COLORADO
Water Quality Control Division
Department of Public Health & Environment

Colorado's Long-Term Monitoring Plan:
Collecting Data for Assessing Risks to Public Health and the Environment in the Upper Animas River Basin

Animas River below Cement Creek, August 15, 2015

April 4, 2016 • Official Version
Environmental Data Unit

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APPENDICES

1. EXECUTIVE SUMMARY

On August 5, 2015, the United States Environmental Protection Agency (EPA) conducted an investigation of the Gold King Mine (GKM) near Silverton, Colorado, to assess the on-going water releases from the mine, treat mine water, and to assess the feasibility of further mine remediation. While excavating above an old adit, EPA triggered a breach from above the mine tunnel, spilling approximately three million gallons of water stored behind the collapsed material into Cement Creek, a tributary of the Animas River (EPA 2016a).

This long-term monitoring plan describes the surface water, sediment and biological monitoring to be performed by Colorado Department of Public Health and Environment (CDPHE) in the Upper Animas River basin from spring 2016 through summer of 2017 in Colorado. It further describes a contractual partnership with U.S. Geological Survey (USGS) to install and maintain continuous monitoring devices at existing discharge gages to monitor instantaneous field measurements.

The key objectives of this project are to monitor water quality conditions in the Upper Animas River basin to assess risks to public health and the environment using a combination of instantaneous field measurements and grab samples that will be analyzed at a laboratory. Collecting such data will advance the State of Colorado's understanding of chemical, physical and biological relationships linked to the cyclical low flow accumulation and high flow release of metals. What is learned will be applied to developing sustainable methods for forming alert notification threshold and communicating risks to public health and the environment.

Sampling will begin during the first week of April 2016 and will continue weekly in order to characterize water quality conditions during the first, post-spill spring runoff. Sampling will continue every other month beginning in August 2016 and will conclude in February 2017. Weekly sampling will continue in April 2017 and conclude after the second runoff season ends. As data becomes available, they will be summarized and posted on CDPHE's website.

2. BACKGROUND

On August 5, 2015, the United States Environmental Protection Agency conducted an investigation of the Gold King Mine near Silverton, Colorado, to assess the on-going water releases from the mine, treat mine water, and to assess the feasibility of further mine remediation. While excavating above an old adit, EPA triggered a breach from above the mine tunnel, spilling approximately three million gallons of water stored behind the collapsed material into Cement Creek, a tributary of the Animas River. The discharge of acidic mining wastewater quickly inundated and scoured the banks of Cement Creek, breached mine tailings, and scoured additional sources of materials, which resulted in a plume of heavy metals, sediments and other chemicals that flowed into the Animas River, past Durango, through Southern Ute Indian Tribe lands, and south to the San Juan River in New Mexico. The plume continued to flow west through the Navajo Nation, Ute Mountain Ute Tribe land and Utah before emptying into Lake Powell in Utah.

The Animas River was closed to recreational uses and public water supply systems across multiple jurisdictions were shut down out of concern for public safety. On August 8, 2015,

Colorado Governor John Hickenlooper declared a state of disaster emergency due to the GKM release and the resulting impacts to downstream waters and users of those waters. On the same day a unified command center was established in Durango to manage the response to the spill.

The Colorado Long-Term Monitoring Plan (CO-LTMP) is designed to collect data in Cement Creek, the Animas River, other surface waterbodies, groundwater potentially impacted by the GKM release as well as impacts caused by historical mining activities in the watershed.

The CO-LTMP is a strategically adaptive plan that will be modified based on data results, observations, and evolving science gathered by CDPHE and local public health and emergency operations partners throughout implementation.

3. EPA PRELIMINARY FINDINGS

The upper reaches of the Animas River basin are heavily impacted by historic mining activities and natural mineralization. Many abandoned mines exist in the Animas River headwaters; including Gold King Mine, which have acid mine drainages (AMD) that produce flows between 30 to 300 gallons per minute that directly or indirectly enter Cement Creek and flow into the Animas River. Acid mine drainage is common around the world and involves chemical processes where subsurface mining exposes metal sulfide minerals to water and air. These flows have occurred prior to the GKM release and are still ongoing.

On February 5, 2016 the Animas River Team at EPA's National Exposure Research Lab presented preliminary key findings of the fate and transport study of metals loading in the Animas River from the GKM release (EPA 2016b). The draft report for this study remains in a peer review process and has not been finalized at the time of this plan. However, EPA's preliminary estimates present a statistically-based narrative that lends support to critical underpinnings of Colorado's long-term plan discussed later in this document.

The key tenets of this draft report are only preliminary estimates. However, those findings characterize matter-of-fact details that help explain the fate and transport of chemicals and sediment during and shortly after the release, current conditions, and prospects for the fate and transport of those matrices in the long-term.

EPA's key findings:

- The three million gallons of AMD from GKM produced roughly 2,800 kg of metals.
- The release of AMD from GKM heavily scoured the banks of Cement Creek, including mine tailings piles, and other sources that contributed to roughly 440,000 kg of metals by the time it reached the Animas River.
- Less than two percent or roughly 8,000 kg of the total was dissolved metals. The remainder was in the colloidal[1] form.

[1] A substance that consists of particles dispersed throughout another substance.

- The Animas River naturally diluted the plume as it traveled downstream. Mixing of the plume with more basic water increased pH, which triggered chemical transformation of dissolved metals to colloidal and particulate metals.

    → 100 percent of the dissolved metals from the GKM release were transformed to colloidal or particulate metals by the time the plume reached the San Juan River.

    → Data showed significant decline in dissolved metal concentrations with increasing distance from the GKM adit.

    → A majority of the total metal load was deposited in the Animas River riverbed.

EPA further reports that a USGS study of acid mine drainage in the Animas River in the 1990's found that increased colloidal and dissolved metal concentrations were common in the river following storms and spring runoff due to AMD contamination from the complex of abandoned mines in the headwaters (Church et al. 1997). What was clear from this study was that riverbeds accumulate metals from AMD during periods of low flow and release those accumulated metals during periods of high flow.

Colorado will utilize these findings to inform development and implementation of its long-term monitoring plan. This will ensure that data is collected spatially and temporally in a manner consistent with the statistically-based narrative but allow adaptability when data indicates the narrative has changed.

4. MONITORING TO PROTECT USES

Water is one of Colorado's most vital resources and must be protected. Maintaining a robust level of protection ensures our surface waters are capable of sustaining human health, such as water supply, supporting and maintaining aquatic life, and providing both recreational and economic activities, including agriculture. Colorado's water quality program is directed to protect surface waters by identifying how water is used (designated uses), setting standards to meet the uses, and subsequently monitoring and reporting on how well water quality supports the use.

Water quality data collected in the Upper Animas River basin prior to and after the GKM spill indicate metals concentrations that potentially threaten attainment of the designated uses for those waterbodies. High metal concentrations are typically associated with periods of high flow, such as spring runoff and precipitation events. The risk that these historical or current events pose to Colorado's designated uses will depend on exceedances found above water quality standards and the duration of exposure to human health and aquatic life.

High flows expected each spring during snowmelt and unanticipated precipitation events are both equally capable of releasing accumulated loads of metals. Characterizing relationships between those metals and continuously monitored parameters, such as turbidity and specific conductance, becomes important for addressing associations between elevated metals concentrations and impacts on designated uses.

Through the implementation of a tiered and iterative monitoring approach, CDPHE intends to address current and future water quality concerns in the Upper Animas River basin by filling

in data gaps and advancing our understanding of chemical, physical and biological relationships linked to the cyclical low flow accumulation and high flow release of metals. What is learned will be applied to developing sustainable methods for forming notification thresholds and communicating risks to public health and the environment.

5. MONITORING ELEMENTS

ELEMENT 1 – SURFACE WATER QUALITY MONITORING

Goals

- Communicate risks associated with metal concentrations in the Upper Animas River basin to the public and agencies to inform management decisions.
- Generate instantaneous and grab data for use in developing statistical relationships between metals and continuously monitored parameters, including flow, temperature, pH, specific conductance, and turbidity to develop and improve alert notification thresholds.
- Use grab data to define relationships for analysis of metals accumulation and release during periods of high or low flow to improve the overall understanding of fate and transport of metals in the Upper Animas River basin.
- Monitor ambient water quality conditions by collecting grab samples during alert notification verification sampling.

Actions

CDPHE will collect water quality data at the following locations:

- Site CEM49 – Cement Creek at mouth
- Site 82 – Animas River near Silverton
- Site 81 – Animas River at Baker's Bridge
- Site 9423A – Animas River at 9th Street Bridge in Durango

At each location, CDPHE or San Juan Basin Health Department (SJBHD) staff will collect 15 weekly water chemistry samples during the 2016 spring runoff (April 1 to mid-July 2016), four bimonthly samples during low flow season, 15 weekly samples during the 2017 spring runoff, and upwards of 50 verification samples over the course of the CO-LTMP. Verification site visits will be determined by actual exceedances of pre-defined thresholds. All parties will use CDPHE's standard operating procedures for the collection of water samples. See Appendix C.

During each visit, field measurements, including temperature, pH, specific conductance and turbidity will be recorded with a handheld multi-parameter probe and reader. Measurements will be recorded on a standardized field log form and transposed to an electronic tracking sheet that will be shared between the CDPHE and SJBHD.

Water chemistry samples will be delivered to and analyzed by CDPHE Laboratory Services Division using the ***WQCD – Mining Impact Surface Water*** analytical panel listed in Appendix A.

Results will be electronically delivered to the WQCD QA/QC Officer. As data is received and processed, results will be assessed against existing water quality standards in Water Quality Control Commission- Regulation #34 as well as other human health screening values.

CDPHE will provide analysis oversight and share responsibility for interpreting results both internally and with external health agencies prior to disseminating information to the public. Validated results will be uploaded into WQCD's local database and then published to EPA's Water Quality Exchange or WQX and STORET.

The water chemistry schedule is in Appendix B. Monitoring locations are mapped in Appendix D.

ELEMENT 2 – REAL-TIME WATER QUALITY MONITORING

Goals

- Generate real-time or instantaneous data for use in developing statistical relationships between metals and continuously monitored parameters, including flow, temperature, pH, specific conductance, and turbidity to develop and fine tune alert notification thresholds.

- Identify if any alert notification thresholds indicate a probability of high metals concentrations in the Upper Animas River basin so public health advisories can be disseminated to the public.

- Use instantaneous data to define relationships for analysis of metals accumulation and release during periods of high or low flow to improve the overall understanding of fate and transport of metals in the Upper Animas River basin.

- Confirm threshold exceedances by verifying exceedances on-site with a handheld multi-parameter probe and reader.

Actions

Statistical relationships between continuously monitored parameters and dissolved or total metals concentrations will be developed at the three USGS discharge gage stations listed below.

- USGS 09358550 Cement Creek at Silverton, CO
- USGS 09359020 Animas River below Silverton, CO
- USGS 09359500 Animas River at Durango, CO

CDPHE will contract with USGS to install, operate and maintain continuously monitored 4-parameter probes at these gage locations. The probes will measure temperature, specific conductance, pH and turbidity. Each gage will measure discharge.

The contract will include operation, maintenance, and a web hosting interface for a minimum of one year beginning on April 1, 2016. Extensions to the contract will be addressed on a year-to-year basis in keeping with Colorado's Basin Adaptive Response Management (WARM) approach.

CDPHE will contract with SJBHD, who will further sub-contract with San Juan County Public Health (SJCPH), to provide on-site verification sampling. CDPHE will provide SJBHD and SJCPH with handheld multi-parameter probes and readers to perform on-site verifications when pre-defined thresholds are exceeded.

A map of USGS sites is shown in Appendix D.

ELEMENT 3 – PUBLIC DRINKING WATER SYSTEM MONITORING

Goals

- Determine if the Gold King Mine spill or present conditions in the Upper Animas River basin will impact public drinking water systems regulated by the State of Colorado.
- Ensure that the public drinking water systems provide drinking water that complies with EPA's Maximum Contaminant Levels (MCLs).

Actions

CDPHE's Source Water Protection (SWAP) program staff will identify the public drinking water systems regulated by the State of Colorado that are located near Cement Creek and the Animas River to identify their existing water sources. SWAP will also work with public drinking water systems to determine compliance with standing MCLs.

ELEMENT 4 – PRIVATE DRINKING WATER SYSTEM MONITORING

Goals

- Determine if the Gold King Mine spill or present conditions will impact private drinking water systems in the Upper Animas River basin.
- Evaluate whether private drinking water systems can provide drinking water that complies with Maximum Contaminant Levels (MCLs).

Actions

San Juan Basin Health Department will visit and collect water chemistry samples at 100 private drinking water systems in the Upper Animas River basin.

Water chemistry samples will be delivered to and analyzed by CDPHE Laboratory Services Division using the ***WQCD – Mining Impact DW Wells*** analytical panel listed in Appendix A. *E. coli* samples will be separated from the sample set and analyzed at the SJBHD laboratory.

All results will be electronically delivered to the designated WQCD QA/QC Officer. As data is received and processed, results will be assessed against existing water quality standards in Water Quality Control Commission - Regulation #34 as well as other human health screening values.

CDPHE will provide analysis, oversight and share responsibility for interpreting results both internally and with external health agencies prior to disseminating this information to the public. Validated results will be uploaded into WQCD's local database and then published to WQX/STORET.

ELEMENT 5 – SEDIMENT SAMPLING

Goals

- Characterize metals concentrations in stream sediments to assess patterns of accumulation and release of metals in the Upper Animas River basin.

- Define relationships for analysis of metals during periods of high or low flow to improve the overall understanding of fate and transport of metals in the Upper Animas River basin.

- Monitor stream sediment conditions by collecting instantaneous grab samples during verification sampling.

Actions

CDPHE will collect sediment data at the following locations:

- Site CEM49 – Cement Creek at mouth
- Site 82 – Animas River near Silverton
- Site 81 – Animas River at Baker's Bridge
- Site 9423A – Animas River at 9th Street Bridge in Durango

At each location, CDPHE or SJBHD will collect 15 weekly sediment samples during the 2016 spring runoff (April 1 to mid-July 2016), four bimonthly sediment samples during low flow season, 15 weekly sediment samples during the 2017 spring runoff, and upwards to 50 verification sediment samples over the course of the long term monitoring plan. Verification site visits will be determined by actual exceedances of pre-defined thresholds. All parties will use EPA Region 8 standard operating procedures for the collection of sediment samples. See Appendix C.

During each visit, field measurements, including temperature, pH, specific conductance and turbidity will be recorded with a handheld multi-parameter probe and reader. Measurements will be recorded on a field log form and transposed to an electronic tracking sheet that will be shared between the local health agency and CDPHE.

Water chemistry samples will be delivered to and analyzed by CDPHE Laboratory Services Division using the ***WQCD – Mining Impact Sediment*** analytical panel listed in Appendix A.

Results will be electronically delivered to the WQCD QA/QC Officer. Results will then be assessed against human health screening values as data is received and processed.

CDPHE will provide analysis oversight and share responsibility for interpreting results both internally and with external health agencies prior to disseminating this information to the public. Validated results will be uploaded into WQCD's local database and then published to WQX/STORET.

The sediment schedule may be found in Appendix B. A map of CDPHE sites is shown in Appendix D.

ELEMENT 6 – AQUATIC LIFE SAMPLING

Goals

- Characterize the condition of benthic macroinvertebrates and streams periphyton in the Upper Animas River basin during the 2016 fall index period.

- Fish will be occasionally collected from the Animas River by Colorado Parks and Wildlife to inform fish consumption advisories.

Actions

CDPHE will collect benthic macroinvertebrate and streams periphyton within the first two weeks of October 2016 at all four sampling locations listed under Element 1, using CDPHE's Standard Operating Procedures. See Appendix C.

Benthic macroinvertebrate samples will be delivered to and analyzed under a contract with CDPHE's vendor for this type of service. Streams periphyton will be delivered to and analyzed for chlorophyll-a, ash-free dry mass and organism counts and taxonomic identifications under a contract with the University of Colorado Cooperative Institute for Research in Environmental Sciences.

Fish tissue samples will be delivered to and analyzed by CDPHE Laboratory Services Division using the ***WQCD – Mining Impact Fish*** analytical panel listed in Appendix A. Results will be reported directly to the WQCD QA/QC Officer.

Benthic macroinvertebrate counts and identifications will be processed to yield a multi-metric index (MMI) score and richness, tolerance, habit and functional feeding metrics for each sample. MMI results will be compared to biological thresholds listed in Water Quality Control Commission Policy 10-1. Metrics will be evaluated for relationships with real-time measures or total/dissolved metals concentrations to improve knowledge about mining impacts to diversity and sensitivity in this basin.

CDPHE will provide analysis oversight and share responsibility for interpreting results both internally and with external health agencies prior to disseminating this information to the public. Validated results will be published to WQX/STORET.

6. ASSESSMENT BENCHMARKS

The State of Colorado divides waterbodies into segments and assigns designated uses to each segment. The Water Quality Control Commission adopts water quality standards that protect those uses. Not all segments in the Upper Animas River basin have the same designated uses or the same water quality standards. Designated uses that may be assigned to segments in the Upper Animas River basin include agriculture, aquatic life, recreation, and water supply. Designated uses and water quality standards for Cement Creek and the Animas River may be found at the following web link.

https://www.colorado.gov/pacific/sites/default/files/34_2016%2803%29-Appendix34-1.pdf

Table 1 presents segment identifications, descriptions and uses for each monitoring site.

Table 1. Segments and Descriptions

StationID	Segment	Segment Description	Designated Uses
CEM49	COSJAF07	Mainstem of Cement Creek, including all tributaries, and wetlands, from the source to the confluence with the Animas River.	Recreation E Agriculture
82	COSJAF04a	Mainstem of the Animas River, including wetlands, from a point immediately above the confluence with Mineral Creek to a point immediately above the confluence with Deer Park Creek.	Aq Life Cold 2 Recreation E Agriculture
81	COSJAF04b	Mainstem of the Animas River, including wetlands, from a point immediately above the confluence with Deer Park Creek to Bakers Bridge.	Aq Life Cold 1 Recreation E Water Supply Agriculture
9423A	COSJAF05a	Mainstem of the Animas River, including wetlands, from Bakers Bridge to the Southern Ute Indian Reservation boundary.	Aq Life Cold 1 Recreation E Water Supply Agriculture

Table 2 presents the chemical, physical and biological data type that will be used for assessments and the applicable regulation or policy that will be the basis for assessing exceedances of water quality standards and impairment or attainment of the designated uses.

Table 2. Assessment Benchmarks for Surface Water, Sediment and Biology

Benchmark	Designated Uses			
	Agriculture	Aquatic Life	Recreation	Water Supply
Water Chemistry	CO Regulation #34	CO Regulation #34	CO Regulation #34	CO Regulation #34 and EPA MCL's
Sediment	NA	NA	EPA Risk-Based Concentrations	NA
Benthic Macroinvertebrates	NA	CO Policy 10-1	NA	NA
Periphyton	NA	NA	Pending June 2017 Rulemaking	NA
Fish Ingestion	NA	CO Policy 96-2	NA	NA

7. DATA COMPILATION AND MANAGEMENT

DATA COMPILATION

All laboratory results from CDPHE and SJBHD will be sent to the WQCD QA/QC Officer. The QA/QC Officer will compile results and track completion in accordance with the monitoring schedule. Results for each analytical panel shown in Appendix A will be compiled in separate worksheet tabs.

Field measurements from CDPHE and SJBHD will be sent to the WQCD QA/QC Officer. The QA/QC Officer will merge field and laboratory data using sample tracking barcode system.

DATA MANAGEMENT

All water chemistry, sediment and fish tissue data will be stored in CDPHE's local data management system known as EQuIS®. Benthic macroinvertebrate data will be stored in CDPHE's Ecological Data Application System (EDAS) database. Periphyton data will be stored in a spreadsheet. WQX will provide the primary means of storing and managing all forms of data for the Upper Animas River basin under the CO-LTMP.

WQX will be the mechanism for sharing the data across all states, tribes, local agencies, and the public. Data loaded to WQX will be mapped to the standard format customary to WQX.

8. REFERENCES CITED

Church, S.E., et al., 1997. *Source, Transport, and Partitioning of Metals between Water, Colloids, and Bed Sediments of the Animas River*, Colorado, USGS Open-File Report 97-151.

U.S. Environmental Protection Agency (EPA). 2016a. *Post-Gold King Mine Release Incident Conceptual Monitoring Plan For Surface Water, Sediments and Biology*. Available at: https://www.epa.gov/goldkingmine/us-epa-releases-monitoring-plan-evaluate-conditions-animas-and-san-juan-rivers. Accessed March 24, 2016.

———. 2016b. *Gold King Mine Acid Mine Drainage Release: DRAFT Analysis of Fate & Transport of Metals in the Animas & San Juan Rivers*. Presented by the Animas River Team, National Exposure Research Lab/EPA, February 5, 2016.

APPENDIX A – LABORATORY TEST PANELS

WQCD – Mining Impact Surface Water
**** Total and Dissolved fractions (ug/L)***

Laboratory Program	Parameters
Inorganic Chemistry	Aluminum
Inorganic Chemistry	Arsenic
Inorganic Chemistry	Cadmium
Inorganic Chemistry	Cobalt
Inorganic Chemistry	Copper
Inorganic Chemistry	Iron
Inorganic Chemistry	Lead
Inorganic Chemistry	Manganese
Inorganic Chemistry	Nickel
Inorganic Chemistry	Selenium
Inorganic Chemistry	Uranium
Inorganic Chemistry	Zinc

WQCD – Mining Impact Sediment
**** Total fraction (mg/m^2)***

Laboratory Program	Parameters
Inorganic Chemistry	Aluminum
Inorganic Chemistry	Arsenic
Inorganic Chemistry	Cadmium
Inorganic Chemistry	Cobalt
Inorganic Chemistry	Copper
Inorganic Chemistry	Iron
Inorganic Chemistry	Lead
Inorganic Chemistry	Manganese
Inorganic Chemistry	Nickel
Inorganic Chemistry	Selenium
Inorganic Chemistry	Uranium
Inorganic Chemistry	Zinc

WQCD – Mining Impact DW Wells
**** Total and Dissolved for metals (ug/L)***

Laboratory Program	Parameters
Inorganic Chemistry	Aluminum
Inorganic Chemistry	Arsenic
Inorganic Chemistry	Cadmium
Inorganic Chemistry	Cobalt
Inorganic Chemistry	Copper
Inorganic Chemistry	Iron
Inorganic Chemistry	Lead
Inorganic Chemistry	Manganese
Inorganic Chemistry	Nickel
Inorganic Chemistry	Selenium
Inorganic Chemistry	Uranium
Inorganic Chemistry	Zinc
Inorganic Chemistry	Nitrate/Nitrite
Inorganic Chemistry	Fluoride
Inorganic Chemistry	Chloride
Inorganic Chemistry	Hardness
Microbiological ‡	*E. coli*

WQCD – Mining Impact Fish
**** Total fraction (mg/kg)***

Laboratory Program	Parameters
Inorganic Chemistry	Aluminum
Inorganic Chemistry	Arsenic
Inorganic Chemistry	Cadmium
Inorganic Chemistry	Cobalt
Inorganic Chemistry	Copper
Inorganic Chemistry	Iron
Inorganic Chemistry	Lead
Inorganic Chemistry	Manganese
Inorganic Chemistry	Nickel
Inorganic Chemistry	Selenium
Inorganic Chemistry	Uranium
Inorganic Chemistry	Zinc
Inorganic Chemistry	Mercury - Fish

‡ Analysis performed at San Juan Basin Health Department laboratory

APPENDIX B – WATER CHEMISTRY AND SEDIMENT SCHEDULE

Station ID	Waterbody and Description	Sampling Period	Routine Visits	Verification Visits	Latitude	Longitude
2016 SPRING RUNOFF (WEEKLY)						
CEM49	CEMENT CREEK AT MOUTH	Apr-Jul 2016	15	20	37.81000	-107.66056
82	ANIMAS RIVER NEAR SILVERTON	Apr-Jul 2016	15		37.7902	-107.6676
81	ANIMAS RIVER ABOVE DURANGO (BAKERS BRIDGE)	Apr-Jul 2016	15		37.45871	-107.79915
9423A	ANIMAS RIVER AT DURANGO - 9TH ST BRIDGE	Apr-Jul 2016	15		37.27456	-107.88427
2016-17 BASE FLOW (EVERY OTHER MONTH)						
CEM49	CEMENT CREEK AT MOUTH	Aug '16-Feb '17	4	10	37.81000	-107.66056
82	ANIMAS RIVER NEAR SILVERTON	Aug '16-Feb '17	4		37.7902	-107.6676
81	ANIMAS RIVER ABOVE DURANGO (BAKERS BRIDGE)	Aug '16-Feb '17	4		37.45871	-107.79915
9423A	ANIMAS RIVER AT DURANGO - 9TH ST BRIDGE	Aug '16-Feb '17	4		37.27456	-107.88427
2017 SPRING RUNOFF (WEEKLY)						
CEM49	CEMENT CREEK AT MOUTH	Apr-Jul 2017	15	20	37.81000	-107.66056
82	ANIMAS RIVER NEAR SILVERTON	Apr-Jul 2017	15		37.7902	-107.6676
81	ANIMAS RIVER ABOVE DURANGO (BAKERS BRIDGE)	Apr-Jul 2017	15		37.45871	-107.79915
9423A	ANIMAS RIVER AT DURANGO - 9TH ST BRIDGE	Apr-Jul 2017	15		37.27456	-107.88427

APPENDIX C – COLLECTION METHODS

Method	SOP Name
Benthic macroinvertebrates	Water Quality Control Division. *Benthic Macroinvertebrate Sampling Protocols Standard Operating Procedure*. May 2010.
Periphyton	Water Quality Control Division. Standard Operating Procedures for the Collection of Streams Periphyton Samples. December 2015.
Sediment	Technical Standard Operating Procedure. Sediment Sampling Methods. SOP No. FLDM-104 Revision 1.0. U.S. Environmental Protection Agency, Region 8 Laboratory. April 2014.
Water chemistry	Water Quality Control Division. Standard Operating Procedures for the Collection of Water Samples. May 2010.

APPENDIX D – MONITORING LOCATIONS