



# Operational Guidelines for Conducting Field Monitoring Activities

Water Quality Control Division • Watershed Section

## 1.0 Introduction

The Watershed Section (section) of the Water Quality Control Division (division) exists to collect, analyze, and report environmental data including chemical, physical and biological to inform regulatory outcomes and address management decisions at multiple scales.

In the bigger picture, the Watershed Section is responsible for designing and managing a statewide monitoring and assessment framework that:

- Supports environmental policy and regulatory decision-making.
- Collects environmental data, including field measurements and samples for laboratory analysis.
- Tracks performance with quarterly Quality Control (QC) of all environmental data.
- Organizes environmental data in locally managed databases and supports data submission to Water Quality Exchange (WQX) and STORET<sup>1</sup>.
- Enables retrieval and data sharing for environmental assessments.

The guidelines discussed in this document will focus exclusively on how the Watershed Section plans for and conducts field work to support the monitoring requirements within the sections' overall monitoring and assessment framework. Accordingly, the monitoring designs developed within this framework will incorporate methods to control decision errors. The objectives to accomplish this are as follows:

- Outline common and standardized procedures for the planning and scheduling of field activities.
- Outline common and standardized procedures for collecting quality and defensible environmental data in the field.
- Outline uniform practices for delivering and submitting samples for laboratory analysis, including submission of acceptable chain of custody forms.

Through the implementation of this document, it is the goal of the Watershed Section that all monitoring activities will be planned and conducted in a uniform manner with standardized procedures employed by all personnel from collection to delivery of samples to the laboratory. Meeting these objectives will ensure that the selected monitoring design yields scientifically valid results and meets the needs of the decision makers.

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<sup>1</sup> U.S. Environmental Protection Agency's (EPA) STOage and RETrieval Program

## 2.0 Pre-Planning

### 2.1 Wish List

The section aligns its annual monitoring work plans with the State fiscal year, which runs July 1<sup>st</sup> to June 30<sup>th</sup> of the following calendar year. Plan development typically begins in late February, prior to the next State fiscal year, with the electronic distribution of a “Wish List” memo in Microsoft Word® and a submittal template to all program leads within the Watershed Section and Permits Unit. The Wish List memo centers only on the collection of water chemistry samples. It delineates how much money is available, how many samples are allocated to each Clean Water Program (program), what the focus watershed basin is, and instructions on submitting the Wish List template.

The Wish List template is a specifically formatted Microsoft Excel® spreadsheet in which program leads can identify the sites they want samples collected from, number of visits, as well as secondary information such as the waterbody segment identifications (WBID), special analytes, and a brief basis for why this data is needed. Sites may be pre-existing monitoring stations but may also be requests for new sites.

The Wish List templates are due during the first week of April. Program leads are directed to forward their templates to the Environmental Data Units (EDU) planning staff that will assemble the sites, visits, and secondary information into a master planning spreadsheet.

Streams biological/physical sampling and lakes biological sampling are dictated by separate EPA Section 106 Monitoring Initiative (MI) grant or EPA Section 106 Performance Partner Grant (PPG) monies. These types and volumes of samples are often indirectly factored into the Wish List site/visit allocations and can dictate how the annual monitoring plan is developed.

### 2.2 Plan Development

After the wish lists are combined into the master planning spreadsheet, planning staff will identify missing information, duplicated site requests, geospatial coordinate errors, opportunities for cross programmatic collaboration, or other issues that require further clarification from the program leads. Planning staff will schedule a face-to-face coordination meeting with all program leads at the end of April. This meeting will be used to solicit additional feedback on how to further fine-tune the monitoring plan to meet the needs of each program.

The planning staff will then use this input to finalize the total number of monitoring sites and visits per site. Planning staff will identify the total number of water chemistry samples to be analyzed per laboratory test panel (routine, trend, etc.) or additional analytes requested. New site identifications and descriptions are created and updated into the sections Environmental Quality Information System (EQiS) database.

Once completed, the planning staff will assign an equivalent number of sites and visits to each sampling technician and assign sample barcode numbers for each site visit. See Section 5.1 for further details on the division’s barcode system.

## 2.3 Laboratory MOU

Once the annual monitoring plan is completed the planning staff will condense sites and visits per test panel into sample volume, cost, and test type schedules within a Memorandum of Understanding (MOU) document. The MOU serves as a contract for services between the division and Colorado Department of Public Health and Environment's (CDPHE) Laboratory Services Division (LSD) for the next state fiscal year.

## 3.0 Planning Considerations

### 3.1 Site Identifications

Historical site identification numbers, referred herein as site IDs, exist in the sections EQUIS database and are distributed to program leads with the Wish List memo and template. Program leads may select from the existing set of site IDs or they may select new sites for which a new site ID is needed. It is important that program leads map out potential new sites and provide the planning staff with accurate geospatial coordinates in decimal degree format.

New site IDs may only be created by the planning staff. This reduces the likelihood of duplicating sites or creating site IDs that do not conform to the site ID scheme used across Colorado's major basins. The planning staff is charged with creating new site IDs and descriptions; integrating those details into the annual monitoring plan, and redistributing the newly created site IDs (inc. description) back to the program leads that originally requested the new site(s) so they may integrate this information into their own Sample Analysis Plans (SAPs).

No sampling of a new site shall occur until that site has been given a site ID and the site location has been thoroughly documented. New sites are considered provisional until such time the site is benchmarked by visiting field staff. The benchmarking or "ground truthing" serves to confirm both the description and geospatial location. Any changes to the site description or geospatial location must be conveyed immediately upon return to the planning staff, which will modify the information in EQUIS.

### 3.2 Property Access

If a site requires entering or crossing private property the landowner should be considered in the site selection process. Planning staff, EDU technicians, and program leads will be responsible for obtaining permission for property access in writing or verbally prior to entering the site for the first time. Since it is not practical to visit each selected site in a statewide monitoring plan before sampling begins, it is imperative that staff contact the landowner beforehand, ask for permission to enter their property, and ask for any information that may be relevant to safe access routes or site-specific hazards.

If necessary, sampling staff may contact landowners on-site for sites involving samples of opportunity. Caution should be exercised in these situations. For instance, sampling staff should phone EDU planning staff or their immediate supervisor with their current location before approaching any landowner on short notice.

### 3.3 Field Health and Safety Plan

Safety is the critical first step in any monitoring program. Taking samples from streams, rivers, and lakes for water quality analysis involves safety risks. The inability to swim and

difficulty in freeing oneself of burdensome equipment or waders if suddenly plunged into deep water are perhaps the most serious risks in taking samples. Keep your feet spread apart and body aligned parallel to the flow and don't fight the water. For drowning protection, a personal flotation device (PFD) is highly recommended whenever an employee works near water and there exists a threat of drowning. Examples of PFD's could be life jackets or buoyancy aids.

At bridge sites, follow all State of Colorado laws for blocking traffic, wear high visibility vests with reflective strips, post appropriate signs at each end of the bridge, and be alert for wide loads and large trucks which may extend over the walkway. Develop a plan for each bridge site.

When working on ice, there is no substitute for experience. When possible, work with someone who is experienced working on ice. Be aware of the temperature, whether the stage is rising or falling, and whether the ice is strong enough to support your body and equipment (USGS 1996).

Water is a carrier for many disease-producing organisms. Appearance alone is no way to judge the safety of the water. Waterborne hazards may come from material dissolved in the water, suspended in the water, or in sediment of the stream substrate. Infections or disease can enter the body through accidental ingestion by mouth or through skin broken by injury or another infection. The selection of appropriate Personal Protection Equipment (PPE) is based on the hazards anticipated or recognized when visiting a site. PPE can range from complex body protection, such as durable splash suits or cloth coveralls to simpler hand protection, such as disposable nitrile gloves.

For more detailed guidelines related to health and safety plans refer to the division's planning procedures for safety in the field (WQCD 2009).

#### 4.0 Scheduling

Site assignments and visits are formally submitted to the EDU technicians after the annual surface water monitoring SAP is signed and dated by an authorized section or unit manager. Samples to be collected by other programs, such as BioHab, Lakes and TMDL, under the plan are passed back to the program leads for inclusion into their own project-specific SAPs. The annual surface water monitoring SAP only describes the site IDs, waterbody name, description, number of visits and geospatial coordinates in general terms. The exact dates of site visits are planned more thoroughly by individual EDU technicians or program leads.

Therefore, all field staff must development a schedule of proposed monitoring activities prior to performing field work. Staff members who have been assigned a particular set of monitoring sites will be responsible for the scheduling of their sampling activities and, if needed, the coordination of a larger field crew. Program leads must develop a detailed schedule of monitoring activities for their own project-specific SAPs.

EDU technicians must also develop and submit a detailed, monthly schedule of monitoring activities. A monthly schedule is comprised of several weekly trip plans. These weekly trip plans distinguish which sites will be visited and completed within the planned month. The schedule for the next month must be completed by the final business day of the preceding month. The schedules must be submitted in a standardized spreadsheet that clearly identifies the details of the monitoring activity and must include the following information at a minimum:

- Technicians name and month of sampling activity
- Dates and site(s) or activities
- Volume and location of QA samples
- Total number of sampling sets submitted to the laboratory
- The receiving laboratory for chemistry and microbiology samples
- Destination and lodging details
- Planned and actual hours worked
- Comments including annotations regarding site accessibility and flow conditions

Once a schedule of proposed monitoring activity has been submitted, it can only be modified with prior approval. If circumstances warrant an unapproved change, that change should be documented immediately in the schedule and communicated verbally or in writing to the EDU planning staff. Reasons for why a sample was not collected should be documented in the Comments column of the schedule (i.e. dry or inaccessible). See example below.

Example:

| Technician Name - December 2016 |                                  |            |                        |                             |                  |           |                                      |                             |                |
|---------------------------------|----------------------------------|------------|------------------------|-----------------------------|------------------|-----------|--------------------------------------|-----------------------------|----------------|
| FY 2017                         |                                  |            |                        |                             |                  |           |                                      |                             |                |
| Date                            | Site #(s) or Activities          | QA Samples | Total # of Sample Sets | Delivery Date & How Shipped | Receiving Lab ** |           | Contact # Location                   | Planned/Actual Hours Worked | Comments       |
|                                 |                                  |            |                        |                             | Chem Lab         | Micro Lab |                                      |                             |                |
| 28-Nov                          | Office 1/2 day - leave at 1030   |            |                        |                             |                  |           |                                      | 4/4, 1 hr AL                |                |
| 29-Nov                          | Office - in at 0830              |            |                        |                             |                  |           |                                      | 9/8                         |                |
| 30-Nov                          | Office                           |            |                        |                             |                  |           |                                      | 9/9                         |                |
| 1-Dec                           | Office                           |            |                        |                             |                  |           |                                      | 9/9                         |                |
| 2-Dec                           | Office                           |            |                        |                             |                  |           |                                      | 9/9                         |                |
| 5-Dec                           | Lab AM<br>7182, 58               | 0          | 2                      | 12/7/2016                   | LSD              | NO EC     | Overnight Gunnison - Holiday Inn Exp | 10/                         | Taylor River   |
| 6-Dec                           | 55, 10400 (Blank), 10505, 50     | 1          | 4                      | 12/7/2016                   | LSD              | NO EC     | Overnight Silt - Holiday Inn Exp     | 9/                          | Gunnison River |
| 7-Dec                           | Return to Denver/Lab/Office PM   |            |                        |                             |                  |           |                                      | 9/                          |                |
| 8-Dec                           | Office                           |            |                        |                             |                  |           |                                      | 9/                          |                |
| 9-Dec                           | Office 1/2 day or work from home |            |                        |                             |                  |           |                                      | 3/                          |                |

The monthly schedule must be finalized, including any modifications made within the month, by the final business day of that just completed month.

## 5.0 Preparation

After a schedule of planned field activities has been outlined within project-specific SAPs, adequate supplies to complete the field activities will have to be prepared. In addition to preparing field equipment (i.e. cleaning filtering equipment, meter calibration checks, etc.), a check of other supplies should be made (i.e. sampling bottles, deionized water, filter membranes, etc.).

Bottles of the appropriate type, size, and with the right preservative will have to be obtained from the laboratory. A table of parameters, the appropriate bottles and preservative and maximum sample holding times will be identified in project-specific SAPs.

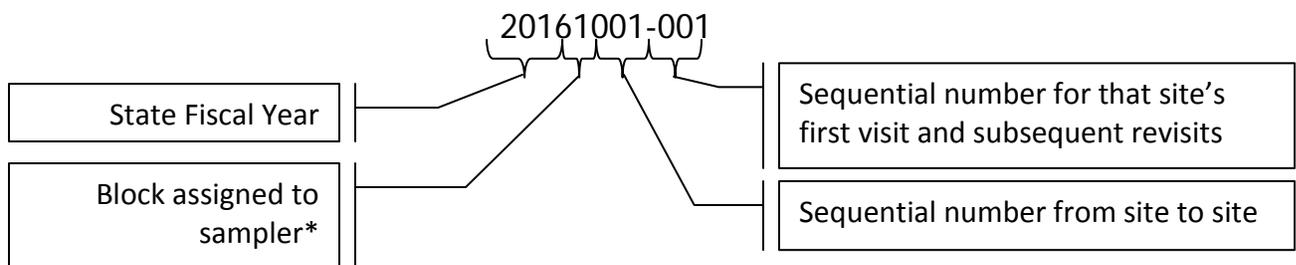
It will be necessary to have extra sample bottles on hand. However, these extra bottles should not be left unused for long periods of time. It is important to document how long the bottles have been kept but not used. Rotation of bottle supply to ensure that no bottles are kept unused for more than 30 days will be a priority.

## 5.1 Barcodes

Every sample will have a unique barcode identification number. Each sample shall have a barcode generated, printed on weatherproof address labels, and affixed to the exterior of each bottle “set” prior collecting a sample. Each set shares the same barcode. The same barcode label is affixed to the primary field log form, which may vary depending on the program. If the sampling event has duplicates or blanks then place those barcode labels on the same field log form.

This unique barcode identification number is an eleven digit number that is bracketed by (\*) asterisks. The \* character is the start and stop reading character for the barcode reader. The first four numbers of the barcode are the four digit fiscal year. The fifth number denotes the block assigned to an EDU technician or specific program in the section. The remaining six numbers in the barcode are sequential numbers based on sites and site revisits within the State fiscal year. Each sampler shall be responsible for making sure that each number used in their block is unique. See example below for further details.

Example:



The following list identifies the block assigned to EDU technicians or programs.

- 1 Jean Aldrich (Sampling Technician)
- 2 Lorie Petersen (Sampling Technician)
- 3 Adam Taubman (Sampling Technician)
- 4 Lakes
- 5 Total Maximum Daily Load (TMDL)
- 6 Biological/Physical Habitat
- 7 319 Non-Point Source
- 8 Power Authority
- 9 Special Studies

When filling out the LSD Request for Analytical Services or Chain of Custody form, place a barcode label in the area labeled “Sample Barcode Here” in the upper left corner.

For the sampling technicians, barcodes will be determined in the pre-planning phases of the annual monitoring plan. See Section 2.2. Duplicates and blanks for the sampling technicians will start at #100 in the sequential number system shown in the example above (i.e. 100, 101, 102, etc.).

## 5.2 Field Documentation

### 5.2.1 Field Technicians

Routine field and sample metadata, generated by EDU technicians, are documented on a macro-enabled Microsoft Excel<sup>®</sup> field log form that is installed on a ruggedized, Windows<sup>®</sup> based tablet computer. This represents approximately 75% of all site visits conducted on an annual basis.

#### Pre-Trip

Each technician is provided with an empty, yet functional field log form. However, in its base state, the form only contains dropdown options that are universal to all technicians, such as specific sampling details (i.e. bridge vs. bank), date/times, or filtering apparatus, to list a few. Prior to a trip, each technician is responsible for pre-loading their assigned barcodes, site IDs, waterbody name/description, and geospatial coordinates into Columns A-E on the tab titled "LINKS" in the field log form. It is important to make sure the site ID is listed in numerical order (i.e. 101, 102, 103...) or the waterbody name/descriptions and coordinates will not match each other when auto-filled into the form later.

This procedure is performed at a desktop computer (PC). Each technician must then transfer the pre-loaded field log form from their PC to the tablet via a universal serial bus (USB) flash drive before starting the trip.

#### Trip

The field log form is a drop down form that uses pre-loaded site and sample metadata elements to identify where, when and how the sample(s) was collected. The user is able to select from a list of options in cells colored white. Brown shaded cells signify areas of the form that "auto populate" based on selections made in the white colored cells. Once the form is completed the user must select the "SUBMIT" button to save the form data to the tab titled "DATA".

After the form data is saved the user may elect to 1) reset the form for a new site or 2) keep the drop down selections already filled within the form for duplicate and/or blank samples collected at the same site. The field log form should always be "RESET" between sites.

As an example, for a weekly field trip with 10 completed sites, one duplicate sample, and one blank sample there will be 12 rows of data saved to the "DATA" tab.

#### Post-Trip

After a trip is completed, the technicians must transfer the field log form from their tablet to a desktop computer via a USB flash drive. The technician must then copy (CNTL+C) the data rows from the "DATA" tab and paste them (CNTL+V) into the Sample Metadata Database for that specified state fiscal year. The "DATA" tab column structure is synchronized to exactly match the column structure in the Sample Metadata Database. Technicians are provided with a visual prompt to paste their data rows beginning in the next empty cell in Column C of the database.

Before beginning another weekly field trip, the technicians must remove the pre-loaded barcodes; site IDs, etc, from the previous weeks' field trip. Then the form may be reloaded

with specific barcodes and site information for the next trip. Repeat the instructions listed under the Pre-Trip section above.

### 5.2.2 Other Field Staff

Those program staff involved in non-routine or special studies, such as TMDL or BioHab, shall at a minimum document field and sample metadata on the division's pre-printed and formatted "Monitoring Field Log" notebook or alternatively in program-specific field logbooks or field sheets (electronic or paper). See Appendix B. Regardless of the type of format used, a separate entry shall be made for each site visit, including site visits which result in no sample(s) being collected. It is imperative that barcode labels be affixed to the field log form to document the sample IDs affiliated with water chemistry samples submitted to LSD.

Field log forms (or logbooks) shall be stored in a known location in the office and readily accessible to monitoring personnel at all times.

### 5.3 Sample Containers

For a list of common sample bottles that are characteristic of a typical "bottle set" collected by division personnel, please refer to the division's SOP here:

*J:\WSMON\SOPs\Sampling\ SOP - Collection of Water Chemistry Samples - 042116.pdf*

Each sample bottle must be labeled using a pre-printed barcode on durable, all-weather address label. This is the only required label to be affixed to the bottle by division staff. Other labels may be affixed during bottle preparation by laboratory staff. The barcode number serves as the division's sample identifier. Labels must be prepared prior to leaving for the field, but may be affixed to the bottles prior to departure or just before the samples are collected. In the first case, if the sampler or sampling team is familiar with his/her or their assigned waterbodies it may be a time savings to pre-label and bag bottle sets before departing to the field. In the latter case, if the sampler or sampling team suspects a few of the assigned waterbodies may be dry or inaccessible, it may be more sensible to label the bottle sets after visiting and assessing the flow condition or accessibility at each site.

Rinsing of sampling containers prior to sample collection should be done only if the bottles have not had special preparation (i.e. acid washed metals bottle) and do not contain a preservative (i.e. nutrient bottle). Bottles and caps that are rinsed before sample collection should be rinsed 3 times with the source water before the sample is collected.

Additionally, for filtered metals bottles, an "E" shall be handwritten on the bottle shoulder with an indelible marker. The "F" shall not be written on the cap.

### 5.4 Field Equipment

#### 5.4.1 Multi-Parameter Probes

The standard multi-parameter probes used in the divisions' surface water monitoring program include the Yellow Springs Instrument (YSI) EX01 series and the In-Situ Troll 9500. Both types of probes are paired with handheld readers manufactured by the same companies. These probes will measure representative field data, such as temperature, dissolved oxygen, specific conductance, and pH, in most stream, river and lake environments. For a more

thorough discussion of the appropriate use of each probe, please refer to the SOPs provided in Section 5.5.1.

#### 5.4.2 Support Equipment

Some of the equipment used for lotic or lentic waterbody monitoring also is used as support equipment for collecting water samples. For a complete list of items needed before going out in the field to collect water chemistry samples, please refer the section’s SOP here:

*J:\WSMON\SOPs\Sampling\ SOP - Collection of Water Chemistry Samples - 042116.pdf*

Additional support equipment for biological and physical data collection performed by other programs within the section may be found in SOPs located at the file pathways in Table 1.

| Standard Operating Procedure             | File Pathway   |
|--|--|
| Collection of benthic macroinvertebrates | <i>J:\WSMON\SOPs\Sampling\ SOP - Collection of Benthic Macroinvertebrates - 111716.pdf</i> |
| Collection of benthic periphyton         | <i>J:\WSMON\SOPs\Sampling\ SOP - Collection of Periphyton Samples - 122215.pdf</i>         |
| Collection of suspended phytoplankton    | <i>J:\WSMON\SOPs\Sampling\ SOP - Lake Sampling Field Methods - 040111.pdf</i>              |
| Collection of pebble counts              | <i>J:\WSMON\SOPs\Sampling\ SOP - Collection of Pebble Counts - 051215.pdf</i>              |
| Flow/discharge                           | <i>J:\WSMON\SOPs\Sampling\ SOP - Discharge Measurements - 120716.pdf</i>                   |

Table 1. SOP File Pathways

These SOPs may be subject to amendments at any time during the term of this operational guideline. Accordingly, version dates for the SOPs may change over time. For the latest version of these SOPs navigate to this folder: *J:\WSMON\SOPs\Sampling*.

### 5.5 Quality Assurance and Quality Control (QA/QC)

#### 5.5.1 Probe Calibrations

A majority of the section uses YSI’s EXO1 multi-parameter probes (meters) that have sensors that require periodic calibrations to assure high performance. Calibration procedures follow a series of basic steps for each sensor, except temperature. Calibration and operating procedures will vary with probe types and manufacturers.

For further details on calibration set up, basic calibrations in KOR<sup>2</sup> software and frequency see the YSI EXO1 User Manual online or the division’s standard operating procedures for YSI instrumentation calibrations here:

*J:\WSMON\SOPs\Instruments\ SOP - YSI EXO1 Sonde - 040815.pdf*

<sup>2</sup> KOR is YSI’s proprietary software to communicate between a probe and a handheld reader.

For further details on calibration setup, basic calibrations in In-Situ software and frequency see the In-Situ Troll 9500 User Manual online or the division's standard operating procedures for In-Situ instrumentation calibrations here:

*J:\WSMON\SOPs\Instruments\SOP - InSitu Troll 9500 - 121714.pdf*

Personnel that perform calibrations on instrumentation must keep a log file of calibration information for each probe. This applies to probes dedicated to individuals, such as the EDU technicians, or program leads, such as TMDL and Lakes. Additionally, calibration log files must be generated and maintained by other personnel using loaner probes. Loaner probes are made available to all section personnel on an "as needed" basis for an assortment of water quality studies. In this regard, it is the responsibility of each user to run calibrations per manufacturer specifications and maintain calibration reports to support the soundness of the data collected with those probes.

### 5.5.2 Field Procedures Quality Control

For quality control facets related to field procedures, please see Section 3.41 of the division's Quality Assurance Project Plan (QAPP) for Surface Water Monitoring and Assessment here:

*J:\WSMON\QMP and QAPP\WQCD QAPP 2015\ WQCD QAPP 2015.pdf*

### 5.5.3 Standard Operating Procedures

All staff conducting monitoring activities and regardless of program shall include on their trip paper or electronic copies of SOP's relevant to the type of work performed. The SOP's shall be readily accessible and referred to when necessary. Modifications to field procedures in the field are not allowed without prior written or verbal consent from the section's Quality Assurance Officer (QAO).

Recommended modifications to any standing SOP may be provided at any time to the QAO for review. These recommendations will be objectively and thoroughly reviewed with emphasis on whether the changes improve clarity and/or address technical substance within the SOP.

All of the section's SOPs are referenced and catalogued here: *J:\WSMON\SOPs*

## 6.0 Sample Delivery and Submittal to Laboratories

### 6.1 Water Chemistry Samples

Water chemistry samples are to be immediately placed in a cooler, preserved with cubed ice to 4 deg C, and delivered to LSD or other sub-contracted laboratories. Holding times shall be accounted for when a schedule is prepared beforehand. Efforts should be made to deliver samples to LSD no later than 4:00 p.m. Monday-Thursday or if samples will be delivered on a Friday, they should be delivered no later than 3:00 p.m. to ensure laboratory Accessioning personnel have adequate time to process the samples after relinquishment.

All water chemistry samples shall be submitted with a completed LSD "Request for Analytical Services" form for each sample "bottle" set (see Appendix C). This form shall be considered the divisions official Chain-of-Custody (COC) for relinquishment of samples to LSD.

Thoroughly complete the form. Specific areas to complete include an affixed unique barcode identification number, station identification, waterbody and description, date/time of sample

collection, number and type of sample containers, sample media, analyses requested, sampler(s) initials and affiliation, name and signature of relinquishing and receiving personnel, as well as the date/time of each custody transfer.

A temperature reading shall be taken from a randomly selected, filled sample bottle within the ice chest and recorded on the form by attending Accessioning personnel.

If circumstances dictate that water chemistry samples, such as *E. coli*, be delivered to a 3<sup>rd</sup> party laboratory, then acquire a blank COC form from attending laboratory personnel. Complete their form per instructions provided. Ask attending laboratory personnel to provide you with a photocopy of the COC once signatures, date/time, and a temperature recording are completed.

Field personnel are required to retain paper copies of all COCs for upwards of 7 years. However, paper COCs may be scanned into the division's Records Center management system earlier. If this is the case, paper copies shall be retained for a minimum of 6 months after the end of fiscal year. In summary, when the 6 month period expires and if the COCs are scanned into the records management system, then the paper COCs may be recycled.

## 6.2 Biological Samples

Biological samples collected by the section are generally preserved by freezing or with 95% ethyl alcohol/10% formalin. For details on properly preserving these types of samples refer to the SOPs provided in Table 1.

All biological samples shall be submitted to contracted vendors for those services with an agreed upon and completed Chain-of-Custody form. Temperatures on not required but signatures and dates/times confirming sample relinquishment are.

## 7.0 References

U.S. Geological Survey. *A Guide to Safe Field Operations*. Open-File Report 95-777. June 1996.

Water Quality Control Division. *SOP - Safety in the Field - 060109*. June 2009.

## 8.0 Document Version

2.0\_122216

## 9.0 Approval Signatures

1/4/2017

X Andrew Ross

Andrew Ross  
Environmental Data Unit - Acting Unit Mana...  
Signed by: Andrew Ross

1/3/2017

X Chris Theel

Chris Theel  
Environmental Data Unit - QA Officer

# Appendix A - Electronic Field Log Form

| WQCD FIELD LOG FORM  |           |                                       |
|--|-----------|---------------------------------------|
| * White cells are required   |           |                                       |
| Barcode Number:  |           | <input type="button" value="SUBMIT"/> |
| Sampler Initials:  |           | <input type="button" value="RESET"/>  |
| Station Metadata   |           |                                       |
| Station ID:  |           |                                       |
| Waterbody Name/Desc:   |           | Auto-populates                        |
| EQUiS Latitude:  |           | Auto-populates                        |
| EQUiS Longitude:   |           | Auto-populates                        |
| Captured New Coordinates? :  |           |                                       |
| GPS Method:  |           | * only if new coordinates             |
| GPS Device:  |           | *                                     |
| GPS Datum:   |           | *                                     |
| Sat Status:  |           | *                                     |
| Collection Date and Time   |           |                                       |
| Sample Date:   | 12/7/2016 | Refresh                               |
| Sample Time:   |           |                                       |
| Sample Collection Information  |           |                                       |
| Sampling Location:   |           |                                       |
| Instream Location:   |           |                                       |
| Collection Method:   |           |                                       |
| Filtering Equip:   |           |                                       |
| Filter Holder:   |           |                                       |
| Filter Paper Type:   |           |                                       |
| Filtering Method:  |           |                                       |
| Filter Count (used):   |           |                                       |
| Field Measurements   |           |                                       |
| Instruments Used:  |           |                                       |
| Calibration (on site):   |           |                                       |
| Measure Method:  |           |                                       |
| Stream Temp:   |           | °C                                    |
| Spec. Conductance:   |           | uS/cm                                 |
| pH:  |           | su @                                  |
| DO:  |           | mg/l                                  |
| Air Temp:  |           | °C                                    |
| Field Comments:  |           | enter, if necessary                   |
| QA / QC  |           |                                       |
| QA/QC Type:  |           |                                       |
| Blank Barcode:   |           |                                       |
| Duplicate Barcode:   |           |                                       |
| D.I. Water Month:  |           |                                       |
| Source:  |           |                                       |
| Bottles and Preservation   |           |                                       |
| Preservation:  |           |                                       |
| Chem Recv Lab:   |           |                                       |
| Micro Recv Lab:  |           |                                       |
| Panel:   |           |                                       |
| Bottle Set:  |           | Auto-populates                        |
| If not panel or is in addition to panel, check all individual bottles that apply ↓ |           |                                       |
| Metals 250 ml:   |           |                                       |
| Metals-F 250 ml:   |           |                                       |
| Neutrals 250 ml:   |           |                                       |
| Nutrients 250 ml:  |           |                                       |
| LL TN 125 ml:  |           |                                       |
| SVOC 1 L:  |           |                                       |
| E. coli 100 ml:  |           |                                       |
| BD Centr. 50 ml:   |           |                                       |
| Other Field Activity (check all that apply)  |           |                                       |
| Macroinvertebrates   |           |                                       |
| Habitat  |           |                                       |
| Pebbles  |           |                                       |
| Flow   |           |                                       |
| Updated Field Coordinates  |           |                                       |
| New Field Latitude:  |           | keyboard entry                        |
| New Field Longitude:   |           | keyboard entry                        |

# Appendix B - General Paper Field Log Form

**Sample Bar Code Label**

Start Time: \_\_\_\_\_ hrs    Sample Time: \_\_\_\_\_ hrs    End Time: \_\_\_\_\_ hrs

Site No. \_\_\_\_\_    Sample Collection Date: \_\_\_\_\_

Stream / Site Name \_\_\_\_\_

Location Description \_\_\_\_\_

GPS: Type \_\_\_\_\_ No. \_\_\_\_\_

Latitude \_\_\_\_\_ N    Longitude \_\_\_\_\_ W    Elevation \_\_\_\_\_

Map Datum \_\_\_\_\_    Sat Status \_\_\_\_\_

SAMPLE COLLECTION INFORMATION :    SAMPLER: \_\_\_\_\_

Sampling Location:     Bridge     Instream     Other     Left Bank     Thalweg     Right Bank

Collection Method:     From bridge w/bucket     Instream w/bucket     Instream direct

Filtering Equipment:     Geo Tech Pump     Syringe     Other \_\_\_\_\_

Filter Holder:     142 mm Geo Tech     47mm Swinnex     Other \_\_\_\_\_

Filter Paper Type:     142 mm Geo Tech     47mm Geo Tech     Other \_\_\_\_\_

Filtering Method:     Instream direct     From bucket     From sample container

Filters Used - Total Count:    Roughing \_\_\_\_\_    Final \_\_\_\_\_

De-Ionized Water:    Source \_\_\_\_\_    Date \_\_\_\_/\_\_\_\_/\_\_\_\_

Sample Bottles:    Source \_\_\_\_\_    Date \_\_\_\_/\_\_\_\_/\_\_\_\_

QA / QC Samples:    Yes  / No     Type:     Duplicate     Blank     Spike

QA / QC Sample Bar Code No:    \_\_\_\_\_

FIELD MEASUREMENTS:

Instruments Used:     In-situ     Quanta     YSI    Other \_\_\_\_\_    Other \_\_\_\_\_

Instruments Calibrated at this site?    Yes  / No     Meter Index No. \_\_\_\_\_

Measurement Method:     From bridge w/bucket     Instream w/bucket     Instream direct

Measurements:

Stream Temp \_\_\_\_\_ °C    Spc \_\_\_\_\_ uS/cm    DO \_\_\_\_\_ mg/L

pH \_\_\_\_\_ su @ \_\_\_\_\_ °C    T. Alk \_\_\_\_\_ mg/L    Air Temp \_\_\_\_\_ °C

Winkler DO \_\_\_\_\_ mg/L    Other \_\_\_\_\_    Other \_\_\_\_\_

Total Alkalinity calculation: \_\_\_\_\_

Other Field Activity (Check all that apply):

Habitat     RBP     Macroinvertebrate     Flow     Other \_\_\_\_\_

Field/Weather Observations and Comments: \_\_\_\_\_

\_\_\_\_\_

Samples Collected (Check all bottles that apply):

Metals: (250 ml) \_\_\_\_\_ Metals, Filtered (250 ml) \_\_\_\_\_ Metals (1 L) \_\_\_\_\_ Metals, Filtered (1 L) \_\_\_\_\_

Nutrient (250 ml) \_\_\_\_\_ Nutrient (1 L) \_\_\_\_\_ Neutral (1 L) \_\_\_\_\_ Neutral (250 ml) \_\_\_\_\_ Micro \_\_\_\_\_

Other \_\_\_\_\_

Samples on Ice: Yes  / No     Receiving Lab:    Chemical \_\_\_\_\_    Micro \_\_\_\_\_

Maps, Drawings, or Additional Comments on BACK

BAR  
CODE  
LABEL

BLANK

BAR  
CODE  
LABEL

DUPE

BAR  
CODE  
LABEL

SPIKE

# Appendix C - Request for Analytical Services



**Colorado Department of Public Health and Environment**

Laboratory Services Division  
 8100 Lowry Boulevard, Denver, CO 80230-6928  
 Phone: (303) 692-3090  
 Fax: (303) 344-9989

Sample barcode here

**REQUEST FOR ANALYTICAL SERVICES** Note: This form to be used from 7/1/15-6/30/17

**CUSTOMER**

Customer ID: 00000372  
 Name: CDPHE - WQCD - [Unit name here]  
 Address: 4300 Cherry Creek Drive South  
 City/State/Zip: Denver, CO 80246  
 Contact Name: [your name here]  
 Contact Phone: [your phone # here]  
 Contact Email: [your email address here]

**SPECIMEN INFORMATION**

Collected: [ ]-[ ]-[ ] M-D-Y Military: [ ] [ ] a.m.  
 [ ] [ ] p.m.  
 Collected by: [ ] Matrix: Surface Water

**SAMPLE SITE**

Station ID: [ ]  
 Stream Name: \_\_\_\_\_  
 Description: \_\_\_\_\_  
 Check if new station

**BOTTLE INFORMATION**

Check each box that applies

| BOTTLE        | M | PM | Neut | Nut | TN* | was | avac | BC | SI/O | H8 | Number |
|---------------|---|----|------|-----|-----|-----|------|----|------|----|--------|
| 250 ml        | 1 | 1  | 1    | 1   |     |     |      |    |      |    | 4      |
| 500 ml        |   |    |      |     |     |     |      |    |      |    |        |
| 125 ml        |   |    |      |     |     |     |      |    |      |    | 1      |
| 50 ml BD      |   |    |      |     |     | 1   |      |    |      |    |        |
| 1 Liter Amber |   |    |      |     |     |     |      |    |      |    |        |
| Micro         |   |    |      |     |     |     |      |    |      |    |        |
| Other         |   |    |      |     |     |     |      |    |      |    |        |

**TEST ORDER** (Check appropriate box)

| METALS   | NUTRIENTS  | OTHER  | MICROBIOLOGY   |
|--|--|--|--|
| <small>TRACE/ISS TOTAL</small><br><input type="checkbox"/> Aluminum<br><input type="checkbox"/> Antimony<br><input type="checkbox"/> Arsenic<br><input type="checkbox"/> Cadmium<br><input type="checkbox"/> Chromium<br><input type="checkbox"/> Copper<br><input type="checkbox"/> Hardness, Total<br><input type="checkbox"/> Iron<br><input type="checkbox"/> Lead<br><input type="checkbox"/> Magnesium<br><input type="checkbox"/> Manganese<br><input type="checkbox"/> Mercury<br><input type="checkbox"/> Nickel<br><input type="checkbox"/> Potassium<br><input type="checkbox"/> Selenium<br><input type="checkbox"/> Silver<br><input type="checkbox"/> Uranium<br><input type="checkbox"/> Zinc | <input type="checkbox"/> Nitrate/Nitrite<br><input type="checkbox"/> Nitrogen, Ammonia<br><input type="checkbox"/> Nitrogen, Kjeldahl<br><input type="checkbox"/> Nitrogen, Total<br><input type="checkbox"/> Phosphorus, Total<br><b>NEUTRALS</b><br><input type="checkbox"/> Alkalinity, Total<br><input type="checkbox"/> BOD/COD <small>(5-day)</small><br><input type="checkbox"/> Chloride<br><input type="checkbox"/> Conductivity<br><input type="checkbox"/> Fluoride<br><input type="checkbox"/> Nitrite/Nitrate <small>(5-day)</small><br><input type="checkbox"/> Phosphate, Ortho<br><input type="checkbox"/> Solids, Dissolved<br><input type="checkbox"/> Solids, Total Suspended<br><input type="checkbox"/> Solids, Total<br><input type="checkbox"/> Sulfate<br><input type="checkbox"/> _____ | <input type="checkbox"/> DOC<br><input type="checkbox"/> TOC<br><input type="checkbox"/> Cyanide, Direct<br><input type="checkbox"/> Sulfide<br><input type="checkbox"/> UV @ 254<br><input type="checkbox"/> Nonylphenol<br><input type="checkbox"/> _____<br><b>RADIOCHEMISTRY</b><br><input type="checkbox"/> Radium 226<br><input type="checkbox"/> Radium 228<br><input type="checkbox"/> _____ | <input type="checkbox"/> Total Coliform, PA<br><input type="checkbox"/> Fecal Coliform, MT<br><input type="checkbox"/> E. coli, MPN<br><input type="checkbox"/> _____<br><input checked="" type="checkbox"/> <b>TEST PANELS</b><br><input type="checkbox"/> WQCD Routine Panel<br><input type="checkbox"/> WQCD Trend Panel<br><input type="checkbox"/> CPW Panel<br><input type="checkbox"/> WQCD - Mine Impact Surface Water Pkg*<br><input type="checkbox"/> WQCD - Mine Impact Sediment Pkg*<br><input type="checkbox"/> WQCD - Mine Impact DW Wells Pkg*<br><input type="checkbox"/> WQCD - Mine Impact Fish Pkg*<br><input type="checkbox"/> Mining - Metals & Minerals<br><input type="checkbox"/> Mining - Nutrients<br><input type="checkbox"/> Additional Parameters |

| DEPOSITION                  | CHAIN OF CUSTODY  |          |            |
|-----------------------------|---|----------|------------|
| RELINQUISHED BY:            | DATE/TIME:  | RECV BY: | DATE/TIME: |
| RELINQUISHED BY:            | DATE/TIME:  | RECV BY: | DATE/TIME: |
| RELINQUISHED BY:            | DATE/TIME:  | RECV BY: | DATE/TIME: |
| TEMPERATURE AT RECEIPT: * C | LSD Internet Address: <a href="http://www.cdphe.state.co.us/tr/">http://www.cdphe.state.co.us/tr/</a> Form #251 - Revised: 03/16/2016 |          |            |