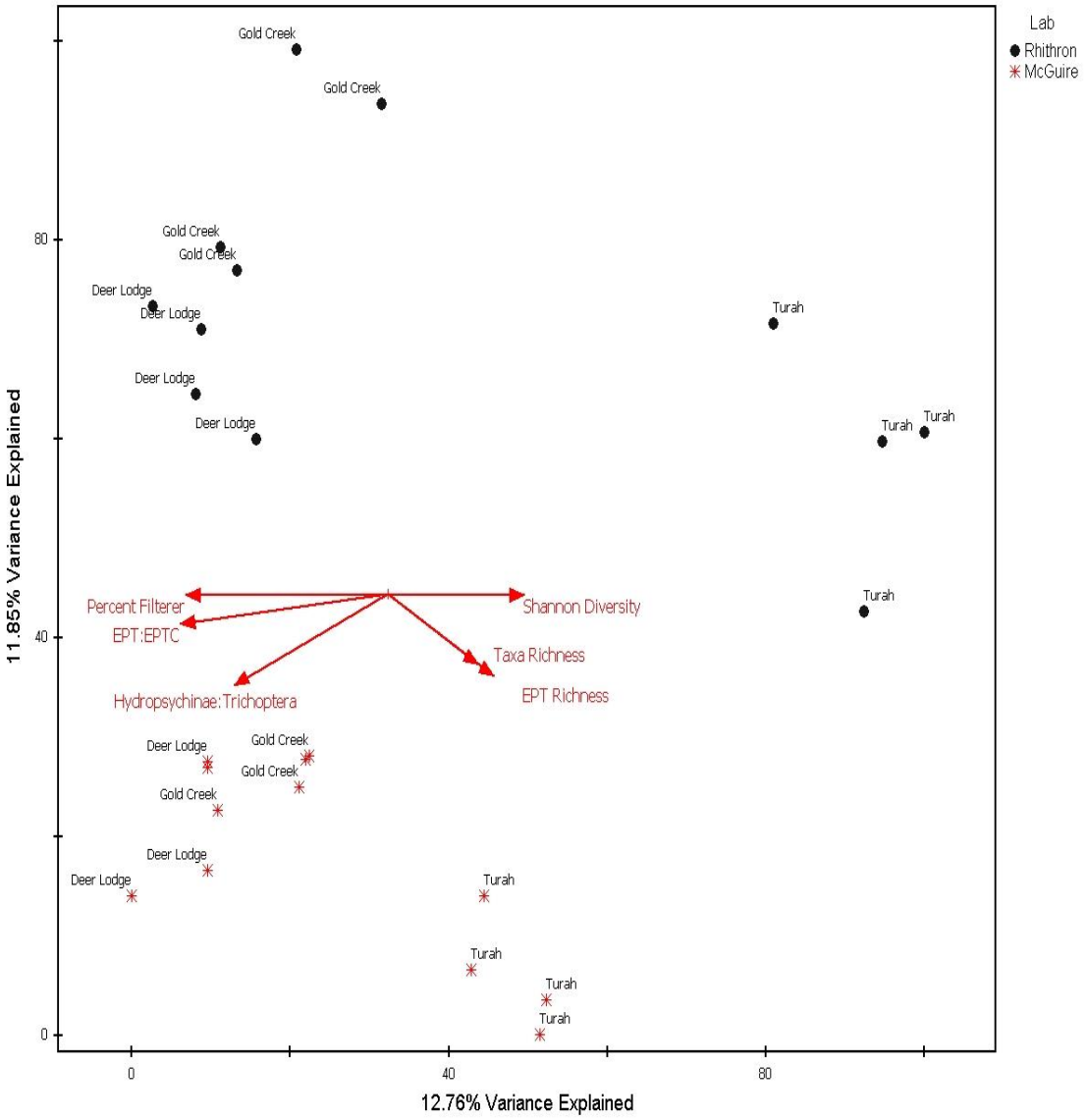

Figure G-1. Principal Components Analysis (PCA) of taxonomic data produced from Clark Fork River samples collected at 3 sites in 2010 and processed by 2 laboratories (McGuire Consulting and Rhithron). Vectors show contributing metrics to McGuire Clark Fork River bioassessment indices.

Discussion

Index comparison results showed significant differences in McGuire indices for CFR samples collected at Turah (overall biointegrity index) and at Gold Creek (organic/nutrient subset index). The evidence from individual metric comparisons suggests that the Hydropsychinae/Trichoptera metric contributes most to these significant differences in index scores. The significant differences in RIVPACS scores may also be related to the differential determinations and/or enumerations within the Hydropsychinae.

Atkins' collections (processed by Rhithron) were made 19 or 20 days later than McGuire's collections (processed by McGuire): there is the potential for variation in the taxonomic composition of the samples based solely on temporal progressions of taxa emergence and other seasonal influences. Growth and development of morphological characters which aid identification are also temporally-based factors that may have influenced identifications and counts produced by the 2 laboratories. These potential effects were not specifically studied in this analysis.

McGuire's procedure of subsampling abundant organisms in high-density samples was not documented in such a way as to clearly indicate which samples were handled in this way, and which organisms were subsampled. However, documentation of the method seems to indicate that most samples from Clark Fork River projects were subsampled for abundant organisms as opposed to being fully sorted. While this analysis assumes that all of the samples were subjected to estimated abundances of certain organisms, it is possible that none of the samples compared in this analysis were processed by means of subsampling.

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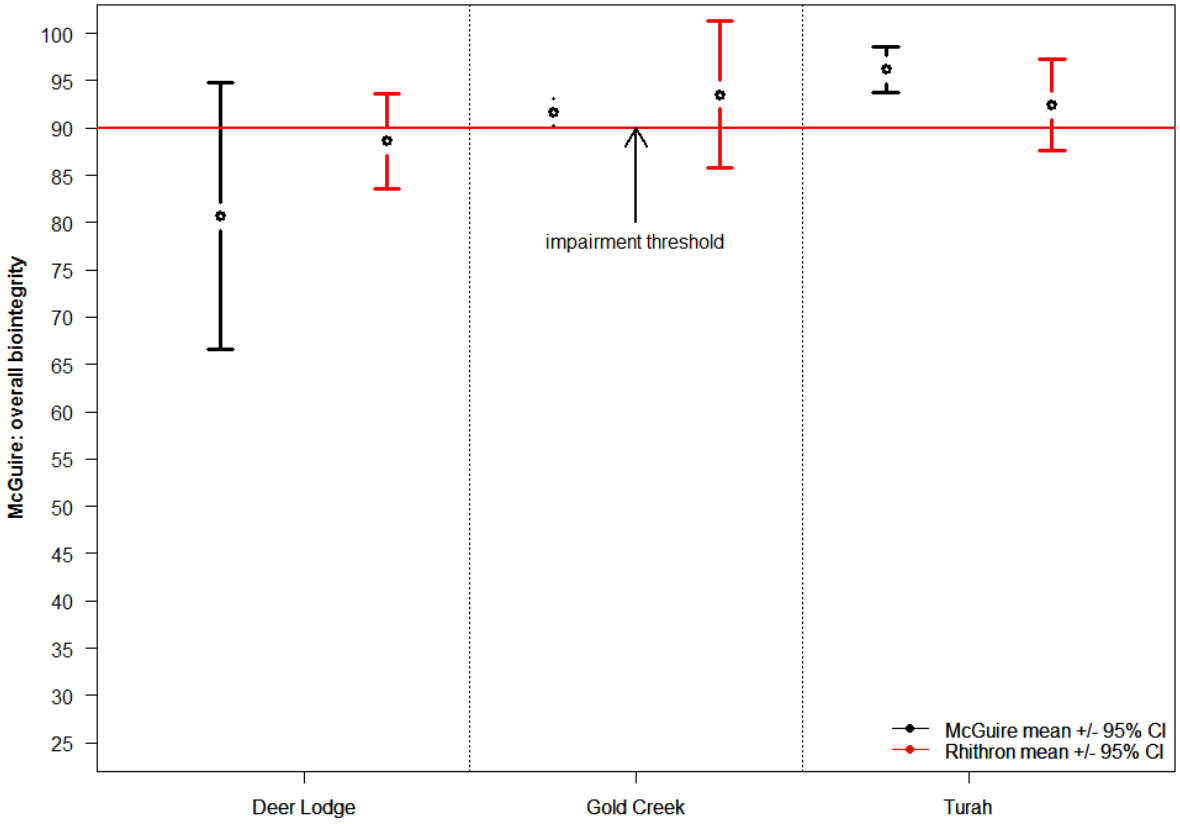

Figure G-2: Variability among replicates: mean scores by laboratory and 95% confidence intervals for McGuire's overall biointegrity index. Clark Fork River basin, Fall 2010.

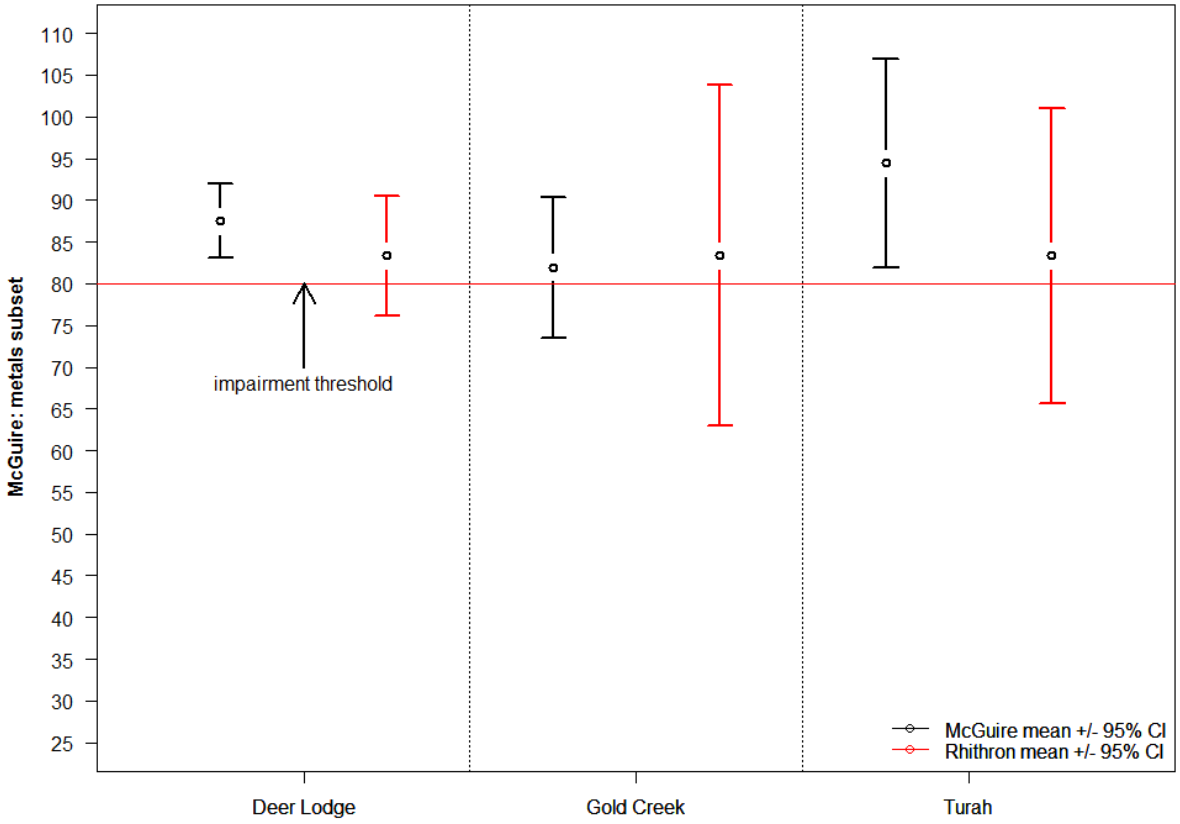

Figure G-3: Variability among replicates: mean scores by laboratory and 95% confidence intervals for McGuire's metals subset. Clark Fork River basin, Fall 2010.

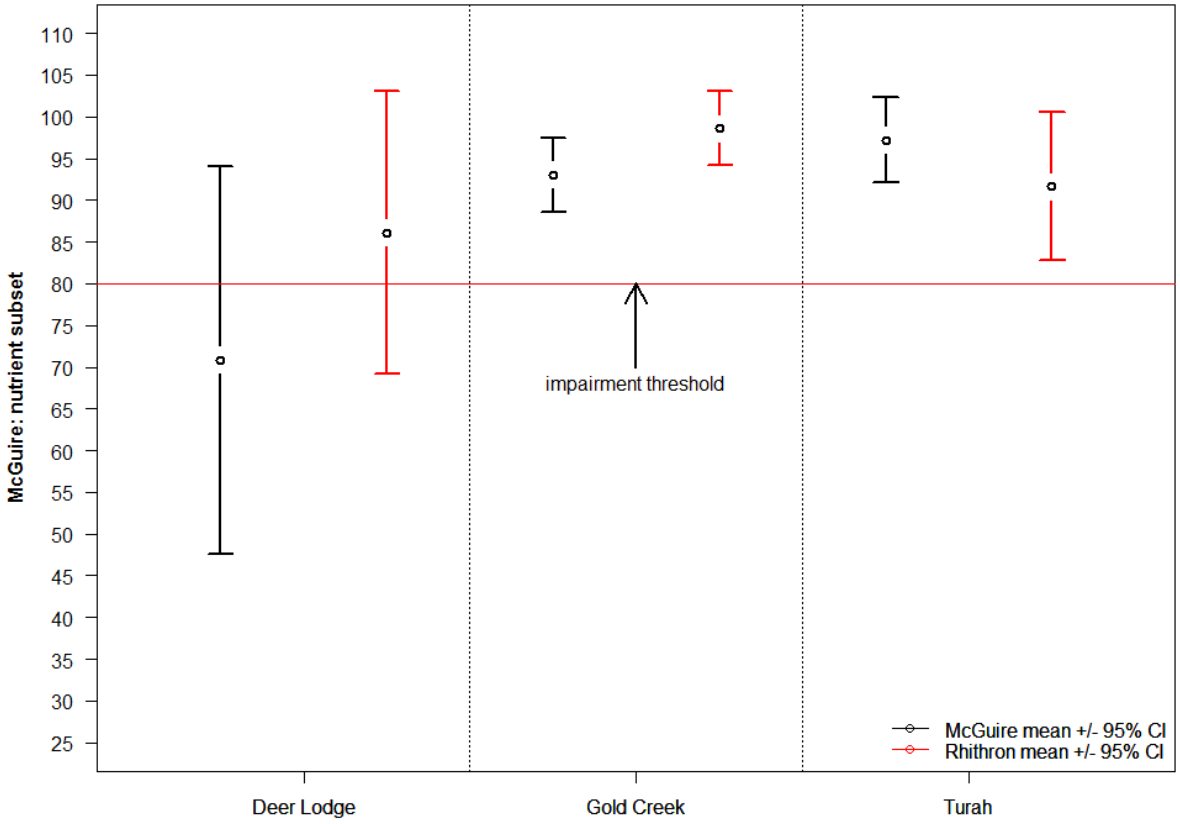

Figure G-4: Variability among replicates: mean scores by laboratory and 95% confidence intervals for McGuire's nutrient subset. Clark Fork River basin, Fall 2010.

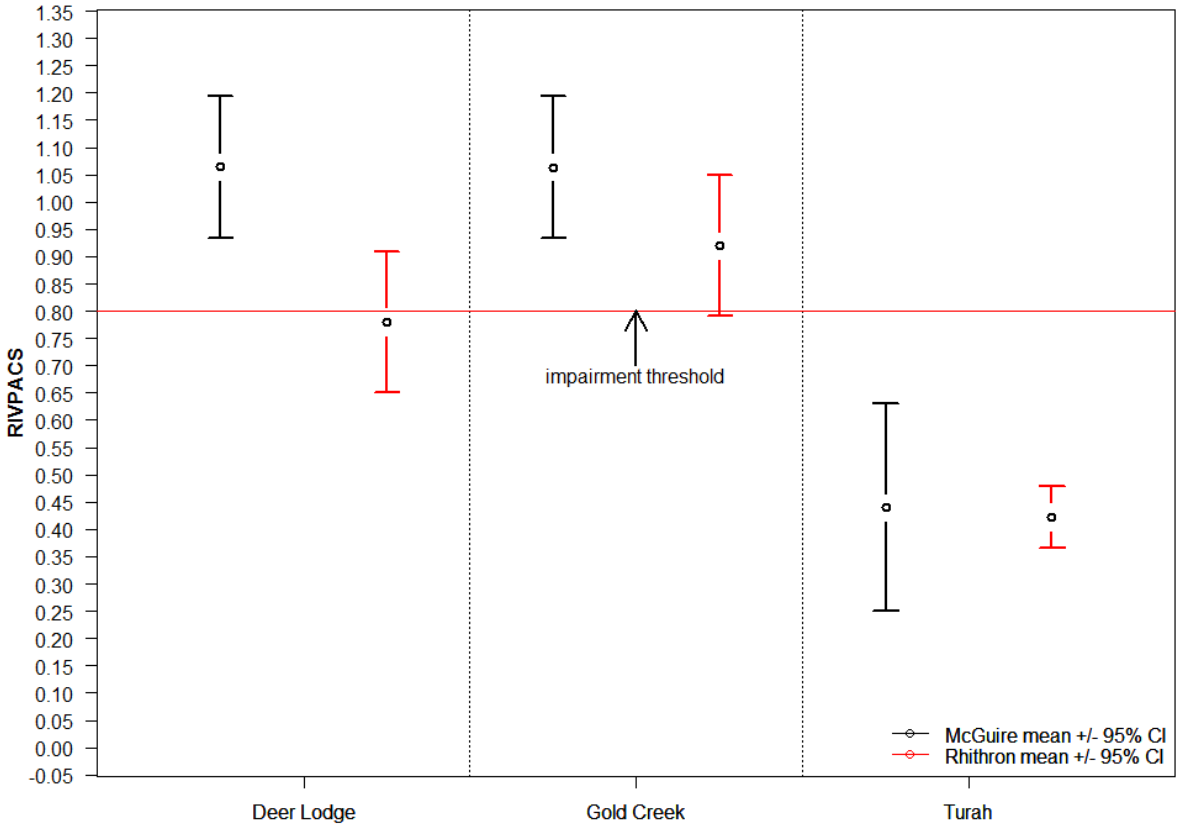

Figure G-5: Variability among replicates: mean scores by laboratory and 95% confidence intervals for MT DEQ's RIVPACS model. Clark Fork River basin, Fall 2010.

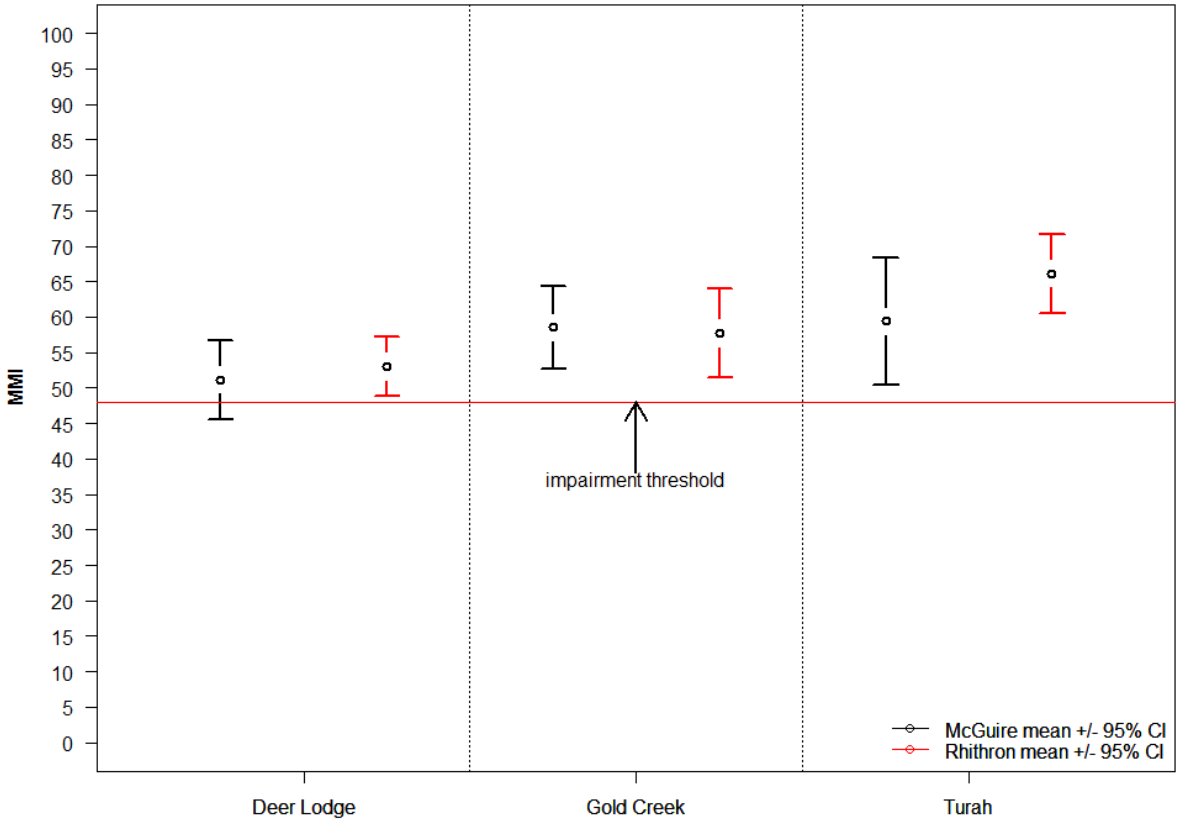

Figure G-6: Variability among replicates: mean scores by laboratory and 95% confidence intervals for MT DEQ's MMI model. Clark Fork River basin, Fall 2010.

APPENDIX H

PERIPHYTON: DATA

APPENDIX H1

PERIPHYTON DATA:
NON-DIATOM ALGAE

Site ID: MCWC-MWB
Site Description: Mill and Willow Creeks at Frontage Road
Date Sampled: 9/13/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 12/13/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
diatoms	Bacillariophyta	d	1
Nostoc	Cyanophyta	a	2
Vaucheria	Xanthophyta	f	3
Cylindrospermum	Cyanophyta	f	4
Closterium	Chlorophyta	c	5
Staurastrum	Chlorophyta	f	6
Stigeoclonium	Chlorophyta	f	7
Audouinella	Rhodophyta	c	8
Cladophora	Chlorophyta	o	9
Microchaete	Cyanophyta	f	10
Scenedesmus	Chlorophyta	f	11
Ulothrix	Chlorophyta	o	12
Mougeotia	Chlorophyta	o	13
Spirogyra	Chlorophyta	o	14
Cosmarium	Chlorophyta	o	15
Phormidium	Cyanophyta	o	16
Heteroleibleinia	Cyanophyta	o	17
Dactylococcopsis	Cyanophyta	o	18
Pediastrum	Chlorophyta	r	19
Gloeocystis	Chlorophyta	r	20
Coelastrum	Chlorophyta	r	21

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

Site ID: MWB-SBC
Site Description: Mill-Willow Bypass near mouth
Date Sampled: 9/13/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 12/13/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
diatoms	Bacillariophyta	d	1
Phormidium	Cyanophyta	a	2
Tolyphothrix	Cyanophyta	a	3
Nostoc	Cyanophyta	a	4
Cladophora	Chlorophyta	f	5
Scenedesmus	Chlorophyta	f	6
Mougeotia	Chlorophyta	o	7
Closterium	Chlorophyta	o	8
Cosmarium	Chlorophyta	o	9
Staurastrum	Chlorophyta	o	10
Pediastrum	Chlorophyta	o	11
Dactylococcopsis	Cyanophyta	c	12
Heteroleibleinia	Cyanophyta	f	13
Chamaesiphon	Cyanophyta	c	14
Microchaete	Cyanophyta	o	15
Oedogonium	Chlorophyta	r	16
Ulothrix	Chlorophyta	r	17
Coelastrum	Chlorophyta	r	18
Merismopedia	Cyanophyta	r	19

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

Site ID: SS-25
Site Description: Silver Bow Creek at Warm Springs
Date Sampled: 9/13/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 12/13/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
Oedogonium	Chlorophyta	d	1
diatoms	Bacillariophyta	d	2
Cladophora	Chlorophyta	a	3
Tolypothrix	Cyanophyta	c	4
Scenedesmus	Chlorophyta	f	5
Dactylococcopsis	Cyanophyta	f	6
Microcystis	Cyanophyta	c	7
Stigeoclonium	Chlorophyta	o	8
Closterium	Chlorophyta	o	9
Leptolyngbya	Cyanophyta	o	10
Gloeocystis	Chlorophyta	r	11
Microchaete	Cyanophyta	r	12

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

Site ID: WSC-SBC
Site Description: Warm Springs Creek near mouth
Date Sampled: 9/13/2012
Sampled by: E.Weber
Analyzed by: E. Weber
Date Analyzed: 12/14/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
diatoms	Bacillariophyta	d	1
Audouinella	Rhodophyta	d	2
Ulothrix	Chlorophyta	f	3
Oedogonium	Chlorophyta	o	4
Closterium	Chlorophyta	o	5
Phormidium	Cyanophyta	o	6
Stigeoclonium	Chlorophyta	o	7
Dactylococcopsis	Cyanophyta	o	8
Mougeotia	Chlorophyta	r	9
Cosmarium	Chlorophyta	r	10

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

Site ID: CFR-03A
Site Description: Clark Fork near Galen
Date Sampled: 9/12/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 12/14/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
Nostoc	Cyanophyta	d	1
diatoms	Bacillariophyta	d	2
Cladophora	Chlorophyta	a	3
Homoeothrix	Cyanophyta	f	4
Chamaesiphon	Cyanophyta	a	5
Oedogonium	Chlorophyta	o	6
Heteroleibleinia	Cyanophyta	f	7
Audouinella	Rhodophyta	o	8
Gloeothece	Cyanophyta	o	9
Dactylococcopsis	Cyanophyta	c	10
Scenedesmus	Chlorophyta	o	11
Stigeoclonium	Chlorophyta	r	12
Cosmarium	Chlorophyta	r	13

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

Site ID: LC-7
Site Description: Lost Creek near mouth
Date Sampled: 9/12/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 12/17/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
Chara	Chlorophyta	f	1
diatoms	Bacillariophyta	a	2
Nostoc	Cyanophyta	a	3
Cladophora	Chlorophyta	f	4
Spirogyra	Chlorophyta	f	5
Audouinella	Rhodophyta	f	6
Heteroleibleinia	Cyanophyta	a	7
Mougeotia	Chlorophyta	c	8
Chamaesiphon	Cyanophyta	a	9
Draparnaldia	Chlorophyta	c	10
Pediastrum	Chlorophyta	c	11
Tribonema	Xanthophyta	c	12
Closterium	Chlorophyta	o	13
Chroodactylon	Rhodophyta	o	14

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

Site ID: RTC-1
Site Description: Racetrack Creek near mouth
Date Sampled: 9/12/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 12/17/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
Audouinella	Rhodophyta	a	1
Phormidium	Cyanophyta	a	2
diatoms	Bacillariophyta	d	3
Vaucheria	Xanthophyta	f	4
Cladophora	Chlorophyta	f	5
Ulothrix	Chlorophyta	c	6
Oedogonium	Chlorophyta	c	7
Gloeocystis	Chlorophyta	c	8
Spirogyra	Chlorophyta	o	9
Heribaudiella	Phaeophyta	o	10
Tribonema	Xanthophyta	o	11
Scenedesmus	Chlorophyta	c	12
Ankistrodesmus	Chlorophyta	c	13
Chamaesiphon	Cyanophyta	c	14
Enteromorphya	Chlorophyta	r	15
Zygnema	Chlorophyta	r	16
Stigeoclonium	Chlorophyta	r	17
Oscillatoria	Cyanophyta	r	18
Dactylococcopsis	Cyanophyta	o	19

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

Site ID: CFR-27H
Site Description: Clark Fork at Deer Lodge
Date Sampled: 9/12/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 12/18/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
diatoms	Bacillariophyta	d	1
Cladophora	Chlorophyta	f	2
Nostoc	Cyanophyta	a	3
Oedogonium	Chlorophyta	c	4
Chamaesiphon	Cyanophyta	a	5
Scenedesmus	Chlorophyta	f	6
Leptolyngbya	Cyanophyta	c	7
Heteroleibleinia	Cyanophyta	c	8
Closterium	Chlorophyta	o	9
Pediastrum	Chlorophyta	o	10
Cosmarium	Chlorophyta	o	11
Klebsormidium	Chlorophyta	r	12
Chroodactylon	Rhodophyta	r	13
Protoderma	Chlorophyta	r	14
Phormidium	Cyanophyta	r	15

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

Site ID: CFR-42G
Site Description: Clark Fork above Little Blackfoot River
Date Sampled: 9/12/2012
Taken by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 12/18/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
diatoms	Bacillariophyta	d	1
Cladophora	Chlorophyta	f	2
Nostoc	Cyanophyta	a	3
Stigeoclonium	Chlorophyta	f	4
Scenedesmus	Chlorophyta	a	5
Pediastrum	Chlorophyta	o	6
Cosmarium	Chlorophyta	o	7
Homoeothrix	Cyanophyta	o	8
Coelastrum	Chlorophyta	o	9
Leptolyngbya	Cyanophyta	o	10
Klebsormidium	Chlorophyta	r	11
Ankistrodesmus	Chlorophyta	r	12
Dactylococcopsis	Cyanophyta	r	13

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

Site ID: LBR-CFR
Site Description: Little Blackfoot River near Garrison
Date Sampled: 9/12/2012
Taken by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 12/18/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
Nostoc	Cyanophyta	d	1
diatoms	Bacillariophyta	d	2
Oedogonium	Chlorophyta	a	3
Vaucheria	Xanthophyta	f	4
Cladophora	Chlorophyta	c	5
Mougeotia	Chlorophyta	c	6
Spirogyra	Chlorophyta	c	7
Tribonema	Xanthophyta	f	8
Closterium	Chlorophyta	f	9
Audouinella	Rhodophyta	c	10
Cosmarium	Chlorophyta	c	11
Scenedesmus	Chlorophyta	c	12
Ankistrodesmus	Chlorophyta	f	13
Heteroleibleinia	Cyanophyta	c	14
Stigeoclonium	Chlorophyta	o	15
Klebsormidium	Chlorophyta	o	16
Dactylococcopsis	Cyanophyta	f	17
Trichormus	Cyanophyta	o	18
Zygnema	Chlorophyta	r	19
Phormidium	Cyanophyta	r	20
Homoeothrix	Cyanophyta	r	21

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

Site ID: CFR-53C
Site Description: Clark Fork at Gold Creek
Date Sampled: 9/11/2012
Taken by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 12/19/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
Cladophora	Chlorophyta	a	1
Nostoc	Cyanophyta	d	2
diatoms	Bacillariophyta	d	3
Scenedesmus	Chlorophyta	f	4
Mougeotia	Chlorophyta	o	5
Stigeoclonium	Chlorophyta	o	6
Closterium	Chlorophyta	o	7
Cosmarium	Chlorophyta	o	8
Heteroleibleinia	Cyanophyta	c	9
Ulothrix	Chlorophyta	r	10
Homoeothrix	Cyanophyta	o	11
Chamaesiphon	Cyanophyta	c	12
Pediastrum	Chlorophyta	r	13
Dactylococcopsis	Cyanophyta	o	14
Oscillatoria	Cyanophyta	r	15
Gloeocystis	Chlorophyta	r	16
Coelastrum	Chlorophyta	r	17

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

Site ID: FC-CFR
Site Description: Flint Creek near mouth
Date Sampled: 9/11/2012
Taken by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 12/19/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
Nostoc	Cyanophyta	d	1
Cladophora	Chlorophyta	a	2
diatoms	Bacillariophyta	d	3
Oedogonium	Chlorophyta	f	4
Scenedesmus	Chlorophyta	f	5
Chamaesiphon	Cyanophyta	a	6
Pediastrum	Chlorophyta	c	7
Cosmarium	Chlorophyta	c	8
Stigeoclonium	Chlorophyta	c	9
Audouinella	Rhodophyta	c	10
Ulothrix	Chlorophyta	o	11
Closterium	Chlorophyta	o	12
Chaetophora	Chlorophyta	o	13
Heteroleibleinia	Cyanophyta	c	14
Homoeothrix	Cyanophyta	o	15
Microchaete	Cyanophyta	o	16
Staurastrum	Chlorophyta	o	17
Ankistrodesmus	Chlorophyta	o	18
Phormidium	Cyanophyta	r	19
Merismopedia	Cyanophyta	r	20

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

Site ID: CFR-84F
Site Description: Clark Fork near Drummond
Date Sampled: 9/11/2012
Taken by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 12/19/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
diatoms	Bacillariophyta	d	1
Cladophora	Chlorophyta	d	2
Nostoc	Cyanophyta	a	3
Stigeoclonium	Chlorophyta	f	4
Tribonema	Xanthophyta	c	5
Scenedesmus	Chlorophyta	c	6
Chamaesiphon	Cyanophyta	f	7
Oedogonium	Chlorophyta	o	8
Audouinella	Rhodophyta	o	9
Pediastrum	Chlorophyta	o	10
Klebsormidium	Chlorophyta	r	11
Homoeothrix	Cyanophyta	r	12
Microchaete	Cyanophyta	r	13

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

Site ID: RC-CFR
Site Description: Rock Creek near mouth
Date Sampled: 9/11/2012
Taken by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 12/20/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
diatoms	Bacillariophyta	d	1
Nostoc	Cyanophyta	d	2
Ulothrix	Chlorophyta	f	3
Ankistrodesmus	Chlorophyta	a	4
Scenedesmus	Chlorophyta	f	5
Audouinella	Rhodophyta	o	6
Spirogyra	Chlorophyta	o	7
Dactylococcopsis	Cyanophyta	c	8
Closterium	Chlorophyta	o	9
Pediastrum	Chlorophyta	o	10
Coelastrum	Chlorophyta	r	11
Phormidium	Cyanophyta	o	12
Gloeocystis	Chlorophyta	r	13
Cosmarium	Chlorophyta	r	14

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

Site ID: CFR-116A
Site Description: Clark Fork near Turah
Date Sampled: 9/11/2012
Taken by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 12/20/2012
Remarks: scan of non-diatom algae at 100X-400X

Taxon	Algal Division	ERA[1]	EBR[2]
diatoms	Bacillariophyta	d	1
Cladophora	Chlorophyta	d	2
Ulothrix	Chlorophyta	f	3
Scenedesmus	Chlorophyta	a	4
Heteroleibleinia	Cyanophyta	a	5
Phormidium	Cyanophyta	f	6
Stigeoclonium	Chlorophyta	c	7
Leptolyngbya	Cyanophyta	f	8
Chamaesiphon	Cyanophyta	a	9
Ankistrodesmus	Chlorophyta	c	10
Dactylococcopsis	Cyanophyta	c	11
Audouinella	Rhodophyta	o	12
Closterium	Chlorophyta	o	13
Nostoc	Cyanophyta	o	14
Pediastrum	Chlorophyta	o	15
Cosmarium	Chlorophyta	o	16
Heribaudiella	Phaeophyta	o	17
Coelastrum	Chlorophyta	o	18
Homoeothrix	Cyanophyta	r	19
Microchaete	Cyanophyta	r	20

[1]Estimated Relative Abundance: d=dominant; a=abundant; f=frequent; c=common; o=occasional; r=rare

[2]Estimated Biovolume Rank

APPENDIX H2

PERIPHYTON DATA:
DIATOM ALGAE

Site ID: MCWC-MWB
Site Description: Mill and Willow Creeks at Frontage Road
Date Sampled: 9/13/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 1/15/2013
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Achnanthidium minutissimum	69	8.63	0.00
Amphipleura pellucida	2	0.25	0.00
Amphora pediculus	6	0.75	0.00
Cocconeis placentula	95	11.88	0.00
Cymbella excisa	71	8.88	0.00
Cymbella janischii	4	0.50	0.00
Diatoma mesodon	2	0.25	0.00
Diatoma moniliformis	2	0.25	0.00
Encyonema minutum	3	0.38	0.00
Encyonema procerum	4	0.50	0.00
Encyonema prostratum	1	0.13	0.00
Eolimna minima	6	0.75	0.00
Epithemia sorex	97	12.13	0.00
Fragilaria capucina	12	1.50	0.00
Fragilaria vaucheriae	9	1.13	0.00
Geissleria acceptata	11	1.38	0.00
Gomphoneis eriense	5	0.63	0.00
Gomphonema parvulum	4	0.50	0.00
Gomphonema pumilum	8	1.00	0.00
Hippodonta capitata	5	0.63	0.00
Mayamaea agrestis	2	0.25	0.00
Melosira varians	38	4.75	0.00
Meridion circulare	2	0.25	0.00
Navicula antonii	6	0.75	0.00
Navicula cryptocephala	8	1.00	0.00
Navicula cryptotenella	45	5.63	0.00
Navicula gregaria	7	0.88	0.00
Navicula lanceolata	2	0.25	0.00
Navicula microcari	2	0.25	0.00
Navicula notha	2	0.25	0.00
Navicula protracta	4	0.50	0.00
Navicula reichardtiana	22	2.75	0.00
Navicula tripunctata	2	0.25	0.00
Nitzschia dissipata	72	9.00	0.00
Nitzschia fonticola	5	0.63	0.00
Nitzschia heufleriana	2	0.25	0.00
Nitzschia inconspicua	2	0.25	0.00
Nitzschia linearis	5	0.63	0.00
Nitzschia palea	8	1.00	0.00
Nitzschia paleacea	15	1.88	0.00
Placoneis elginensis	1	0.13	0.00
Planothidium dubium	2	0.25	0.00
Planothidium frequentissimum	24	3.00	0.00
Planothidium lanceolatum	10	1.25	0.00
Pseudostaurosira parasitica	2	0.25	0.00
Pseudostaurosira brevistriata	16	2.00	0.00
Reimeria sinuata	14	1.75	0.00
Rhoicosphenia abbreviata	3	0.38	0.00
Sellaphora pupula	2	0.25	0.00
Staurosira construens var. venter	30	3.75	0.00
Staurosirella leptostauron	6	0.75	0.00
Staurosirella pinnata	11	1.38	0.00
Stephanocyclus meneghiniana	4	0.50	0.00
Surirella minuta	8	1.00	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	54	Excellent
Shannon Diversity (H'):	3.20	Excellent
Dominant Taxon Percent:	12.13	Excellent
Disturbance Taxa Percent:	8.63	Excellent
Pollution Index:	2.64	Excellent
Siltation Index:	30.50	Good
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Good**	

Montana Mountain Streams (after Teply & Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	31.25	
Metals Impairment:		**57%**
Nutrients Increaser Taxa Percent:	29.88	
Nutrients Impairment:		**58%**

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	22.63	
Sediment Impairment:		**72%**

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	0.88
Cosmopolitan Taxa Percent:	93.13
Rhopalodiales Percent:	12.13
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	4.00
Tolerant/Indifferent Taxa %:	89.25
Nitrogen Metabolism/Organic N Tolerence[1]	
N-Autotroph/Low Organic N Taxa %:	24.63
N-Autotroph/High Organic N Taxa %:	49.13
N-Heterotroph/High Organic N Taxa %:	9.63
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	74.00

[1]after Van Dam et.al 1994.

Site ID: MWB-SBC
Site Description: Mill-Willow Bypass near mouth
Date Sampled: 9/13/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 1/15/2013
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Achnanthidium minutissimum	32	4.00	0.00
Amphora pediculus	7	0.88	0.00
Cocconeis pediculus	16	2.00	0.00
Cocconeis placentula	43	5.38	0.00
Cymbella excisa	93	11.63	0.00
Cymbella lange-bertalotii	5	0.63	0.00
Diatoma vulgaris	5	0.63	0.00
Encyonema minutum	4	0.50	0.00
Encyonema silesiaum	3	0.38	0.00
Eolimna minima	4	0.50	0.00
Epithemia sorex	94	11.75	0.00
Fragilaria capucina	38	4.75	0.00
Geissleria decussis	4	0.50	0.00
Gomphoneis eriense	2	0.25	0.00
Gomphonema minutum	14	1.75	0.00
Gomphonema parvulum	4	0.50	0.00
Gomphonema pumilum	10	1.25	0.00
Gomphonema rhombicum	2	0.25	0.00
Gomphonema truncatum	13	1.63	0.00
Melosira varians	56	7.00	0.00
Navicula antonii	1	0.13	0.00
Navicula capitatoradiata	3	0.38	0.00
Navicula cryptotenella	28	3.50	0.00
Navicula protracta	1	0.13	0.00
Navicula reichardtiana	28	3.50	0.00
Navicula tripunctata	9	1.13	0.00
Nitzschia amphibia	4	0.50	0.00
Nitzschia dissipata	9	1.13	0.00
Nitzschia fonticola	162	20.25	0.00
Nitzschia graciliformis	2	0.25	0.00
Nitzschia heufleriana	1	0.13	0.00
Nitzschia linearis	11	1.38	0.00
Nitzschia palea	13	1.63	0.00
Nitzschia paleacea	4	0.50	0.00
Nitzschia supralitorea	2	0.25	0.00
Placoneis elginensis	2	0.25	0.00
Planothidium frequentissimum	14	1.75	0.00
Planothidium lanceolatum	1	0.13	0.00
Reimeria sinuata	1	0.13	0.00
Rhoicosphenia abbreviata	3	0.38	0.00
Staurosira construens var. venter	7	0.88	0.00
Staurosirella leptostauron	5	0.63	0.00
Staurosirella pinnata	6	0.75	0.00
Stephanocyclus meneghiniana	20	2.50	0.00
Synedra acus	1	0.13	0.00
Synedra ulna	12	1.50	0.00
Tryblionella hungarica	1	0.13	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	47	Excellent
Shannon Diversity (H'):	2.97	Good
Dominant Taxon Percent:	20.25	Excellent
Disturbance Taxa Percent:	4.00	Excellent
Pollution Index:	2.66	Excellent
Siltation Index:	36.13	Good
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Good**	

Montana Mountain Streams (after Teply & Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	50.63	
Metals Impairment:		94%
Nutrients Increaser Taxa Percent:	20.75	
Nutrients Impairment:		34%

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	11.63	
Sediment Impairment:		38%

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	0.50
Cosmopolitan Taxa Percent:	94.75
Rhopalodiales Percent:	11.75
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	5.50
Tolerant/Indifferent Taxa %:	90.38
Nitrogen Metabolism/Organic N Tolerence[1]	
N-Autotroph/Low Organic N Taxa %:	26.75
N-Autotroph/High Organic N Taxa %:	44.13
N-Heterotroph/High Organic N Taxa %:	13.38
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	76.50

[1]after Van Dam et.al 1994.

Site ID: WSC-SBC
Site Description: Warm Springs Creek near mouth
Date Sampled: 9/13/2012
Sampled by: E.Weber
Analyzed by: E. Weber
Date Analyzed: 1/16/2013
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Achnanthidium minutissimum	167	20.88	0.00
Achnanthidium pyrenaicum	36	4.50	0.00
Amphora pediculus	2	0.25	0.00
Cocconeis pediculus	5	0.63	0.00
Cocconeis placentula	17	2.13	0.00
Cyclotella striata	2	0.25	0.00
Cymbella excisa	53	6.63	0.00
Cymbella subturgidula	4	0.50	0.00
Diatoma moniliformis	45	5.63	0.00
Diatoma vulgaris	5	0.63	0.00
Encyonema minutum	23	2.88	0.00
Encyonema reichardtii	2	0.25	0.00
Encyonema silesiacum	27	3.38	0.00
Fragilaria capucina	2	0.25	0.00
Gomphoneis minuta	2	0.25	0.00
Gomphonema citera	2	0.25	0.00
Gomphonema pumilum	2	0.25	0.00
Melosira varians	5	0.63	0.00
Navicula capitatoradiata	15	1.88	0.00
Navicula cryptotcephala	4	0.50	0.00
Navicula cryptotenella	17	2.13	0.00
Navicula eidrigiana	2	0.25	0.00
Navicula gregaria	2	0.25	0.00
Navicula reichardtiana	17	2.13	0.00
Navicula tripunctata	18	2.25	0.00
Nitzschia agnita	9	1.13	0.00
Nitzschia dissipata	36	4.50	0.00
Nitzschia fonticola	208	26.00	0.00
Nitzschia graciliformis	2	0.25	0.00
Nitzschia linearis	2	0.25	0.00
Nitzschia pura	11	1.38	0.00
Nitzschia pusilla	4	0.50	0.00
Nitzschia sociabilis	1	0.13	0.00
Nitzschia sublinearis	8	1.00	0.00
Reimeria sinuata	13	1.63	0.00
Staurosira construens var. venter	18	2.25	0.00
Staurosirella leptostauron	6	0.75	0.00
Staurosirella pinnata	6	0.75	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	38	Excellent
Shannon Diversity (H'):	2.65	Good
Dominant Taxon Percent:	26.00	Good
Disturbance Taxa Percent:	20.88	Excellent
Pollution Index:	2.77	Excellent
Siltation Index:	44.5	Fair
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Fair**	

Montana Mountain Streams (after Teply & Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	40.25	
Metals Impairment:		79%
Nutrients Increaser Taxa Percent:	8.63	
Nutrients Impairment:		12%

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	7.63	
Sediment Impairment:		28%

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	5.25
Cosmopolitan Taxa Percent:	90.00
Rhopalodiales Percent:	0.00
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	6.38
Tolerant/Indifferent Taxa %:	86.25
Nitrogen Metabolism/Organic N Tolerance[1]	
N-Autotroph/Low Organic N Taxa %:	7.38
N-Autotroph/High Organic N Taxa %:	77.25
N-Heterotroph/High Organic N Taxa %:	0.63
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	74.13

[1]after Van Dam et.al 1994.

Site ID: SS-25
Site Description: Silver Bow Creek at Warm Springs
Date Sampled: 9/13/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 1/15/2013
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Achnanthidium exiguum	2	0.25	0.00
Achnanthidium minutissimum	8	1.00	0.00
Amphora pediculus	1	0.13	0.00
Amphora veneta	18	2.25	0.00
Cocconeis pediculus	46	5.75	0.00
Cocconeis placentula	44	5.50	0.00
Cymbella excisa	2	0.25	0.00
Diatoma vulgaris	2	0.25	0.00
Encyonema silesiacum	2	0.25	0.00
Epithemia sorex	40	5.00	0.00
Fragilaria capucina	53	6.63	0.00
Gomphoneis minuta	8	1.00	0.00
Gomphonema minutum	1	0.13	0.00
Gomphonema parvulum	2	0.25	0.00
Gomphonema pumilum	3	0.38	0.00
Gomphonema subclavatum	8	1.00	0.00
Gomphonema truncatum	4	0.50	0.00
Melosira varians	53	6.63	0.00
Navicula capitatoradiata	1	0.13	0.00
Navicula cryptotenella	17	2.13	0.00
Navicula reichardtiana	5	0.63	0.00
Navicula tripunctata	3	0.38	0.00
Nitzschia amphibia	11	1.38	0.00
Nitzschia dissipata	2	0.25	0.00
Nitzschia fonticola	213	26.63	0.00
Nitzschia inconspicua	2	0.25	0.00
Nitzschia linearis	1	0.13	0.00
Nitzschia palea	15	1.88	0.00
Nitzschia paleacea	68	8.50	0.00
Planothidium frequentissimum	1	0.13	0.00
Psammothidium marginulatum	2	0.25	0.00
Pseudostaurosira brevistriata	10	1.25	0.00
Reimeria sinuata	2	0.25	0.00
Rhoicosphenia abbreviata	13	1.63	0.00
Sellaphora pupula	2	0.25	0.00
Staurosira construens var. venter	10	1.25	0.00
Staurosirella leptostauron	4	0.50	0.00
Stephanocyclus meneghiniana	9	1.13	0.00
Synedra acus	63	7.88	0.00
Synedra ulna	49	6.13	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	40	Excellent
Shannon Diversity (H'):	2.75	Good
Dominant Taxon Percent:	26.63	Good
Disturbance Taxa Percent:	1.00	Excellent
Pollution Index:	2.48	Good
Siltation Index:	42.50	Fair
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Fair**	

Montana Mountain Streams (after Teply & Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	51.25	
Metals Impairment:		95%
Nutrients Increaser Taxa Percent:	28.88	
Nutrients Impairment:		56%

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	12.75	
Sediment Impairment:		42%

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	1.00
Cosmopolitan Taxa Percent:	87.63
Rhopalodiales Percent:	5.00
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	8.13
Tolerant/Indifferent Taxa %:	90.25
Nitrogen Metabolism/Organic N Tolerance[1]	
N-Autotroph/Low Organic N Taxa %:	8.75
N-Autotroph/High Organic N Taxa %:	60.38
N-Heterotroph/High Organic N Taxa %:	20.00
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	61.00

[1]after Van Dam et.al 1994.

Site ID: CFR-03A
Site Description: Clark Fork near Galen
Date Sampled: 9/12/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 1/17/2012
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Achnanthidium minutissimum	20	2.50	0.00
Amphora pediculus	12	1.50	0.00
Cocconeis pediculus	17	2.13	0.00
Cocconeis placentula	41	5.13	0.00
Cymbella excisa	122	15.25	0.00
Diatoma moniliformis	128	16.00	0.00
Diatoma vulgaris	3	0.38	0.00
Encyonema minutum	7	0.88	0.00
Encyonema reichardtii	6	0.75	0.00
Encyonema silesiacum	5	0.63	0.00
Eolimna minima	4	0.50	0.00
Epithemia sorex	45	5.63	0.00
Geissleria decussis	3	0.38	0.00
Gomphonema minutum	3	0.38	0.00
Gomphonema parvulum	31	3.88	0.00
Gomphonema pumilum	12	1.50	0.00
Gomphonema truncatum	5	0.63	0.00
Melosira varians	5	0.63	0.00
Navicula antonii	7	0.88	0.00
Navicula capitatoradiata	6	0.75	0.00
Navicula cryptocephala	2	0.25	0.00
Navicula cryptotenella	26	3.25	0.00
Navicula reichardtiana	9	1.13	0.00
Navicula tripunctata	22	2.75	0.00
Nitzschia agnita	1	0.13	0.00
Nitzschia amphibia	13	1.63	0.00
Nitzschia archibaldii	2	0.25	0.00
Nitzschia dissipata	22	2.75	0.00
Nitzschia fonticola	108	13.50	0.00
Nitzschia heufleriana	2	0.25	0.00
Nitzschia inconspicua	5	0.63	0.00
Nitzschia linearis	1	0.13	0.00
Nitzschia palea	2	0.25	0.00
Nitzschia paleacea	41	5.13	0.00
Nitzschia sociabilis	2	0.25	0.00
Nitzschia sublinearis	3	0.38	0.00
Planothidium dubium	2	0.25	0.00
Planothidium frequentissimum	4	0.50	0.00
Pseudostaurosira brevistrata	20	2.50	0.00
Reimeria sinuata	4	0.50	0.00
Rhoicosphenia abbreviata	1	0.13	0.00
Staurosira construens var. venter	2	0.25	0.00
Staurosirella leptostauron	3	0.38	0.00
Staurosirella pinnata	2	0.25	0.00
Stephanocyclus meneghiniana	16	2.00	0.00
Surirella minuta	1	0.13	0.00
Synedra acus	1	0.13	0.00
Synedra ulna	1	0.13	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	48	Excellent
Shannon Diversity (H'):	2.98	Good
Dominant Taxon Percent:	16.00	Excellent
Disturbance Taxa Percent:	2.50	Excellent
Pollution Index:	2.55	Excellent
Siltation Index:	34.88	Good
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Good**	

Montana Mountain Streams (after Teply & Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	43.00	
Metals Impairment:		83%
Nutrients Increaser Taxa Percent:	40.50	
Nutrients Impairment:		81%

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	11.88	
Sediment Impairment:		39%

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	0.00
Cosmopolitan Taxa Percent:	94.38
Rhopalodiales Percent:	5.63
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	0.50
Tolerant/Indifferent Taxa %:	96.63
Nitrogen Metabolism/Organic N Tolerance[1]	
N-Autotroph/Low Organic N Taxa %:	24.75
N-Autotroph/High Organic N Taxa %:	51.63
N-Heterotroph/High Organic N Taxa %:	14.63
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	61.88

[1]after Van Dam et.al 1994.

Site ID: LC-7
Site Description: Lost Creek near mouth
Date Sampled: 9/12/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 1/18/2013
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Achnanthidium deflexum	2	0.25	0.00
Achnanthidium minutissimum	211	26.38	0.00
Achnanthidium pyrenaicum	2	0.25	0.00
Amphipleura pellucida	1	0.13	0.00
Amphora pediculus	55	6.88	0.00
Cocconeis pediculus	1	0.13	0.00
Cocconeis placentula	14	1.75	0.00
Cyclotella striata	1	0.13	0.00
Cymbella cymbiformis	2	0.25	0.00
Cymbella excisa	5	0.63	0.00
Diatoma moniliformis	6	0.75	0.00
Diatoma tenuis	4	0.50	0.00
Encyonema silesiacum	2	0.25	0.00
Encyonopsis microcephala	105	13.13	0.00
Eolimna minima	6	0.75	0.00
Eucocconeis laevis	2	0.25	0.00
Fragilaria sepes	2	0.25	0.00
Fragilaria vaucheriae	1	0.13	0.00
Geissleria acceptata	1	0.13	0.00
Gomphonema minutum	6	0.75	0.00
Gomphonema olivaceum	6	0.75	0.00
Gomphonema pumilum	4	0.50	0.00
Gomphonema truncatum	2	0.25	0.00
Navicula cryptotenella	27	3.38	0.00
Navicula gregaria	2	0.25	0.00
Navicula libonensis	2	0.25	0.00
Navicula reichardtiana	11	1.38	0.00
Navicula tripunctata	3	0.38	0.00
Navicula veneta	5	0.63	0.00
Nitzschia archibaldii	4	0.50	0.00
Nitzschia capitellata	3	0.38	0.00
Nitzschia communis	1	0.13	0.00
Nitzschia denticula	1	0.13	0.00
Nitzschia dissipata	37	4.63	0.00
Nitzschia graciliformis	10	1.25	0.00
Nitzschia hantzschiana	16	2.00	0.00
Nitzschia inconspicua	2	0.25	0.00
Nitzschia palea	17	2.13	0.00
Nitzschia perminuta	4	0.50	0.00
Nitzschia pusilla	1	0.13	0.00
Nitzschia sociabilis	15	1.88	0.00
Nitzschia vermicularis	1	0.13	0.00
Planothidium frequentissimum	5	0.63	0.00
Psammothidium lauenbergianum	2	0.25	0.00
Pseudostaurosira parasitica	1	0.13	0.00
Pseudostaurosira brevistriata	29	3.63	0.00
Reimeria sinuata	3	0.38	0.00
Rhoicosphenia abbreviata	26	3.25	0.00
Rhopalodia gibba	1	0.13	0.00
Sellaphora stroemii	10	1.25	0.00
Staurosira construens var. venter	19	2.38	0.00
Staurosirella leptostauron	13	1.63	0.00
Staurosirella pinnata	11	1.38	0.00
Stephanocyclus meneghiniana	4	0.50	0.00
Synedra acus	9	1.13	0.00
Synedra ulna	62	7.75	0.00
Tryblionella hungarica	2	0.25	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	57	Excellent
Shannon Diversity (H'):	2.94	Good
Dominant Taxon Percent:	26.38	Good
Disturbance Taxa Percent:	26.38	Good
Pollution Index:	2.54	Excellent
Siltation Index:	22.63	Good
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Good**	

Montana Mountain Streams (after Teply and Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	15.88	
Metals Impairment:		20%
Nutrients Increaser Taxa Percent:	11.50	
Nutrients Impairment:		16%

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	7.25	
Sediment Impairment:		27%

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	0.25
Cosmopolitan Taxa Percent:	70.75
Rhopalodiales Percent:	0.13
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	11.50
Tolerant/Indifferent Taxa %:	85.38
Nitrogen Metabolism/Organic N Tolerence[1]	
N-Autotroph/Low Organic N Taxa %:	22.88
N-Autotroph/High Organic N Taxa %:	56.25
N-Heterotroph/High Organic N Taxa %:	3.75
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	79.25

[1]after Van Dam et.al 1994.

Site ID: RTC-1
Site Description: Racetrack Creek near mouth
Date Sampled: 9/12/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 1/17/2013
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Achnanthidium deflexum	2	0.25	0.00
Achnanthidium minutissimum	455	56.88	0.00
Achnanthidium pyrenaicum	36	4.50	0.00
Amphora pediculus	22	2.75	0.00
Cocconeis pediculus	3	0.38	0.00
Cocconeis placentula	17	2.13	0.00
Cymbella excisa	7	0.88	0.00
Diatoma moniliformis	6	0.75	0.00
Encyonema minutum	41	5.13	0.00
Encyonema reichardtii	30	3.75	0.00
Encyonema silesiacum	31	3.88	0.00
Eolimna minima	2	0.25	0.00
Fragilaria vaucheriae	1	0.13	0.00
Geissleria decussis	2	0.25	0.00
Gomphoneis eriense	1	0.13	0.00
Gomphonema minutum	1	0.13	0.00
Gomphonema parvulum	8	1.00	0.00
Gomphonema pumilum	4	0.50	0.00
Gomphonema truncatum	1	0.13	0.00
Navicula cryptotenella	5	0.63	0.00
Navicula gregaria	2	0.25	0.00
Navicula reichardtiana	22	2.75	0.00
Navicula tripunctata	6	0.75	0.00
Nitzschia dissipata	11	1.38	0.00
Nitzschia fonticola	16	2.00	0.00
Nitzschia hantzschiana	5	0.63	0.00
Nitzschia inconspicua	3	0.38	0.00
Nitzschia linearis	1	0.13	0.00
Nitzschia palea	9	1.13	0.00
Planothidium dubium	2	0.25	0.00
Planothidium frequentissimum	16	2.00	0.00
Planothidium lanceolatum	5	0.63	0.00
Reimeria sinuata	16	2.00	0.00
Rhoicosphenia abbreviata	1	0.13	0.00
Sellaphora laevissima	2	0.25	0.00
Staurosira construens	2	0.25	0.00
Staurosirella leptostauron	3	0.38	0.00
Stephanocyclus meneghiniana	1	0.13	0.00
Synedra ulna	2	0.25	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	39	Excellent
Shannon Diversity (H'):	2.01	Good
Dominant Taxon Percent:	56.88	Fair
Disturbance Taxa Percent:	56.88	Fair
Pollution Index:	2.82	Excellent
Siltation Index:	10.75	Excellent
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Fair**	

Montana Mountain Streams (after Teply & Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	10.13	
Metals Impairment:		11%
Nutrients Increaser Taxa Percent:	5.13	
Nutrients Impairment:		8%

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	8.75	
Sediment Impairment:		30%

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	4.63
Cosmopolitan Taxa Percent:	89.88
Rhopalodiales Percent:	0.00
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	7.63
Tolerant/Indifferent Taxa %:	85.50
Nitrogen Metabolism/Organic N Tolerence[1]	
N-Autotroph/Low Organic N Taxa %:	2.75
N-Autotroph/High Organic N Taxa %:	81.50
N-Heterotroph/High Organic N Taxa %:	2.88
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	72.00

[1]after Van Dam et.al 1994.

Site ID: CFR-27H
Site Description: Clark Fork at Deer Lodge
Date Sampled: 9/12/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 1/18/2013
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Achnanthidium minutissimum	186	23.25	0.00
Amphora copulata	1	0.13	0.00
Amphora pediculus	29	3.63	0.00
Caloneis tenuis	1	0.13	0.00
Cocconeis pediculus	7	0.88	0.00
Cocconeis placentula	16	2.00	0.00
Cymbella excisa	17	2.13	0.00
Cymbella lange-bertalotii	4	0.50	0.00
Diatoma moniliformis	81	10.13	0.00
Diatoma vulgaris	5	0.63	0.00
Encyonema minutum	27	3.38	0.00
Encyonema silesiacum	18	2.25	0.00
Eolimna minima	6	0.75	0.00
Fragilaria capucina	8	1.00	0.00
Fragilaria vaucheriae	2	0.25	0.00
Geissleria decussis	4	0.50	0.00
Gomphonema olivaceum	1	0.13	0.00
Gomphonema parvulum	9	1.13	0.00
Gomphonema pumilum	2	0.25	0.00
Gomphonema truncatum	2	0.25	0.00
Meridion circulare	2	0.25	0.00
Navicula antonii	7	0.88	0.00
Navicula capitatoradiata	1	0.13	0.00
Navicula cryptotenella	23	2.88	0.00
Navicula reichardtiana	15	1.88	0.00
Navicula tripunctata	9	1.13	0.00
Neidium binodeformis	1	0.13	0.00
Neidium dubium	4	0.50	0.00
Nitzschia dissipata	20	2.50	0.00
Nitzschia fonticola	31	3.88	0.00
Nitzschia heufleriana	7	0.88	0.00
Nitzschia inconspicua	8	1.00	0.00
Nitzschia linearis	4	0.50	0.00
Nitzschia palea	27	3.38	0.00
Planothidium frequentissimum	1	0.13	0.00
Psammothidium marginulatum	2	0.25	0.00
Pseudostaurosira parasitica	3	0.38	0.00
Pseudostaurosira brevistrata	57	7.13	0.00
Reimeria sinuata	6	0.75	0.00
Rhoicosphenia abbreviata	16	2.00	0.00
Sellaphora pupula	5	0.63	0.00
Staurosira construens var. venter	16	2.00	0.00
Staurosirella leptostauron	4	0.50	0.00
Staurosirella pinnata	6	0.75	0.00
Stephanocyclus meneghiniana	40	5.00	0.00
Surirella minuta	3	0.38	0.00
Synedra acus	2	0.25	0.00
Synedra rumpens	2	0.25	0.00
Synedra ulna	35	4.38	0.00
Synedra ulna var. spathulifera	17	2.13	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	50	Excellent
Shannon Diversity (H'):	3.09	Excellent
Dominant Taxon Percent:	23.25	Excellent
Disturbance Taxa Percent:	23.25	Excellent
Pollution Index:	2.54	Excellent
Siltation Index:	21.25	Good
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Good**	

Montana Mountain Streams (after Teply and Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	24.25	
Metals Impairment:		40%
Nutrients Increaser Taxa Percent:	23.25	
Nutrients Impairment:		42%

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	7.00	
Sediment Impairment:		26%

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	0.00
Cosmopolitan Taxa Percent:	95.38
Rhopalodiales Percent:	0.00
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	2.88
Tolerant/Indifferent Taxa %:	92.13
Nitrogen Metabolism/Organic N Tolerence[1]	
N-Autotroph/Low Organic N Taxa %:	12.25
N-Autotroph/High Organic N Taxa %:	65.88
N-Heterotroph/High Organic N Taxa %:	11.25
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	62.25

[1]after Van Dam et.al 1994.

Site ID: CFR-42G
Site Description: Clark Fork above Little Blackfoot River
Date Sampled: 9/12/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 1/19/2013
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Achnanthidium minutissimum	2	0.25	0.00
Amphora pediculus	19	2.38	0.00
Caloneis bacillum	2	0.25	0.00
Cocconeis pediculus	12	1.50	0.00
Cocconeis placentula	2	0.25	0.00
Cymbella excisa	1	0.13	0.00
Diatoma moniliformis	234	29.25	0.00
Diatoma vulgaris	3	0.38	0.00
Encyonema minutum	2	0.25	0.00
Encyonema silesiacum	1	0.13	0.00
Eolimna minima	6	0.75	0.00
Epithemia adnata	4	0.50	0.00
Epithemia sorex	230	28.75	0.00
Gomphoneis eriense	6	0.75	0.00
Gomphonema minutum	1	0.13	0.00
Gomphonema olivaceum	15	1.88	0.00
Gomphonema parvulum	5	0.63	0.00
Gomphonema truncatum	1	0.13	0.00
Mayamaea agrestis	4	0.50	0.00
Navicula antonii	4	0.50	0.00
Navicula cryptotenella	41	5.13	0.00
Navicula lanceolata	2	0.25	0.00
Navicula reichardtiana	21	2.63	0.00
Navicula tripunctata	2	0.25	0.00
Navicula veneta	2	0.25	0.00
Nitzschia archibaldii	2	0.25	0.00
Nitzschia dissipata	23	2.88	0.00
Nitzschia fonticola	10	1.25	0.00
Nitzschia graciliformis	2	0.25	0.00
Nitzschia hantzschiana	6	0.75	0.00
Nitzschia heufleriana	3	0.38	0.00
Nitzschia inconspicua	6	0.75	0.00
Nitzschia linearis	4	0.50	0.00
Nitzschia palea	18	2.25	0.00
Nitzschia paleacea	6	0.75	0.00
Nitzschia pura	2	0.25	0.00
Nitzschia pusilla	2	0.25	0.00
Nitzschia recta	2	0.25	0.00
Planothidium frequentissimum	2	0.25	0.00
Planothidium lanceolatum	1	0.13	0.00
Pseudostaurosira parasitica	2	0.25	0.00
Pseudostaurosira brevistriata	6	0.75	0.00
Reimeria sinuata	5	0.63	0.00
Rhoicosphenia abbreviata	19	2.38	0.00
Sellaphora pupula	1	0.13	0.00
Staurosira construens var. venter	8	1.00	0.00
Staurosirella pinnata	9	1.13	0.00
Stephanocyclus meneghiniana	19	2.38	0.00
Synedra acus	3	0.38	0.00
Synedra ulna	17	2.13	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	50	Excellent
Shannon Diversity (H'):	2.50	Good
Dominant Taxon Percent:	29.25	Good
Disturbance Taxa Percent:	0.25	Excellent
Pollution Index:	2.44	Good
Siltation Index:	21.13	Good
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Good**	

Montana Mountain Streams (after Teply and Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	39.63	
Metals Impairment:		78%
Nutrients Increaser Taxa Percent:	65.75	
Nutrients Impairment:		>99%

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	4.38	
Sediment Impairment:		19%

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	0.75
Cosmopolitan Taxa Percent:	96.50
Rhopalodiales Percent:	29.25
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	1.38
Tolerant/Indifferent Taxa %:	94.13
Nitrogen Metabolism/Organic N Tolerence[1]	
N-Autotroph/Low Organic N Taxa %:	31.50
N-Autotroph/High Organic N Taxa %:	50.50
N-Heterotroph/High Organic N Taxa %:	7.50
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	55.50

[1]after Van Dam et.al 1994.

Site ID: LBR-CFR
Site Description: Little Blackfoot River near Garrison
Date Sampled: 9/12/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 1/21/2013
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Achnanthidium minutissimum	17	2.13	0.00
Adlafia minuscula	8	1.00	0.00
Amphipleura pellucida	2	0.25	0.00
Amphora libyca	3	0.38	0.00
Caloneis bacillum	2	0.25	0.00
Cocconeis pediculus	54	6.75	0.00
Cocconeis placentula	52	6.50	0.00
Cymatopleura solea	1	0.13	0.00
Cymbella excisa	2	0.25	0.00
Diatoma moniliformis	44	5.50	0.00
Encyonema minutum	9	1.13	0.00
Encyonema silesiacum	2	0.25	0.00
Epithemia sorex	116	14.50	0.00
Gomphoneis eriense	12	1.50	0.00
Gomphonema drutelingense	2	0.25	0.00
Gomphonema micropus	2	0.25	0.00
Gomphonema minutum	31	3.88	0.00
Gomphonema olivaceum	1	0.13	0.00
Gomphonema parvulum	6	0.75	0.00
Gomphonema pumilum	7	0.88	0.00
Mayamaea atomus	6	0.75	0.00
Melosira varians	13	1.63	0.00
Navicula antonii	4	0.50	0.00
Navicula capitatoradiata	25	3.13	0.00
Navicula cryptocephala	2	0.25	0.00
Navicula cryptotenella	15	1.88	0.00
Navicula lanceolata	1	0.13	0.00
Navicula reichardtiana	28	3.50	0.00
Navicula tripunctata	21	2.63	0.00
Nitzschia amphibia	3	0.38	0.00
Nitzschia archibaldii	10	1.25	0.00
Nitzschia dissipata	19	2.38	0.00
Nitzschia fonticola	99	12.38	0.00
Nitzschia hantzschiana	6	0.75	0.00
Nitzschia inconspicua	12	1.50	0.00
Nitzschia palea	42	5.25	0.00
Nitzschia paleacea	9	1.13	0.00
Nitzschia perminuta	4	0.50	0.00
Nitzschia recta	2	0.25	0.00
Nitzschia supralitorea	4	0.50	0.00
Planothidium frequentissimum	4	0.50	0.00
Planothidium lanceolatum	6	0.75	0.00
Pseudostaurosira brevistrata	4	0.50	0.00
Reimeria sinuata	1	0.13	0.00
Rhoicosphenia abbreviata	2	0.25	0.00
Sellaphora pupula	2	0.25	0.00
Staurosira construens var. venter	16	2.00	0.00
Stephanocyclus meneghiniana	9	1.13	0.00
Surirella minuta	2	0.25	0.00
Synedra acus	1	0.13	0.00
Synedra rumpens	16	2.00	0.00
Synedra ulna	39	4.88	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	52	Excellent
Shannon Diversity (H'):	3.22	Excellent
Dominant Taxon Percent:	14.50	Excellent
Disturbance Taxa Percent:	2.13	Excellent
Pollution Index:	2.51	Excellent
Siltation Index:	40.50	Fair
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Fair**	

Montana Mountain Streams (after Teply and Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	41.75	
Metals Impairment:		82%
Nutrients Increaser Taxa Percent:	38.25	
Nutrients Impairment:		77%

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	18.13	
Sediment Impairment:		59%

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	1.88
Cosmopolitan Taxa Percent:	90.50
Rhopalodiales Percent:	14.50
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	5.00
Tolerant/Indifferent Taxa %:	89.75
Nitrogen Metabolism/Organic N Tolerence[1]	
N-Autotroph/Low Organic N Taxa %:	16.50
N-Autotroph/High Organic N Taxa %:	54.50
N-Heterotroph/High Organic N Taxa %:	13.00
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	61.13

[1]after Van Dam et.al 1994.

Site ID: CFR-53C
Site Description: Clark Fork at Gold Creek
Date Sampled: 9/11/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 1/21/2013
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Amphora ovalis	1	0.13	0.00
Amphora pediculus	12	1.50	0.00
Caloneis schumanniana	2	0.25	0.00
Cocconeis pediculus	18	2.25	0.00
Cocconeis placentula	20	2.50	0.00
Cymbella excisa	2	0.25	0.00
Diatoma moniliformis	83	10.38	0.00
Diatoma vulgaris	14	1.75	0.00
Encyonema minutum	7	0.88	0.00
Eolimna minima	2	0.25	0.00
Epithemia sorex	377	47.13	0.00
Fragilaria vaucheriae	2	0.25	0.00
Geissleria acceptata	1	0.13	0.00
Gomphoneis eriense	6	0.75	0.00
Gomphonema olivaceum	5	0.63	0.00
Gomphonema truncatum	2	0.25	0.00
Luticola mutica	2	0.25	0.00
Melosira varians	1	0.13	0.00
Navicula antonii	2	0.25	0.00
Navicula capitatoradiata	8	1.00	0.00
Navicula cryptotenella	40	5.00	0.00
Navicula reichardtiana	25	3.13	0.00
Navicula tripunctata	12	1.50	0.00
Neidium ampliatum	2	0.25	0.00
Nitzschia amphibia	2	0.25	0.00
Nitzschia dissipata	13	1.63	0.00
Nitzschia fonticola	16	2.00	0.00
Nitzschia graciliformis	2	0.25	0.00
Nitzschia heufleriana	2	0.25	0.00
Nitzschia inconspicua	7	0.88	0.00
Nitzschia linearis	4	0.50	0.00
Nitzschia palea	2	0.25	0.00
Nitzschia paleacea	7	0.88	0.00
Nitzschia pura	2	0.25	0.00
Nitzschia sigmoidea	1	0.13	0.00
Nitzschia sociabilis	3	0.38	0.00
Nitzschia supralitorea	2	0.25	0.00
Planothidium lanceolatum	2	0.25	0.00
Pseudostaurosira brevistrata	21	2.63	0.00
Reimeria sinuata	3	0.38	0.00
Rhoicosphenia abbreviata	22	2.75	0.00
Staurosira construens var. venter	8	1.00	0.00
Staurosirella pinnata	4	0.50	0.00
Stephanocyclus meneghiniana	22	2.75	0.00
Synedra acus	1	0.13	0.00
Synedra ulna	6	0.75	0.00
Synedra ulna var. spathulifera	2	0.25	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	47	Excellent
Shannon Diversity (H'):	2.36	Good
Dominant Taxon Percent:	47.13	Good
Disturbance Taxa Percent:	0.00	Excellent
Pollution Index:	2.70	Excellent
Siltation Index:	19.63	Excellent
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Good**	

Montana Mountain Streams (after Teply and Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	61.50	
Metals Impairment:		99%
Nutrients Increaser Taxa Percent:	69.25	
Nutrients Impairment:		>99%

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	7.25	
Sediment Impairment:		27%

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	0.75
Cosmopolitan Taxa Percent:	97.25
Rhopalodiales Percent:	47.13
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	0.88
Tolerant/Indifferent Taxa %:	94.38
Nitrogen Metabolism/Organic N Tolerence[1]	
N-Autotroph/Low Organic N Taxa %:	50.50
N-Autotroph/High Organic N Taxa %:	33.38
N-Heterotroph/High Organic N Taxa %:	5.63
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	76.13

[1]after Van Dam et.al 1994.

Site ID: FC-CFR
Site Description: Flint Creek near mouth
Date Sampled: 9/11/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 1/22/2013
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Achnanthidium minutissimum	26	3.25	0.00
Adlafia minuscula	2	0.25	0.00
Amphora pediculus	11	1.38	0.00
Cocconeis pediculus	11	1.38	0.00
Cocconeis placentula	52	6.50	0.00
Cymbella excisa	22	2.75	0.00
Cymbella lange-bertalotii	2	0.25	0.00
Cymbella tumida	2	0.25	0.00
Diatoma moniliformis	17	2.13	0.00
Diatoma vulgaris	11	1.38	0.00
Encyonema minutum	5	0.63	0.00
Encyonema prostratum	1	0.13	0.00
Encyonema silesiacum	10	1.25	0.00
Eolimna minima	13	1.63	0.00
Epithemia sorex	104	13.00	0.00
Epithemia turgida	1	0.13	0.00
Eunotia minor	1	0.13	0.00
Fragilaria capucina	6	0.75	0.00
Gomphonema micropus	5	0.63	0.00
Gomphonema minutum	7	0.88	0.00
Gomphonema olivaceum	1	0.13	0.00
Gomphonema parvulum	4	0.50	0.00
Gomphonema pumilum	4	0.50	0.00
Hippodonta capitata	1	0.13	0.00
Melosira varians	2	0.25	0.00
Navicula capiatoradiata	18	2.25	0.00
Navicula cryptotenella	23	2.88	0.00
Navicula eidrigiana	2	0.25	0.00
Navicula lanceolata	1	0.13	0.00
Navicula reichardtiana	34	4.25	0.00
Navicula tripunctata	32	4.00	0.00
Nitzschia archibaldii	11	1.38	0.00
Nitzschia capitellata	2	0.25	0.00
Nitzschia dissipata	67	8.38	0.00
Nitzschia fonticola	36	4.50	0.00
Nitzschia hantzschiana	5	0.63	0.00
Nitzschia heufleriana	2	0.25	0.00
Nitzschia inconspicua	2	0.25	0.00
Nitzschia linearis	2	0.25	0.00
Nitzschia palea	42	5.25	0.00
Nitzschia paleacea	7	0.88	0.00
Nitzschia perminuta	2	0.25	0.00
Nitzschia pura	15	1.88	0.00
Nitzschia sigmoidea	3	0.38	0.00
Nitzschia sociabilis	2	0.25	0.00
Nitzschia supralitorea	6	0.75	0.00
Planothidium frequentissimum	22	2.75	0.00
Planothidium lanceolatum	8	1.00	0.00
Pseudostaurosira brevistriata	32	4.00	0.00
Reimeria sinuata	4	0.50	0.00
Rhoicosphenia abbreviata	42	5.25	0.00
Sellaphora pupula	3	0.38	0.00
Staurosira construens var. venter	6	0.75	0.00
Staurosirella leptostauron	8	1.00	0.00
Staurosirella pinnata	14	1.75	0.00
Stephanocyclus meneghiniana	15	1.88	0.00
Surirella brightwellii	2	0.25	0.00
Surirella minuta	7	0.88	0.00
Synedra ulna	2	0.25	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	59	Excellent
Shannon Diversity (H'):	3.43	Excellent
Dominant Taxon Percent:	13.00	Excellent
Disturbance Taxa Percent:	3.25	Excellent
Pollution Index:	2.57	Excellent
Siltation Index:	42.75	Fair
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Fair**	

Montana Mountain Streams (after Teply and Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	38.13	
Metals Impairment:		75%
Nutrients Increaser Taxa Percent:	34.38	
Nutrients Impairment:		69%

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	19.25	
Sediment Impairment:		62%

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	0.00
Cosmopolitan Taxa Percent:	93.38
Rhopalodiales Percent:	13.13
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	2.63
Tolerant/Indifferent Taxa %:	90.38
Nitrogen Metabolism/Organic N Tolerence[1]	
N-Autotroph/Low Organic N Taxa %:	22.38
N-Autotroph/High Organic N Taxa %:	52.88
N-Heterotroph/High Organic N Taxa %:	11.38
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	71.38

[1]after Van Dam et.al 1994.

Site ID: CFR-84F
Site Description: Clark Fork near Drummond
Date Sampled: 9/11/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 1/22/2013
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Achnanthidium minutissimum	2	0.25	0.00
Amphora pediculus	6	0.75	0.00
Calonies bacillum	4	0.50	0.00
Cocconeis pediculus	34	4.25	0.00
Cocconeis placentula	12	1.50	0.00
Cymbella excisa	4	0.50	0.00
Cymbella mexicana	2	0.25	0.00
Diatoma moniliformis	5	0.63	0.00
Diatoma vulgaris	237	29.63	0.00
Eolimna minima	2	0.25	0.00
Epithemia sorex	277	34.63	0.00
Fragilaria capucina	1	0.13	0.00
Fragilaria vaucheriae	2	0.25	0.00
Gomphoneis eriense	4	0.50	0.00
Gomphonema minutum	3	0.38	0.00
Gomphonema olivaceum	8	1.00	0.00
Navicula capitatoradiata	37	4.63	0.00
Navicula cryptotenella	14	1.75	0.00
Navicula reichardtiana	6	0.75	0.00
Navicula tripunctata	5	0.63	0.00
Nitzschia archibaldii	4	0.50	0.00
Nitzschia dissipata	14	1.75	0.00
Nitzschia fonticola	17	2.13	0.00
Nitzschia heufleriana	2	0.25	0.00
Nitzschia inconspicua	6	0.75	0.00
Nitzschia linearis	3	0.38	0.00
Nitzschia palea	14	1.75	0.00
Planothidium lanceolatum	2	0.25	0.00
Pseudostaurosira brevistrata	3	0.38	0.00
Reimeria sinuata	8	1.00	0.00
Rhoicosphenia abbreviata	13	1.63	0.00
Rhopalodia gibba	2	0.25	0.00
Staurosira construens var. venter	11	1.38	0.00
Staurosirella leptostauron	2	0.25	0.00
Stephanocyclus meneghiniana	5	0.63	0.00
Synedra ulna	27	3.38	0.00
Synedra ulna var. spathulifera	2	0.25	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	37	Excellent
Shannon Diversity (H'):	2.21	Good
Dominant Taxon Percent:	34.63	Good
Disturbance Taxa Percent:	0.25	Excellent
Pollution Index:	2.81	Excellent
Siltation Index:	15.5	Excellent
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Good**	

Montana Mountain Streams (after Teply and Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	75.50	
Metals Impairment:		>99%
Nutrients Increaser Taxa Percent:	43.50	
Nutrients Impairment:		85%

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	8.13	
Sediment Impairment:		28%

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	0.75
Cosmopolitan Taxa Percent:	97.75
Rhopalodiales Percent:	34.88
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	1.13
Tolerant/Indifferent Taxa %:	96.88
Nitrogen Metabolism/Organic N Tolerence[1]	
N-Autotroph/Low Organic N Taxa %:	36.50
N-Autotroph/High Organic N Taxa %:	55.88
N-Heterotroph/High Organic N Taxa %:	3.38
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	85.75

[1]after Van Dam et.al 1994.

Site ID: RC-CFR
Site Description: Rock Creek near mouth
Date Sampled: 9/11/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 1/22/2013
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Achnanthidium minutissimum	32	4.00	0.00
Adlafia minuscula	8	1.00	0.00
Cocconeis pediculus	1	0.13	0.00
Cocconeis placentula	45	5.63	0.00
Cymbella janischii	1	0.13	0.00
Diatoma moniliformis	21	2.63	0.00
Diatoma vulgaris	1	0.13	0.00
Didymosphenia geminata	4	0.50	0.00
Encyonema fogedii	183	22.88	0.00
Encyonema muelleri	13	1.63	0.00
Encyonema silesiacum	25	3.13	0.00
Eolimna minima	2	0.25	0.00
Epithemia sorex	32	4.00	0.00
Epithemia turgida	6	0.75	0.00
Fragilaria capucina	2	0.25	0.00
Gomphonema pumilum	34	4.25	0.00
Gomphonema subclavatum	1	0.13	0.00
Hannaea arcus	1	0.13	0.00
Melosira varians	1	0.13	0.00
Navicula antonii	2	0.25	0.00
Navicula capitatoradiata	16	2.00	0.00
Navicula cryptotenella	18	2.25	0.00
Navicula leistikowii	2	0.25	0.00
Navicula radiosa	1	0.13	0.00
Nitzschia dissipata	5	0.63	0.00
Nitzschia hantzschiana	45	5.63	0.00
Nitzschia inconspicua	2	0.25	0.00
Nitzschia lancettula	145	18.13	0.00
Nitzschia palea	2	0.25	0.00
Nitzschia paleacea	25	3.13	0.00
Opephora pacifica	5	0.63	0.00
Planothidium frequentissimum	3	0.38	0.00
Planothidium lanceolatum	1	0.13	0.00
Pseudostaurosira brevistriata	25	3.13	0.00
Reimeria sinuata	1	0.13	0.00
Rhopalodia gibba	1	0.13	0.00
Staurosira construens var. venter	18	2.25	0.00
Staurosirella leptostauron	2	0.25	0.00
Staurosirella pinnata	7	0.88	0.00
Stephanocyclus meneghiniana	1	0.13	0.00
Synedra mazamaensis	56	7.00	0.00
Synedra ulna	4	0.50	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	42	Excellent
Shannon Diversity (H'):	2.74	Good
Dominant Taxon Percent:	22.88	Excellent
Disturbance Taxa Percent:	4.00	Excellent
Pollution Index:	2.83	Excellent
Siltation Index:	16.00	Excellent
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Good**	

Montana Mountain Streams (after Teply and Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	15.13	
Metals Impairment:		19%
Nutrients Increaser Taxa Percent:	24.25	
Nutrients Impairment:		44%

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	6.88	
Sediment Impairment:		25%

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	7.00
Cosmopolitan Taxa Percent:	37.00
Rhopalodiales Percent:	4.88
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	32.38
Tolerant/Indifferent Taxa %:	64.50
Nitrogen Metabolism/Organic N Tolerence[1]	
N-Autotroph/Low Organic N Taxa %:	39.25
N-Autotroph/High Organic N Taxa %:	45.50
N-Heterotroph/High Organic N Taxa %:	4.13
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	79.75

[1]after Van Dam et.al 1994.

Site ID: CFR-116A
Site Description: Clark Fork near Turah
Date Sampled: 9/11/2012
Sampled by: E. Weber
Analyzed by: E. Weber
Date Analyzed: 1/23/2013
Remarks: count of 800 diatom valves

Diatom Taxonomy

Species	Valves	PRA	% Ab.
Achnanthidium minutissimum	93	11.63	0.00
Amphora pediculus	10	1.25	0.00
Cocconeis pediculus	22	2.75	0.00
Cocconeis placentula	20	2.50	0.00
Cymbella excisa	119	14.88	0.00
Cymbella lange-bertalotii	2	0.25	0.00
Cymbella subturgidula	2	0.25	0.00
Diatoma moniliformis	122	15.25	0.00
Diatoma vulgaris	60	7.50	0.00
Encyonema minutum	16	2.00	0.00
Encyonema muelleri	1	0.13	0.00
Encyonema silesiacum	4	0.50	0.00
Eolimna minima	2	0.25	0.00
Epithemia sorex	40	5.00	0.00
Fragilaria vaucheriae	4	0.50	0.00
Geissleria decussis	2	0.25	0.00
Gomphoneis minuta	2	0.25	0.00
Gomphonema olivaceum	4	0.50	0.00
Gomphonema parvulum	1	0.13	0.00
Gomphonema procerum	2	0.25	0.00
Gomphonema pumilum	20	2.50	0.00
Navicula capitatoradiata	14	1.75	0.00
Navicula cryptotenella	22	2.75	0.00
Navicula leistikowii	1	0.13	0.00
Navicula reichardtiana	8	1.00	0.00
Navicula tripunctata	4	0.50	0.00
Nitzschia dissipata	26	3.25	0.00
Nitzschia fonticola	51	6.38	0.00
Nitzschia hantzschiana	2	0.25	0.00
Nitzschia heufleriana	2	0.25	0.00
Nitzschia inconspicua	2	0.25	0.00
Nitzschia linearis	2	0.25	0.00
Nitzschia palea	4	0.50	0.00
Nitzschia paleacea	33	4.13	0.00
Nitzschia pura	5	0.63	0.00
Nitzschia sigmoidea	1	0.13	0.00
Placoneis elginensis	2	0.25	0.00
Planothidium frequentissimum	2	0.25	0.00
Pseudostaurosira brevistrata	10	1.25	0.00
Reimeria sinuata	11	1.38	0.00
Rhoicosphenia abbreviata	7	0.88	0.00
Staurosira construens var. venter	29	3.63	0.00
Staurosirella leptostauron	2	0.25	0.00
Staurosirella pinnata	4	0.50	0.00
Stephanocyclus meneghiniana	5	0.63	0.00
Synedra mazamaensis	3	0.38	0.00
Total:	800	100.00	0.00

Diatom Metrics

Montana Mountain Streams (after Bahls 1992)

Metric	Value	Biointegrity
Species Richness:	46	Excellent
Shannon Diversity (H'):	2.96	Good
Dominant Taxon Percent:	15.25	Excellent
Disturbance Taxa Percent:	11.63	Excellent
Pollution Index:	2.69	Excellent
Siltation Index:	22.88	Good
Abornmal Cells Percent:	0.00	Excellent
Overall Biological Integrity Rating:	**Good**	

Montana Mountain Streams (after Teply and Bahls 2005)

Metric	Value	Probability
Metals Increaser Taxa Percent:	48.00	
Metals Impairment:		89%
Nutrients Increaser Taxa Percent:	32.38	
Nutrients Impairment:		63%

Middle Rockies Ecoregion Streams (after Teply 2010)

Metric	Value	Probability
Sediment Increaser Taxa Percent:	7.88	
Sediment Impairment:		27%

Additional Diatom Metrics

Metric	Value
Native Taxa Percent:	0.88
Cosmopolitan Taxa Percent:	94.75
Rhopalodiales Percent:	5.00
Trophic State (Elevated Inorganic Nutrients)[1]	
Intolerant Taxa %:	1.88
Tolerant/Indifferent Taxa %:	95.13
Nitrogen Metabolism/Organic N Tolerence[1]	
N-Autotroph/Low Organic N Taxa %:	22.13
N-Autotroph/High Organic N Taxa %:	63.50
N-Heterotroph/High Organic N Taxa %:	5.88
Saprobity/Oxygen Saturation Requirement[1]	
Low BOD/High Oxygen Saturation Taxa %:	69.00

[1]after Van Dam et.al 1994.

APPENDIX H3

PERIPHYTON DATA: DIATOM ASSOCIATION METRICS FOR MONTANA MOUNTAIN STREAMS

Appendix C. Diatom association metrics used by the State of Montana to evaluate biological integrity in **mountain** streams: references, range of values, expected response to increasing impairment or natural stress, and criteria for rating levels of biological integrity. The lowest rating for any one metric is the rating for that site.

Biological Integrity/ Impairment or Stress/ Use Support	No. of Species Counted[1]	Diversity Index[2] (Shannon)	Pollution Index[3]	Siltation Index[4]	Disturbance Index[5]	% Dominant Species[6]	% Abnormal Valves[7]
Excellent/None Full Support	>29	>2.99	>2.50	<20.0	<25.0	<25.0	0
Good/Minor Full Support	20-29	2.00-2.99	2.01-2.50	20.0-39.9	25.0-49.9	25.0-49.9	>0.0, <3.0
Fair/Moderate Partial Support	19-10	1.00-1.99	1.50-2.00	40.0-59.9	50.0-74.9	50.0-74.9	3.0-9.9
Poor/Severe Nonsupport	<10	<1.00	<1.50	>59.9	>74.9	>74.9	>9.9
References	Bahls 1979 Bahls 1993	Bahls 1979	Bahls 1993	Bahls 1993	Barbour et al. 1999	Barbour et al. 1999	McFarland et al. 1997
Range of Values	0-100+	0.00-5.00+	1.00-3.00	0.0-90.0+	0.0-100.0	~5.0-100.0	0.0-30.0+
Expected Response	Decrease[8]	Decrease[8]	Decrease	Increase	Increase	Increase	Increase

[1]Based on a proportional count of 400 cells (800 valves)

[2]Base 2 [bits] (Weber 1973)

[3]Composite numeric expression of the pollution tolerances assigned by Lange-Bertalot (1979) to the common diatom species

[4]Sum of the percent abundances of all species in the genera *Navicula, Nitzschia* and *Surirella*

[5]Percent abundance of *Achnanthidium minutissimum* (synonym: *Achnanthes minutissima*)

[6]Percent abundance of the species with the largest number of valves in the proportional count

[7]Valves with an irregular outline or with abnormal ornamentation, or both

[8]Species richness and diversity may increase somewhat in mountain streams in response to slight to moderate increases in nutrients or sediment