

Appendix A – Chlorophyll a Photo Packet



REACH PHOTO: 10 mg/m²



REACH PHOTO: 38 mg/m²

Collect chlorophyll at sites where growth is estimated to be >50 mg/m². If in doubt, collect a sample



REACH PHOTO: 44 mg/m²



REACH PHOTO: 96 mg/m²

Collect chlorophyll at sites where growth is estimated to be >50 mg/m². If in doubt, collect a sample



REACH PHOTO: 152 mg/m²



REACH PHOTO: 154 mg/m²

Collect chlorophyll at sites where growth is estimated to be >50 mg/m². If in doubt, collect a sample



SUBSTRATE PHOTO: 15mg/m²

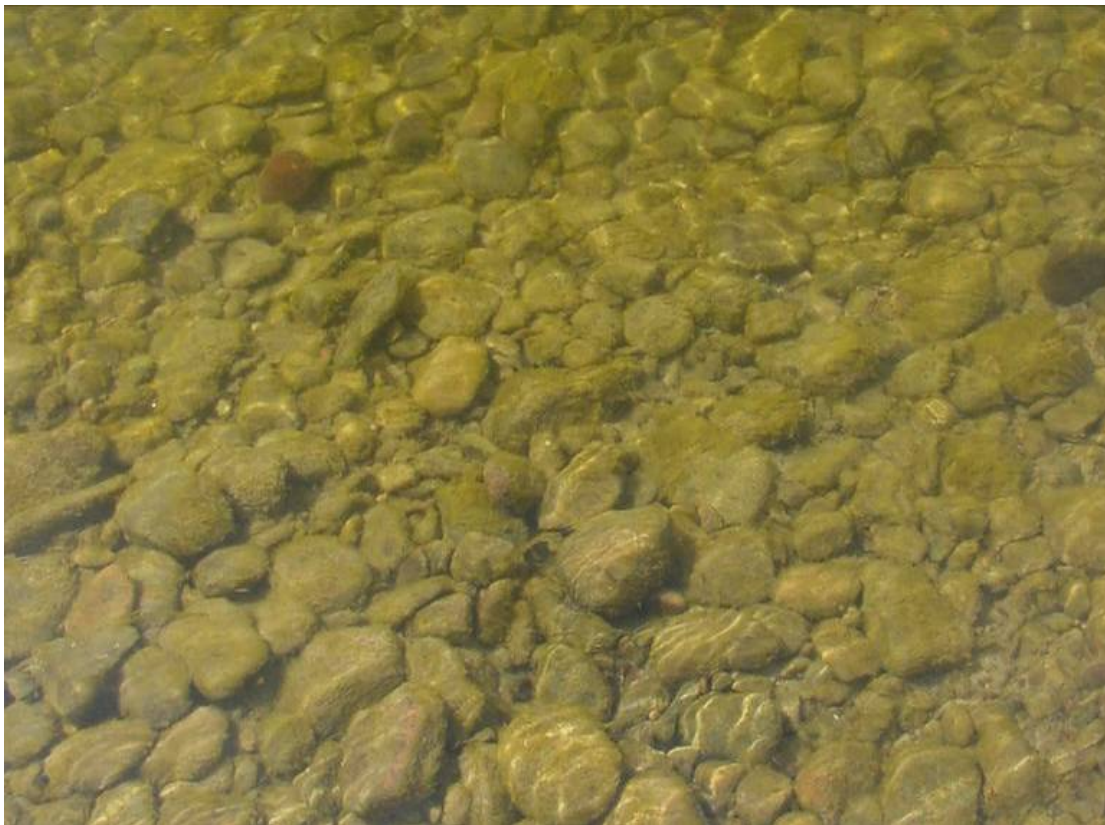


SUBSTRATE PHOTO: 23mg/m²

Collect chlorophyll at sites where growth is estimated to be >50 mg/m². If in doubt, collect a sample



SUBSTRATE PHOTO: 44 mg/m²



SUBSTRATE PHOTO: 60 mg/m²

Collect chlorophyll at sites where growth is estimated to be >50 mg/m². If in doubt, collect a sample



SUBSTRATE PHOTO: 106 mg/m²



SUBSTRATE PHOTO: 137 mg/m²

Collect chlorophyll at sites where growth is estimated to be >50 mg/m². If in doubt, collect a sample

Appendix B

[Boulder-Elkhorn Planning Area]

**Analyte Checklist with Analytical Method, Required Reporting Limit,
Collection Container, Preservation Method, and Holding Time**

Analysis	Parameter	Preferred Method	Alternate Method	Req. Report Limit ug/L	Holding Time Days	Bottle	Preservative
Water Sample - Common Ions and Physical Parameters							
<input checked="" type="checkbox"/>	Total Suspended Solids (TSS)	EPA 160.2	A 2540D	4000	7	1L HDPE	≤ 6°C
<input type="checkbox"/>	Total Dissolved Solids (TDS)	EPA 160.1	A 2540C	4000	7		
<input type="checkbox"/>	Total Alkalinity	EPA 310.2	A 2320B	1000	14		
<input type="checkbox"/>	Sulfate	EPA 300.0	A 4110 B	50	28		
<input type="checkbox"/>	Chloride	EPA 300.0		50	28		
<input type="checkbox"/>	Dissolved Organic Carbon (DOC)	A 5310 B			28	125ml Glass	Filt. 0.45 um, H ₂ SO ₄ , ≤6°C
<input type="checkbox"/>	Sulfide	A 4500-S2 D			7	250 ml. HDPE	Zinc Acetate + NaOH to pH >9, ≤ 6°C
Water Sample - Calculated Results							
<input checked="" type="checkbox"/>	Total Hardness as CaCO ₃ Note 1	A 2340 B (Calc)	EPA 130.1	1000			
<input type="checkbox"/>	Sodium Absorption Ratio (SAR)	Calc					
Water Sample - Nutrients							
<input checked="" type="checkbox"/>	Total Persulfate Nitrogen (TPN)	SM 4500-N C	A 4500-N-B	50	30	250ml HDPE	≤ 6°C
<input type="checkbox"/>	Dissolved Orthophosphate as P	EPA 365.1	A 4500-P F	1	2 (28 if frozen)	125ml HDPE	Filt. 0.45 um, ≤ 6°C or frozen
<input checked="" type="checkbox"/>	Total Phosphorus as P	EPA 365.1	A 4500-P F	5	28	500ml HDPE	H ₂ SO ₄ , ≤ 6°C
<input checked="" type="checkbox"/>	Nitrate-Nitrite as N	EPA 353.2	A4500-NO3 F	10			
<input type="checkbox"/>	Total Ammonia as N	EPA 350.1	A4500-NH3 B, C, D, E, or G	50			
Water Sample - Dissolved Metals (0.45 um filtered)							
<input checked="" type="checkbox"/>	Aluminum	EPA 200.7	EPA 200.8	30	180	250ml HDPE (Note 2)	HNO ₃
<input type="checkbox"/>	Cadmium	EPA 200.8		0.08			
<input type="checkbox"/>	Chromium	EPA 200.8	EPA 200.7	1			
<input checked="" type="checkbox"/>	Copper	EPA 200.8	EPA 200.7	1			
<input checked="" type="checkbox"/>	Iron	EPA 200.7		50			
<input checked="" type="checkbox"/>	Lead	EPA 200.8		0.5			
<input type="checkbox"/>	Silver	EPA 200.8	EPA 200.7	0.5			
<input checked="" type="checkbox"/>	Zinc	EPA 200.7		10			
<input type="checkbox"/>	Antimony	EPA 200.8		3			
<input type="checkbox"/>	Barium	EPA 200.7	EPA 200.8	5			
<input type="checkbox"/>	Beryllium	EPA 200.7	EPA 200.8	1			
<input type="checkbox"/>	Boron	EPA 200.7	EPA 200.8	10			
<input type="checkbox"/>	Manganese	EPA 200.7	EPA 200.8	5			
<input type="checkbox"/>	Nickel	EPA 200.7	EPA 200.8	10			
<input type="checkbox"/>	Thallium	EPA 200.8		0.2			
<input type="checkbox"/>	Uranium, Natural	200.8		30			

Analysis	Parameter	Preferred Method	Alternate Method	Req. Report Limit ug/L	Holding Time Days	Bottle	Preservative
<input type="checkbox"/>	Chromium VI	EPA 218.6	A 3500-Cr E	10	28	125ml HDPE	Filt. 0.45 um, ≤ 6°C, pH 9.3-9.7 with Ammonium Sulfate buffer solution added per EPA 218.6
Water Sample - Total Recoverable Metals							
<input type="checkbox"/>	<i>Total Recoverable Metals Digestion</i>	EPA 200.2	A 3030F (b)	N/A	180	500ml HDPE	HNO ₃
<input checked="" type="checkbox"/>	Arsenic	EPA 200.8		3			
<input checked="" type="checkbox"/>	Cadmium	EPA 200.8		0.08			
<input type="checkbox"/>	Calcium	EPA 200.7		1000			
<input type="checkbox"/>	Chromium	EPA 200.8	EPA 200.7	1			
<input checked="" type="checkbox"/>	Copper	EPA 200.8	EPA 200.7	1			
<input checked="" type="checkbox"/>	Iron	EPA 200.7		50			
<input checked="" type="checkbox"/>	Lead	EPA 200.8		0.5			
<input type="checkbox"/>	Magnesium	EPA 200.7		1000			
<input type="checkbox"/>	Potassium	EPA 200.7		1000			
<input type="checkbox"/>	Selenium	EPA 200.8		1			
<input checked="" type="checkbox"/>	Silver	EPA 200.8	EPA 200.7/200.9	0.5			
<input type="checkbox"/>	Sodium	EPA 200.7		1000			
<input checked="" type="checkbox"/>	Zinc	EPA 200.7		10			
<input type="checkbox"/>	Antimony	EPA 200.8		3			
<input type="checkbox"/>	Barium	EPA 200.7	EPA 200.8	5			
<input type="checkbox"/>	Beryllium	EPA 200.7	EPA 200.8	1			
<input type="checkbox"/>	Boron	EPA 200.7	EPA 200.8	10			
<input type="checkbox"/>	Manganese	EPA 200.7	EPA 200.8	5			
<input type="checkbox"/>	Nickel	EPA 200.7	EPA 200.8	10			
<input type="checkbox"/>	Thallium	EPA 200.8		0.2			
<input type="checkbox"/>	Uranium, Natural	EPA 200.8		30			
Water Sample – Total Metals							
<input checked="" type="checkbox"/>	Mercury	EPA 245.1		0.05	28	HDPE, Glass	HNO ₃
<input checked="" type="checkbox"/>	Mercury, Ultra low level Note3	EPA 245.7		0.005	28	100mL Glass	0.5 ml 12N HCL
<input type="checkbox"/>	Mercury, Ultra low level	EPA 1631		0.005	90	100mL Glass	0.5 ml 12N HCL

Note 1: For metals sampling, total hardness should be run on the TR digested sample. If the lab will additionally report Ca and Mg for the same cost, have them report individually as well.

Note 2: If aluminum is the only dissolved metal collected, the collection container is a 60 cm³ syringe. Then, 50 mL of the sample is field-filtered into a 50 mL centrifuge tube.

Note 3: For Ultra low-level mercury by method 245.7, both a trip blank and field blank are required for each set of samples. Both the trip blank and field blank will be analyzed and charged at \$50 each.

Analysis	Parameter	Preferred Method	Alternate Method	Req. Report Limit mg/kg (dry weight)	Holding Time Days	Bottle	Preservative
Sediment Sample - Total Recoverable Metals							
<input type="checkbox"/>	Total Recoverable Metals Digestion	EPA 200.2		N/A	180	500ml HDPE Widemouth	
<input checked="" type="checkbox"/>	Arsenic	EPA 200.8	EPA 200.9	1			
<input checked="" type="checkbox"/>	Cadmium	EPA 200.8	EPA 200.9	0.2			
<input type="checkbox"/>	Chromium	EPA 200.8	EPA 200.7	9			
<input checked="" type="checkbox"/>	Copper	EPA 200.8	EPA 200.7	15			
<input checked="" type="checkbox"/>	Iron	EPA 200.7	EPA 200.7	10,000			
<input checked="" type="checkbox"/>	Lead	EPA 200.8	EPA 200.9	5			
<input checked="" type="checkbox"/>	Silver	EPA 200.7	EPA 200.9				
<input checked="" type="checkbox"/>	Zinc	EPA 200.7	EPA 200.7	20			
<input checked="" type="checkbox"/>	Mercury	EPA 7471B		0.05	28		
Chlorophyll-a							
<input type="checkbox"/>	Chlorophyll-a (in water)	A 10200 H			21 (pH ≥ 7) ASAP (pH ≤ 7) ⁴	Variable	Cool or frozen ⁵
<input type="checkbox"/>	Ash Free Dry Weight	SM 10300C-5					

Note 4: Solid/filter samples taken from water having a pH 7 or higher will be placed in airtight plastic freezer bags and stored frozen for not more than 21 days. Samples from acidic water must be processed promptly to prevent chlorophyll-a degradation.

Note 5: Freeze samples only if filtered or hoop sample. Samples requiring filtration will not be frozen until filtered.

Adapted from Title 40 Code of Federal Regulations, Parts 136-149. 2007 ed.

Appendix C

QA/QC Checklist and Data Qualifiers

Quality Control Checklist

- ___ Condition of samples upon receipt
 - ___ Cooler/sample temperature
 - ___ Proper collection containers
 - ___ All containers intact
 - ___ Sample pH of acidified samples <2

- ___ All field documentation complete. If incomplete areas cannot be completed, document the issue.

- ___ Holding times met

- ___ Field duplicates collected at the proper frequency (specified in SAP)

- ___ Field blanks collected at the proper frequency (specified in SAP)

- ___ All sample IDs match those provided in the SAP. Field duplicates are clearly marked on samples and noted as such in lab results.

- ___ Analyses carried out as described within the SAP (e.g. analytical methods, photo documentation, field protocols)

- ___ Reporting detection limit met the project-required detection limit

- ___ All blanks were less than the project-required detection limit

- ___ If any blanks exceeded the project-required detection limit, associated data is flagged

- ___ Laboratory blanks/duplicates/matrix spikes/lab control samples were analyzed at a 10% frequency

- ___ Laboratory blanks/duplicates/matrix spikes/lab control samples were all within the required control limits defined within the SAP

- ___ Project DQOs and DQIs were met (as described in SAP)

- ___ Summary of results of QC analysis, issues encountered, and how issues were addressed (corrective action)

- ___ Completed QC checklist before STORET upload

Table C-1. Data qualifiers and descriptions.

Result Qualifier	Result Qualifier Description
B	Detection in field and/or trip blank
D	Reporting limit (RL) increased due to sample matrix interference (sample dilution)
H	EPA Holding Time Exceeded
J	Estimated: The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
R	Rejected: The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
U	Not Detected: The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
UJ	Not Detected/Estimated: The analyte was not detected at a level greater than or equal to the adjusted CRQL or the reported adjusted CRQL is approximate and may be inaccurate or imprecise.

Table C-2. Quality control terminology and descriptions.

FIELD QC		
Term	Description	Purpose/Usage
Trip Blanks	Used only for VOC (Volatile Organic Chemicals). Alias VOA (volatile organic analysis)	To determine if cross contamination occurs between samples.
Field Blank	Reagent water exposed to field sampling conditions	Monitors contamination resulting from field activities and or ambient levels of analytes present at time of sampling.
Field Duplicate	Two independent samples taken under the same conditions. For solids; two samples which are co-located (taken side by side.) Water samples would be two independent samples taken at the same location at the same time.	To determine the homogeneity of the samples collected.
Field Replicate	A single sample is obtained, homogenized, then slit into multiple samples	Monitors laboratory precision independent of laboratory operations.
LABORATORY BATCH QC		
Acronym	Description	Definition
LRB/Method Blank	Laboratory Reagent Blank	An aliquot of reagent water or other blank matrices that are treated exactly as a sample including exposure to all glassware, equipment, solvents, reagents, and internal standards that are used with other samples. The LRB is used to determine if method analytes or other interferences are present.
LFB/LCS	Laboratory Fortified Blank; Laboratory Control Sample	Reagent water spiked with a known amount of analyte. Ideally treated exactly like a MS/LFM. Control used to determine bias in sample spikes.

MS/LFM	Matrix Spike/Laboratory Fortified Matrix	An aliquot of an environmental sample to which known quantities of the method analytes are added in the laboratory. The LFM is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the LFM corrected for background concentrations
MSD/LFMD	Matrix Spike Duplicate/Laboratory Fortified Matrix Duplicate	Determine method precision in sample concentrations are < 5X the RL.
DUP	Duplicate	Determine method precision in sample concentrations are > 5X the RL.
QCS	Quality Control Sample	A solution of method analytes of known concentrations which is used to fortify an aliquot of reagent water or sample matrix. The QCS is obtained from a source external to the laboratory and different from the source of calibration standards. It is used to check either laboratory or instrument performance
SRM	Standard Reference Material	Primarily used as a QCS to verify instrument calibration.

LABORATORY ANALYSIS QC

Acronym	Description	Definition
ICB	Initial Calibration Blank	Monitors instrument drift at low end of cal curve.
CCB	Continuing Calibration Blank	Monitors instrument drift at low end of cal curve.
ICV	Initial Calibration Blank	Monitors instrument drift at a defined concentration near the mid range of cal curve.
CCV	Continuing Calibration Blank	Monitors instrument drift at a defined concentration near the mid range of cal curve.
IPC	Instrument Performance Check	Monitors instrument drift at a defined concentration near the mid range of cal curve.
MS/LFM	Matrix Spike/Laboratory Fortified Matrix	An aliquot of an environmental sample to which known quantities of the method analytes are added in the laboratory. The LFM is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the LFM corrected for background concentrations
MSD/LFMD	Matrix Spike Duplicate/Laboratory Fortified Matrix Duplicate	Determine method precision in sample concentrations are < 5X the RL.
DUP	Duplicate	Determine method precision in sample concentrations are > 5X the RL.

QCS	Quality Control Sample	A solution of method analytes of known concentrations which is used to fortify an aliquot of reagent water or sample matrix. The QCS is obtained from a source external to the laboratory and different from the source of calibration standards. It is used to check either laboratory or instrument performance
SRM	Standard Reference Material	Primarily used as a QCS to verify instrument calibration.
IDL	Instrument detection limit	Signal just above baseline. 3-5x the STD DEV of 7 replicates of a blank. Not used for quantification.
MDL	Method detection limit	Statistical determination of the lowest concentration of an analyte with 95% certainty the analyte is present.
PQL	Practical Quantitation Limit	3-5x the MDL. Lowest level that quantification is determined
RL	Reporting Limit	Value a Laboratory reports results. Usually the PQL.