

**Standard Operating Procedures for the
Planning of and Field Procedures for
Conducting Monitoring Activity**

Colorado Department of Public Health and Environment
Water Quality Control Division
Environmental Data Unit

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(Revision 06)

Standard Operating Procedures – Planning and Field Procedures for Monitoring Activity

Overview

The Environmental Data Unit of the Water Quality Control Division exists to gather, analyze and report data regarding the chemical, physical and biological integrity and quality of state waters. This unit is responsible for designing and managing monitoring systems to support environmental policy and regulatory decision making; collection and analyzing physical, chemical, hydrological and biological samples in the field; preparing samples for laboratory analysis; and ensuring analytical results and field data are properly entered in a computerized information management system. The unit also conducts toxicity studies and interprets toxicity study results, but the scope of this SOP will address only planning of, and conducting field activities.

The intent of this SOP is to achieve the following:

- Outline a uniform policy in the planning of field activity (generation of monthly and weekly schedules and documentation of changes to schedules)
- Standardize documentation of field activities with field logs and uniform use of analysis request forms received from state or contract labs
- Standardize the use of common “field kits” for performing field activities, and ensure field personnel are using common procedures to complete field activities (relevant SOPs are to be used and followed when completing all field activities)
- Outline common QA/QC procedures to be followed by all personnel
- Ensure that a standard policy of sample delivery is used by all personnel

Through the implementation of this SOP, it is the goal of the Environmental Data Unit that all field activities are planned and conducted in a like manner, and with common procedures employed by all personnel when delivering samples to the laboratory. It will help to ensure that all environmental data is collected using the same techniques, is scientifically valid, defensible, and of known and acceptable precision and accuracy.

Planning, Scheduling of Monitoring Activities

Teams of at least two Environmental Data Unit staff members will complete all monitoring field activities done during times of hazardous sampling conditions (i.e. extreme winter conditions – hazardous ice or snow conditions). The staff member who has been assigned the responsibility of sampling a particular site will also be responsible for the scheduling of sampling activity and the coordination of sampling as a team. Unit staff working alone may complete sampling during times of “normal” sampling conditions. However, the location of sampling activity should always be made known to other staff within the Unit.

All staff planning monitoring activity, whether routine or a special study, will project a schedule of proposed monitoring activity, by month, and submit it for review by the 25th of the prior month. The staff member who has been assigned a particular set of monitoring sites will also be responsible for the scheduling of sampling activity, and if needed, the coordination of the sampling team. A schedule, which documents the work as completed for the month, will be submitted by the 5th of the following month. The schedules will be submitted in a uniform, agreed upon format. Both schedules will include the following information; sample delivery

date, the laboratory to which the samples are to be or were delivered (chemistry and micro), the sites where QA samples (sample blanks and sample duplicates) are projected to be (or were) collected, and the names of monitoring team members. Once a schedule of proposed monitoring activity has been submitted, it should only be modified by prior approval. If circumstances warrant an unapproved change, notification of that change should be made ASAP. The reason a sample was not collected should be noted in the comments column of the schedule (e.g. no flow, no access).

In addition to monthly schedules, a trip plan will be submitted by Friday of each week. The trip plan will include the following information: 1) A summary of the current week's planned monitoring activity (e.g. completed as planned, sites missed or unsampled and why - site dry or no access, etc.), or sites added and why. 2) A summary of any changes to the current month's monitoring plan to be included in the coming week's projected trip plan (sites to be added or deleted with explanation of why). 3) The projected trip plan for the coming week, which includes projected activity by day with estimated times of projected activity. See Trip Plan Template for acceptable format and required information (**Attached**).

A personal daily activity log will be maintained with copies of the week's entries submitted by the end of the day each Friday. To be included in this log will be daily vehicle mileage, work start time and end time, and details of activities throughout the day with associated times.

Monitoring schedules should have accommodations for the time necessary at weeks end to complete the weekly trip plan (see Trip Plan discussion above), and to submit copies of the week's field log book entries and daily activity log entries, and with the last week of the month left open for data entry, completion of a projection of the next months monitoring schedule, and to submit a revised schedule of the present month which reflects the actual monitoring completed for the month. NO samples are to be collected on holidays or weekends, unless granted prior approval.

Site Numbers and Documentation of a Sampling Site Location

No sampling of a monitoring site shall take place until a site has been given a site identification number and the site location has been documented and monumented. Please refer to the SOP that describes the process of creating a new site identification number, and the SOP for establishment and documentation of a sampling site location for complete details. Site identification numbers are not to be modified or created, except as described in the SOP. A sampling site location is not to be modified or established, except as described in the SOP (**Attached**).

Preparing for Field Activity

After a schedule of projected field activity has been completed, adequate supplies to complete the plan will have to be obtained. In addition to preparing field equipment (cleaning filtering equipment, meter calibration checks), a check of other supplies should be made (sampling bottles, DI water, filter membranes). 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 container and preservative, and maximum sample holding time is attached. It will be necessary to have extra bottles on hand, but they should not be left unused for long periods. It is important

to note how long 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. A checklist is **attached** and should be reviewed before leaving on a field trip.

Self Generated Bar Code ID and Number

Every sample and sample set will have a unique bar code ID and number generated prior to the time the sample is collected, including QA samples. Bar codes and numbers will be generated as outlined below:

Required objects:

- code 39 fonts installed on your computer
- the template located at J:\WSMON\barcode

Barcode number generation:

This number is a nine digit number that is bracketed by *. 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 digit is an assigned block identifier which will relate to the group number (Monitoring Plan Sampling Group #, Assigned Program #).

The block identifier will be assigned as follows:

- Group 1: 20101xxxx
- Group 2: 20102xxxx
- Group 3: 20103xxxx
- Lakes: 20104xxxx
- Other programs as needed, whenever water quality samples are collected (e.g. Bio-Hab, TMDL, Standards): 20105xxxx, 20106xxxx, etc

The remaining four numbers in the bar code are sequential numbers. This will allow for 100,000 sampling events to be uniquely identified in a fiscal year. Each person will be responsible for making sure that each number used in their block is unique. A spreadsheet suggesting a method for tracking these numbers is located at J:\WSMON\barcode titled "barcode tracking suggestion".

Barcode label printing:

A template has been generated to assist in the creation of our barcode labels, it can be found at J:\WSMON\barcode. When you open the template it will appear to be full of blank labels. There will be a security warning bar at the top of the window. Click on the options button, and enable the content. Then click on the view tab, and then click macro button. Run the bar code titled "autobarcode". A popup window will ask you to enter the bar code number you wish to apply to the labels. Once you hit "ok" it will generate a column of labels. To generate the next column of bar codes place the cursor at the top of the column and re-run the macro. The barcodes on the template are generated with a font. If you need to add this bar code to a different document the font used is named "free 3 of 9".

Barcode label use:

Attach a label for each sampling event where a sample was gathered to your field log book. If the sampling event has blanks or dupes place those labels on the field log for the sampling event for which they were gathered.

When filling out the request for analytical service place the bar code in the area labeled "Sample Site". Leave the areas labeled "customer ID" and "sample type" blank. Fill out the remaining sections of the form as before.

Barcode field data entry database:

The field logs will now be scanned as pdf files instead of copied. These pdf's should be stored in the proper folder in the subdirectory J:\WSMON\Field_data_data_entry\Fieldlogs.

The database that the field data will be entered in is located at J:\WSMON\Field_data_data_entry. The database is named fielddata.accdb. To open the data entry table double click on the table named Fielddata. Some fields in the table are required and will not let you move to the next record unless all required fields are entered. The required fields are: barcode, site_ID, date, time, log_image, and fiscal_year. To enter the link for the log_image right click on the field and select the hyperlink option, then select edit hyperlink. Then navigate to the proper file, select it, and press ok. An alternate data entry method would be to use the template located in the folder J:\WSMON\Field_data_data_entry. The yellow columns represent the required fields if these are not filled out you will not be able to import the file. Once you have the records in the data file the way you want them copy all of the records you want to import. Open the fielddata table in the database, then paste append the copied records into the table. If there are records that the database does not like it will create a table named paste errors and move those records there.

Field Documentation

All staff will document all monitoring activity using standard field logbooks, which contain pre-printed field log forms. Each sampling event will have its own log entry, with all pertinent data requested on the log form provided. Each log entry will include at least the following; sample date and sample customer ID number, site number and description, sample collector's name, site latitude and longitude and associated GPS documenting data, start/sample/end times, how and where the sample was collected (e.g. off bridge with bucket, left/right stream bank – determined while facing *upstream*), whether samples were collected directly into the sample container or poured out of a bucket, all field measurements and how the measurements were taken (e.g.

directly out of the stream, out of a bucket), sample filtering information, observations and comments, and summary of QA activity if any.

All documentation will be done at the time of sampling using the Division's preprinted and formatted "Monitoring Field Log" notebook. A separate entry will be made for each site visit, including site visits which result in no sample collected. Each log entry will be made to include all requested information on the preprinted and formatted page. A LSD request for analytical services form will be completely filled out as per directions for completing the form (**Attached**), for each sample set. As much of the form as possible will be filled out prior to field staff leaving for the field (only sample collection time, date, and Customer ID needs to be completed at the time of sample collection).

Those involved in routine sampling will keep a personal activity log, and for special studies, a field log specific to that project will be maintained (a separate log for each team involved in the project). Logbooks are to be kept in a known location in the office, when monitoring personnel are not in the field.

All electronically recorded meter field data will be downloaded at a minimum, by the last Friday of the month in which the monitoring was completed. Time permitting, weekly downloads are preferable.

Sampling Containers

Sampling containers will be labeled using pre-printed labels using the accepted preformatted template. Although the labels must be prepared prior to leaving for the field, the labels will not be placed on the sampling containers until just before the samples are collected. The following information will be included on the labels for all sampling containers:

- Site number and the short site description
- Date and time (fields for this information should be included on the label, but this information should not be added to the label until the sample is actually collected)
- Collector's initials

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

Standardized Field Kits/Mandatory Use of SOPs

Kits, which include the same or comparable field meters and equipment, will be provided to all staff performing field activities. The appropriate SOP(s) will be followed when conducting all fieldwork, without modification. Modifications in field procedures will be made only after a proposed change to an SOP is reviewed and approved, and with subsequent incorporation into the SOP.

All staff conducting monitoring activity must have the notebook of Unit SOP's available at all times while in the field.

Back-up equipment should be taken when available (e.g. meters, probes, batteries).

QA/QC

Self-checks should be performed at least weekly, or whenever a meters operation is in doubt. A self-check can be done through meter calibration, the use of a reference sample, repeating field titrations periodically, use of pH test strips to confirm meter readings, etc. The results of all self-checks will be documented in the field logbook. Change pH buffers frequently, at least once a month. Meters should be calibrated before use each day, and per instructions in the operations manual. A calibration and logbook will be kept with each meter.

At the end of each sampling day, the following end of day calibration procedure will be completed:

- Check pH and conductance against standard and record these results in the field log. Do not make adjustment to the meter at this time, just document the results
- DO need not be included in this end of day calibration

At the beginning of each week, or prior to departing on a monitoring trip, the following reference standard check will be completed:

- DO – In lab, after air calibration, compare meter reading taken from bucket of stable water, and compare these results with the last posted Winkler result taken from the water from the bucket and document results
- pH and conductance – after calibration, compare reading taken from reference solutions and document results

All staff maintaining their own field meters will schedule a monthly QA check through LSD. Staff checking out meters for a special study will perform a QA check of all meters before taking equipment into the field.

At a frequency of 10%, repeat field titration (2 to 3 times) and record each result. For all monitoring activity, a duplicate sample set will be collected at a frequency of 10% of total sample sets collected. Sample blanks, of all sample types, and filter blanks should be collected one per sample trip, or one per week if you are out for entire week or several days at a time. Field duplicates and field blanks will be collected as discussed below:

▪ **Field duplicates**

Field duplicates will be field sample replicates and will be used to determine field precision. Duplicate samples are a set of similar samples collected from the same site, at about the same time, and analyzed in the same manner. Duplicate samples may be equated to “fraternal twins” in that they originate from one source but each sample may contain a slightly different chemical composition.

The samples are to be collected concurrently. If sample containers are filled directly from the source water, like sample containers will be filled side-by-side. If a sampling device is used (e.g. bucket), fill like sample containers from the sampling device, and then move on to the next type of sample container. For filtered samples, use two separate set-ups to filter the source water. This would require cleaning and rinsing the filtering set-up, and then preparing the filtering equipment for a second sample, if only one filtering set-up is available.

- **Field blanks**

Field blanks help to ensure that sampling equipment, sampling containers, and de-ionized rinse water is effectively cleaned and/or free from contaminants that may be introduced into a sample via the equipment or rinse water. Field blanks, which also can be referred to as equipment blanks, are blank solutions (solutions of de-ionized water) that are processed through the equipment used for collecting and processing an environmental sample. Four types of surface water quality sampling equipment have blank samples taken from them: 1) the de-ionized water container, 2) the sample container, 3) the filter apparatus, and 4) the sample collection device (bucket). If a bucket is used during sample collection, a “bucket blank” should be taken at least once a month. Rinse the bucket with D.I. water after sample collection and then pour D.I. water from the bucket into the appropriate sampling container. If a filter blank is taken from a bucket, the bottle should be labeled as a “Filtered” Metals Bucket Blank. For special studies, each team should collect a sample blank and filter blank, and “bucket blank” if appropriate, at least once during the study.

Fill sample containers for field blanks directly from the D.I. source. For filtered samples, set-up the filtering equipment as for a routine sample, but use D.I. water for the source water, and filter as you would a routine sample.

Complete a separate LSD Request for Analysis form for each QA/QC sample collected, and generate a sample Customer ID number as you would a routine sample. Each QA/QC sample will be associated with a specific monitoring site (e.g. Site #12345 – DUPE, Site #12345 – Bucket Blank, Filtered Metals).

Each month’s projected monitoring schedule will indicate the sites where QA/QC samples are planned to be collected.

Oversight of monitoring activity may occur at any time. Field staff should be prepared to accommodate staff performing oversight activity at any time.

Delivery of Samples – Chain of Custody

All samples will be submitted with a completed LSD “Request for Analytical Services” form for each sample set. The form should be completed per instructions for completing the form. All requested information is to be provided. Samples are to be immediately placed in a cooler with

some type of cold pack and delivered to the lab, or shipped as soon as possible after sample collection. If samples are to be shipped, do not ship with ice, but with some type of self-contained cold pack. Sample holding times should be accounted for when a schedule is projected, and samples delivered to meet all holding times. If samples will be delivered on a Friday, samples should be to the lab by 2PM. Chain-of-custody should be documented using a separate "Chain-of-Custody Report" form (attached) for every sample collected, or by utilizing the "Chain-of-Custody" sign-off at the bottom of the LSD "Request for Analytical Services" form.

Appropriate sample handling protocol should be observed when shipping or delivering samples (samples should be kept in a cooler with ice packs whether shipped or self delivered, maintain chain-of-custody at all times). The temperature of the samples at the time of delivery is to be documented on the "Chain-of-Custody Report" form, or at the bottom of the LSD "Request for Analytical Services" form. The temperature will be taken from a "temperature blank" within the cooler, or some other comparable means.

Instructions for Completing LSD “Request for Analytical Services” Form (Numbered sections below refer to specific sections of the form - See Example Form)

Completing the Form

- Use only permanent ink pen (blue or black), with ball point or roller tip (**no pencil, no felt tip pens**) to complete the form
- If a correction must be made, strike out the incorrect entry with a single line, and initial
- Request for Analytical Services forms will be distributed from within the unit. In the interest of maintaining Quality Control, and to ensure that the same request form is being used by all, only forms distributed from within the unit should be used
- If a sample “**Blank**”, “**Duplicate**”, or other type of QA sample is collected along with the associated sample, **COMPLETE A SEPARATE FORM FOR EACH QA SAMPLE SET AND QA SAMPLE TYPE SUBMITTED.**

1) CUSTOMER

- Information in this area will be preprinted, and will be specific to the program requesting analytical service
- The Contact and Phone fields will be the designated contact for the specific program requesting the analysis

2) Sample Site

- Place only the Bar Code Label and Number here. **Make no indication of the sample type or description of the sample site.**

3) Sample Bar Code Id and Number (to replace Sample Customer ID No.)

- Generate unique Bar Code IDs and numbers as described in “Standard Operating Procedures for the Planning of and Field Procedures for Conducting Monitoring Activity”. Each QA sample set submitted will be counted in the numerical sequence of the week day, with each QA sample type collected counted separately.

4) Sample Information

- Complete collection date and time as directed on form
- Collector’s complete name must be written into the box adjacent to “Collected by:”, and the collector should enter their name the **same** way every time a form is submitted (e.g. first initial and full last name, full first and last name)
- Box adjacent to Matrix should be completed only if matrix is not water
- **Do Not** check the boxes that describe sample. This is a QA/QC step to ensure the

- lab has no indication if the sample set is for QA purposes or is the routine sample
- Indicated appropriate Panel on the line adjacent to “Test Panel”

5) Sample TYPE and BOTTLE INFORMATION

- Do not check the box which describes the sample 's purpose. This is a QA/QC step to ensure the lab has no indication if the sample set is for QA purposes or is the routine sample
- Mark box(es) which describe the sample bottle(s) with the number of each kind to be turned in and indicate the total number of bottles at the far right

6) Test Order Box

- If individual tests are to be ordered in addition to those on the requested Test Panel, check the appropriate boxes (or check box and write in requested test). Include a brief comment explaining the reason for the request
- Field test data should be written into the appropriate boxes
- Check appropriate boxes to indicate Radiochemistry or Microbiology tests to be ordered (or check box and write in requested test)

7) Chain of Custody

- Staff submitting samples will sign their name next to “RELINQUISHED BY:”, and also indicated the date and time, when the samples are received by LDS staff (LDS staff will also sign for samples received, including their name, date/time, and indicate the temperature at which the samples were received)
- If samples are to shipped, staff will sign their name, and indicated the date and time the shipping container was sealed and left for shipment

Trip Plans and Template

Summary of activity projected in previous week's trip plan (show the date range, Monday to Friday)

- If monitoring activity was completed as projected in trip plan the summary should simply state that monitoring was completed as projected in the trip plan
- If there were changes to the trip plan (sites missed, sites added, or a change in the day of projected sampling), summarize the changes that were made and why
- Changes forced due to circumstances encountered while trying to sample or access a particular site should be documented and explained in the summary

Summary of changes to current month's projected monitoring plan in the trip plan being projected for the coming week (show the date range, Monday to Friday)

- If only sites projected in current month's monitoring plan are to be sampled, state no expected changes to monitoring plan
- If sites other than those projected in the current month's monitoring plan are to be included in the projected trip plan, list the sites and the reason for the addition to the week's trip plan. Or if deleting a site from the month's monitoring plan, explain the reason why.

Trip plan for the coming week (show the date range, Monday to Friday)

- Include all sampling related activity (all prep work – equipment prep, supply prep, etc.) for each day. If, for example, you plan no trip related activity until midweek, indicate as follows, and proceed with trip details for the remainder of the week (or if no monitoring

activity planned for the entire week, trip plan should state no monitoring activity planned for the week):

Monday - No trip related activity planned

Tuesday - 1 to 2 hours prep time at the lab pm. Leave lab at 1700 for home with van and leave from home the next morning

Wednesday - Leave from home 0700. List the sites you expect to sample and the expected end time for the day, and sample delivery plans (e.g. Ecoli samples to be hand delivered or shipped to what lab with times, and delivery plans for water chemistry samples). If staying out overnight, expected arrival time at motel. If a one day trip, include end time with sample delivery details, with expected times to return to office/lab/home.

Thursday - If a multi-day trip, expected time to leave motel and the list of sites expected to be sampled. Include expected end time for the day and sample delivery details. If you expect to conclude the trip today, include your expected return time to Denver/office/home, along with the sample delivery details.

Friday - If samples to be delivered today, include expected delivery time and return to office. If trip was completed prior to Friday, state no trip related activity planned for today.

See Trip Plan Template on following pages.

Brief description of daily itinerary

Day	Date	Travel	Location of Field Activity	Overnight Location
1		From :		
		To :		
		Departure :		
2		From :		
		To :		
		Departure :		
3		From :		
		To :		
		Departure :		
4		From :		
		To :		
		Departure :		
5		From :		
		To :		
		Departure :		

Check other forms completed

- () **Emergency contacts (Form B)**
- () **Medical information (Form C)**
- () **Safety planning and needed gear checklist (Form D)**
- () **Map/info for emergency care facility nearest to field activity location**

Form C - MEDICAL INFORMATION

(Note: carry on person during field activity)

Prepared by

Name _____ Date _____

List One or More Personal Doctors

Name	Speciality	Office Phone	Cell phone

Medical Conditions

Allergies and Other Medical Condions	Medications Being Taken	Medications to Avoid

Relevant Medical History

Special Instructions

Field Sampling Checklist

Meters		
pH meter – Calibrated?		spare probes - temp. / pH, storage and fill solution
Fresh Buffers		
- 7		
- 4		
- 10		
D.O. meter – Calibrated to Elevation?		
-Temp./Elevation/Oxygen Solubility Table		spare parts, DO membranes and solution
GPS		
Flow meter		
- rod, tape, spikes and/or clamps		
Extra Batteries?		
- AA		
- C		
- D		
- 9 volt		
Miscellaneous Supplies		
Pens (black, blue), Sharpies		Clipboard, notebook
Pencils		Camera & film
Calculator		Ziploc baggies
Logbook		Plastic wrap
LARS request for analysis forms		Aluminum foil
Map book – atlas		Paper towels
SOP's		

	Sampling gear		QA/QC Supplies
	Hipboots, chest waders		D.I. Water
	Bucket, dipper, rope		Reference Sample
	Extra buckets		Conductivity Standard
	Ice chests		pH test strips
	Water proof gloves		Logbook
	Disposable gloves		
	<u>Filtering equipment</u>		
	- membranes (.45 micron/47 or 142mm)		
	- Prefilters		
	- Syringes Clean?		
	- swinnex disc filter holder and o-rings Clean?		
	- plate type filter holder for 142mm filters with o-rings and support screens Clean?		
	- Forceps, nonmetallic		
	- Geotech pump and tubing		
	<i>Titration Equipment – Total Alkalinity</i>		Sample Bottles
	- beaker/flask, 25 ml. Pipette, pipette		metals _____ ml #
	bulb, 0.02 N sulfuric acid, mixed		neutral _____ ml #
	indicator, self-leveling buret		neutral _____ ml #
	Dump bucket		mercury _____ ml #
	D.I. water __ carboys		nutrient _____ ml #
	ice cubes __ bags		sulfide _____ ml #
			bacti _____ ml #
			CN _____ ml #

Procedures for the Establishment and the Documentation of a Sampling Site Location When First Implementing a New Monitoring Plan

- 1) Site Assignments are made.
- 2) Initial site visit is coordinated between at least the field technician assigned the site and a researcher.
- 3) Establishment and documentation of the sampling site.
 - During the first visit, the team will decide on the best sampling location to represent the site selected.
 - The latitude/longitude of the designated location will be taken and entered into the field log book (the method used to determine latitude/longitude as well as the geo datum used should also be noted in the field log).
 - GPS unit should be set for decimal minutes to the third place and with the map datum set to WGS 84
 - Note the GPS unit used to take the lat./long. reading and the satellite status when the lat./long. reading is taken
 - A detailed site description of the sampling location will be entered into the field log book, including:
 - The site number
 - Date of site visit
 - Surveyors' names
 - All the necessary directions to return to that exact location
 - All the necessary directions to describe the exact location of where the sample is to be collected at the selected site
 - The county in which the site is located
 - A short description of the sampling location will be entered into the field log book, with this description used to label sampling containers and on lab request for analysis field forms for ALL samples collected from this location, with NO variation of this description, NO EXCEPTIONS.
 - The site location should be “monumented” by any reasonable means (e.g. surveyor's tape, stake).
 - Photograph the site looking both upstream and downstream.
- 4) Site Documentation Report
 - Upon completion of the trip the team is responsible for completing a report that documents all of the information outlined above. The report will be filed electronically at a site provided to record site locational information. A standard format to be used is now under development. Included as a part of the report will be a copy of the portion of a topo map with the site location clearly marked.
 - The HUC for each site should be included with this report.
- 5) All site locational information will be coordinated through designated Unit lead worker.

Standard Operating Procedure Site Photo Documentation

Colorado Department of Public Health and Environment
Water Quality Control Division

Revised: July 2009

OVERVIEW

Photographs provide an excellent visual representation of conditions at a given point in time, and can be used to aid documentation of a monitoring site location. Photographs supplement data collection at a monitoring site, and provide a minimum monitoring effort at other sites where data is not collected. Site photographs are intended to supplement the locational data collected for a permanent record of a monitoring site location.

Photography is easy and inexpensive, but still requires careful thought to provide meaningful information on site condition and location. Consistency is necessary to assure that photographs taken over time are comparable.

DATA COLLECTION PROCEDURE

Take photographs upstream and downstream of the selected site of sample collection. Take the photos from the side of the stream that most effectively shows the important characteristics and landmarks that would be the most help in identifying the site. A third photograph of some easily recognized landmark near the site will be taken as an aid to help verify the sampling location.

Select additional photo points as needed to illustrate particular problems at the site, or as a reference location for photo points. Include permanent landmarks such as ridge lines in the photo to assure that the scene can be relocated by a different observer.

A written record will also be made in the field logbook, which describes the photos taken, and pertinent information on site location.

PHOTOGRAPH DATA STORAGE PROCEDURE

A permanent record of the photographs taken will be maintained by monitoring staff responsible for monitoring activity at that specific site. A “photo library” will be maintained on the EDU network drive, and identified for the staff responsible. Staff should also maintain their own

personal copy of the “photo library” for their specific sites. A copy of the photographs taken will be included as part of the site documenting information included in the “Field Monitoring Notebook” prepared by field staff for their group of monitoring sites, for the current fiscal year.

EQUIPMENT LIST

1. Digital Camera
2. Monitoring Field Logbook

Required Containers, Preservation Techniques, Holding Times, Analytical Method, and Practical Detection Limit

Colorado Department of Public Health & Environment
Chemistry and Microbiology
January 2001

EPA PARAMETER	METHOD #	PQL*	HOLDING TIME	SAMPLING CONTAINER**	PRESERVATIVE
Metals		ug/L			
ALUMINIUM	200.7	50	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
ANTIMONY	200.8	0.2	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
ARSENIC	200.8	1	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
BARIUM	200.7	5	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
BERYLLIUM	200.8	0.8	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
BORON	200.7	30	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
CADMIUM	200.8	0.6	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
CHROMIUM	200.7	20	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
CHROMIUM, HEX.	200.8	0.6	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
	218.5	10	24 hours	P,G-AW	Cool, 4°C
COBALT	200.7	20	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
COPPER	200.7	5	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
IRON	200.7	10	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
LEAD	200.8	0.8	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
LITHIUM	200.8	1	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
MANGANESE	200.7	2	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
MERCURY	245.1	0.1	28 days	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
MOLYBDENUM	200.7	50	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
NICKEL	200.7	30	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
SELENIUM	200.8	0.7	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
SILICON	200.7	20	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling

SILVER	200.8	0.6	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
THALLIUM	200.8	0.7	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
TITANIUM	200.7	20	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
URANIUM	200.8	1	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
VANADIUM	200.7	20	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
ZINC	200.7	10	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling

Minerals		mg/L			
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ALKALINITY	SM 2320 B	10	14 days	P,G	Cool, 4°C
CALCIUM	200.7	0.02	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
HARDNESS	130.2	1	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
MAGNESIUM	200.7	0.02	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
POTASSIUM	200.7	0.3	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling
SODIUM	200.7	0.2	6 months	P,G-AW	HNO3 to pH<2, w/in 10 days of sampling

Nutrients		mg/L			
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AMMONIA	350.1	0.03	28 days	P,G	Cool, 4°C - H2SO4 to pH<2
KJELDAHL	351.2	0.5	28 days	P,G	Cool, 4°C - H2SO4 to pH<2
NITRATE/NITRITE	353.2	0.3	28 days	P,G	Cool, 4°C - H2SO4 to pH<2
NITRITE	SM 4500-NO2-B	0.02	48 hours	P,G	Cool, 4°C
o-PHOSPHATE	365.2	0.02	48 hours	P,G	Cool, 4°C
TOTAL PHOSPHATE	365.1	0.01	28 days	P,G	Cool, 4°C - H2SO4 to pH<2

Miscellaneous		mg/L			
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BOD	SM 4500-C	1	48 hours	P,G	Cool, 4°C
CHLORIDE	300	2	28 days	P,G	None Required
CHLORINE	330.1	0.1	2 hours	P,G	None Required
COD	410.1	30	28 days	P,G	Cool, 4°C - H2SO4 to pH<2
CONDUCTIVITY	120.1	0.1	28 days	P,G	Cool, 4°C
CYANIDE, DIRECT	335.2	0.01	14 days	P,G	Cool, 4°C-NaOH to pH>12
CYANIDE, DISTILLED	335.1	0.01	14 days	P,G	Cool, 4°C-NaOH to pH>12
FLUORIDE	SM 4500F C	0.1	28 days	P	None Required
OIL & GREASE	413.1	5	28 days	G	Cool, 4°C - H2SO4 to pH<2
pH	SM 4500-H+-B	N.A.	2 hours	P,G	None Required
PHENOL	420.1	0.1	28 days	G, teflon lined cap	Cool, 4°C - H2SO4 to pH<2
SOLIDS, DISSOLVED	160.1	10	7 days	P,G	Cool, 4°C
SOLIDS, SETTABLE	160.5	0.5	48 hours	P,G	Cool, 4°C

SOLIDS, SUSPENDED	160.2	10	7 days	P,G	Cool, 4°C
SOLIDS, TOTAL	160.3	10	7 days	P,G	Cool, 4°C
SOLIDS, VOLATILE SULFATE	160.4	10	7 days	P,G	Cool, 4°C
SULFIDE	300.0	3	28 days	P,G	Cool, 4°C
	376.2	0.1	7 days	P,G	Cool, 4°C-Zinc acetate+NaOH to pH>9

Radioactivity	pCi/L				
ALPHA	900.0	3	6 months	P,G	HNO3 to pH<2
BETA	900.0	8	6 months	P,G	HNO3 to pH<2
RADIUM 226	903.0	1	6 months	P,G	HNO3 to pH<2
RADIUM 228	904.0	1	6 months	P,G	HNO3 to pH<2

Microbiology	CFU				
TOTAL COLIFORM	9221B	1.1	24 hours	P,G-S	Cool, 4°C-0.008% Na2S2O3
FECAL COLIFORM	9221E	1.1	24 hours	P,G-S	Cool, 4°C-0.008% Na2S2O3
E. COLIFORM	9223B	1.1	24 hours	P,G-S	Cool, 4°C-0.008% Na2S2O3

*PQL=Practical Quantitation Level in Clean Matrix

ug/L=Micrograms per Liter

mg=Milligrams per Liter

pCi/L=Picocuries per Liter

**P=plastic

G=glass

S=sterile

AW=acid washed

Certification of Agreement to Abide By and Acknowledgement of Understanding of this Standard Operation Procedure – For the Planning of and Field Procedures for Conducting Monitoring Activity, CDPHE – WQCD – Monitoring and Assessment Unit (April 2007 – Revision 04)

I _____ (Print Name) have read, and understand, and agree to abide by the procedures and policies outlined in this document.

Signature

Date

Signature – Unit Manager

Date