Appendix C.2 - Quality Assurance Project Plan for the Pocatello Urbanized Area NPDES Phase II Stormwater Permit

Stormwater Monitoring Program Version 1.0, dated June 2020

This Appendix added 12/15/2020.

Quality Assurance Project Plan
for the Pocatello Urbanized Area
NPDES Phase II Stormwater Permit
Stormwater Monitoring Program

Prepared by:
City of Pocatello
Science & Environment Division

In cooperation with:
City of Chubbuck
Bannock County
Idaho Transportation Department
Idaho State University

Version 1.0
June 2020

Acknowledgements
This Quality Assurance Project Plan was developed based on the Quality Assurance Project Plan for the Portneuf Basin Monitoring Project and updated in May 2020. Text was added or omitted depending on its relevance to the Pocatello Urbanized Area's National Pollutant Discharge Elimination System (NPDES) stormwater permit IDS028053, effective October 1, 2019. This plan satisfies part 6.2.6 of the permit.

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Acronyms

BMP	Best Management Practice
BYU EAL	Brigham Young University Environmental Analytical Laboratory
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
IDEQ	Idaho Department of Environmental Quality
ISU	Idaho State University
ITD	Idaho Transportation Department, District 5
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
PSMP	Pocatello Urbanized Area Stormwater Monitoring Program
PUA	Pocatello Urbanized Area
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
SSC	Suspended Sediment Concentration
TP	Total Phosphorus
WOTUS	Waters of the United States
WPC	Water Pollution Control

Section A

PROJECT MANAGEMENT

APPROVALS

Hannah Sanger, Stormwater Permit Manager
City of Pocatello

____ Date________________

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PROJECT ORGANIZATION

City of Pocatello Science and Environment Division staff (City), in cooperation with the Idaho Department of Environmental Quality (IDEQ) and Idaho State University's Socio-Eco-Hydrology Laboratory, prepared this Quality Assurance Project Plan (QAPP) for the Pocatello Urbanized Area (PUA) National Pollutant Discharge Elimination System (NPDES) Phase II Municipal Separate Storm Sewer System (MS4) Stormwater Permit. This Environmental Protection Agency (EPA) NPDES permit No. IDS028053 became effective on October 1, 2019. All permit time requirements are based on the October 1, 2019 date.

The PUA, under the provisions of its current federal stormwater permit, consists of portions of the City of Pocatello, City of Chubbuck, Bannock County, District 5 of the Idaho Transportation Department (ITD), and Idaho State University (ISU). These entities are collectively called the Permittees. Under provisions of the federal NPDES permit, the Permittees are required to monitor water quality in stormwater runoff and waters of the United States (WOTUS) potentially affected by operation of the Permittees' MS4s.

On behalf of the PUA Permittees, staff of the City of Pocatello, or consultants retained by the City, will conduct all field data collection and sampling subsequently described in this document. All laboratory analyses will be completed by the City of Pocatello Water Pollution Control (WPC) laboratory, Energy Laboratories Inc., Brigham Young University Environmental Analytical Lab (BYU EAL), or IAS Envirochem.

This document describes the standards and methods used to ensure consistent sampling procedures and ensure that data generated during field activities are accurate, complete and representative of actual stormwater and riverine conditions.

A multidisciplinary team of technically qualified staff will complete all responsibilities of the PUA Stormwater Monitoring Program (PSMP). Key individuals and their primary responsibilities related to implementing this QAPP are outlined in Table 1.

Table 1. Key Personnel Contact Information and Responsibilities

Name	Title and Responsibilities
City of Pocatello	
Jeff Mansfield 208-234-6212 jmansfield@pocatello.us	*Director, Public Works* - Provides program oversight at the administrative level.
Hannah Sanger 208-234-6518 hsanger@pocatello.us	*Science & Environment Administrator, Stormwater Permit Manager* - Provides oversight for all aspects of the field sample collection program, laboratory analysis and oversight of the QAPP. Facilitates co-permittee coordination.
Jenna Dohman 208-234-6519 jdohman@pocatello.us	*Environmental Technician, QA Manager* - Conducts field sample collection and provides oversight for QAPP. Sits on co-permittee technical committee.
Christi Rowe 208-237-2010 crowe@pocatello.us	*Laboratory Coordinator*- Provides technical oversight for sample processing. Acts as the primary contact for Energy Laboratories, Inc. and provides QA oversight for sample handling, custody, and analytical methods.
City of Chubbuck	
Bridger Morrison 208-237-2430 Bmorrison@cityofchubbuck.us	*Co-permittee Liaison* - Sits on the co-permittee technical committee and serves as the Chubbuck representative for all permit issues.
Bannock County	
Mike Jaglowski 208-236-7230 mjaglowski@bannockcounty.us	*Co-permittee Liaison* - Sits on the co-permittee technical committee and serves as the Bannock County representative for all permit issues.
Idaho Transportation Department	
Alissa Salmore 208-239-3312 Alissa.Salmore@itd.idaho.gov	*Co-permittee Liaison* - Sits on the co-permittee technical committee and serves as the ITD representative for all permit issues.
Idaho State University	
Jennifer Parrott 208-282-3498 parrjenn@isu.edu	*Co-permittee Liaison* - Sits on the co-permittee technical committee and serves as the ISU representative for all permit issues.
Rebecca Hale 208-282-6183 halereb3@isu.edu	*Director of the socio-eco-hydrology lab and assistant professor of biology* - Provides oversight for the field sample collection program, including instrument maintenance and QAQC of data.

PROBLEM DEFINITION, BACKGROUND AND OBJECTIVES

The Portneuf River is a 5th order river that flows through the PUA. The Portneuf River is listed on the U.S. Environmental Protection Agency's (EPA) §303(d) list of impaired waters with respect to attainment of beneficial uses. The impaired listing results from exceedances of total maximum daily loads (TMDLs, developed by DEQ and approved by EPA) of the following constituents: total nitrogen, total phosphorus, total suspended solids (TSS), oil and grease and *E. coli*. Temperature and dissolved oxygen are also pollutants of concern. Sources of these constituents include agriculture (flow alteration, sediment, nutrients, and bacteria), urban areas (sediment, nutrients, oil and grease, and bacteria), and wastewater treatment facilities (nutrients). Industrial land use has also contaminated groundwater, which can interact with water in the Portneuf River (IDEQ, 2010). See Appendix A for numeric standards for surface water are defined in Idaho Administrative Code 58.01.02.

Pocatello and Chubbuck are the largest urban centers in the PUA, with Pocatello comprising approximately 32 square miles and 55,000 people, and Chubbuck comprising approximately 4 square miles and 15,000 people. These cities are the primary human population centers in the Portneuf River Basin, and as such, have the potential to contribute significant pollutants to the river. Monitoring riverine and stormwater quality will assist PUA managers in developing helpful and timely evaluations of the effectiveness of permit-required activities.

The objectives of the monitoring program are to:

- Quantify existing conditions of water quality over time with respect to stormwater runoff to WOTUS,
- Develop a better understanding of the magnitude and sources of point and non-point source pollutant loadings to the river from the Permittees' MS4s,
- Provide credible, defensible scientific information that will help the Permittees meet NPDES permit regulations,
- Assess suitability of standards and compliance with water quality objectives that support beneficial uses, and
- Help determine when conditions in a water body segment have improved to the point that it can be de-listed.

This Quality Assurance Project Plan (QAPP) has been formulated to describe regular monitoring activities of the PSMP as required by the Permit. This QAPP does not describe procedures for dry weather outfall screening that is required by the Permit. That screening will primarily involve visual inspection, and may require grab samples for in-field analysis. An internal document will be generated to explain protocols and prioritization schemes for the dry water outfall screening program.

PROJECT DESCRIPTION AND DOCUMENTATION

The City of Pocatello and its consultant will conduct stormwater monitoring as described in detail in the PUA Stormwater Monitoring Plan (City of Pocatello, 2020). Information about the number of samples, sampling locations, and sampling procedures can be found in that document. Briefly, the monitoring plan is implemented as follows:

- *Water Quality and Discharge* – Grab samples will be collected for analysis of suspended sediment. In addition to grab samples, continuous water quality sondes will also be installed to measure turbidity and water level. To better understand pollutant dynamics, discharge will be indirectly measured at each monitoring location as identified in PUA's Stormwater Monitoring Plan. In locations where flow measurement is not feasible, continuous flow presence sensors will be installed. These will enable calculation of sediment loads from major drainages and sediment retention by two stormwater wetlands.

- *Investigative studies* – These are studies that do not have a set sampling location or frequency, but will be conducted on an exploratory basis. These will include source tracing of *E. coli*, and monitoring of nutrients and salt in the stormwater system. A drainage impact study will also be included to provide information on when different drainages are contributing flow to WOTUS.

Project data will be compiled, edited, saved electronically, and made available to the public. Data from the storm sewer system and the associated riverine system will be published on the Permittees' website (stormwater.pocatello.us) once long-term data are screened and verified. Permittees are responsible for conducting a regular review and update of the QAPP, and will post updated versions to the website.

Table 2. Summary of document and handling procedures for PSMP.

Description	Backup	Retention Period
Field Notes	Saved in files on server	5 years
Chain of Custody Forms	Kept with laboratory results	5 years
Laboratory Notes	Per Laboratory Quality Assurance Plan	5 years
Laboratory and Continuous Monitoring Data	Saved in files on server	5 years

DATA QUALITY OBJECTIVES AND CRITERIA

The PSMP seeks to produce scientifically defensible data that meet monitoring objectives. This involves establishing and meeting goals for precision, accuracy, representativeness, completeness, comparability, bias, and sensitivity.

Precision – Precision is a measure of agreement among individual measurements of the same property under identical or substantially similar conditions. Replicate samples (typically duplicates) shall be collected for all constituents at an annual rate of at least 5% of the total number of samples collected.

Accuracy – Accuracy is a measure of agreement between an analytical measurement and a reference of a known value. Field blanks shall be collected at an annual rate of at least 5% of the total number of samples collected.

Representativeness – The measure of the degree to which data accurately and precisely represent constituent variations at a sampling point is its representativeness. Water flowing past a given location on land is constantly changing in response to a suite of environmental factors. Sampling strategies, equipment, and schedules will be designed to maximize representativeness where possible and applicable.

Completeness – The quantity of valid data available for use compared to the amount of potential data constitutes a measure of completeness. In an ambient water quality monitoring program 90% completeness is a reasonable goal.

Comparability – Comparability is a measure of the confidence with which one data set or method can be compared to another. Standard methods and sampling techniques will be used to assess comparability (APHA, 2017; Shelton, 1994).

Bias - Inherent in any sampling program are potential sampling biases or prejudices. A goal of this QAPP is to describe guidelines and procedures that will eliminate or minimize the amount of sampling bias introduced into the PSMP.

Sensitivity – Sensitivity is the capability of a method or instrument to discriminate between measurement responses representing different levels of a variable of interest.

SPECIAL TRAINING REQUIREMENTS AND SAFETY

Field technicians are trained using written standard operating procedures as well as hands-on training with field sampling equipment. Proper field and laboratory safety procedures are followed with respect to chemicals (e.g., preservatives), and safety equipment (e.g., protective footwear). All records will be maintained by the City.

Safety rules for the field:

- Monitor with at least one partner if possible. Always let someone else know where you are, when you intend to return, and what to do if you don't come back at the appointed time.
- Make certain that each member of a sampling group knows the location of the nearest medical center so that you can locate the center or direct emergency personnel as needed.
- At least one member of each team shall have active Red Cross First Aid training.
- Have a first aid kit handy. Know any important medical conditions of team members (e.g., heart conditions or allergic reactions to bee stings).
- Listen to weather reports. Never go sampling if severe weather is predicted or if a storm occurs while at the site.

- If there is lightning in the area, stay out of contact with the water, avoid contact with bridges and stay away from tall trees. It is usually best to wait out a thunderstorm in your vehicle.
- Never cross private property without the permission of the landowner.
- Do not wade alone. Rocky-bottom streams can be very slippery and can contain deep pools; muddy-bottom streams might also prove treacherous in areas where mud, silt, or sand has accumulated in sinkholes. If you must cross the stream, your partner(s) should wait on dry land and be ready to assist you if you fall.
- Do not attempt to cross streams that are swift and above the knee in depth without taking proper precautions. Personal flotation devices shall be worn when wading in water deeper than two feet or at any time when there is a risk of drowning. When engaged wading activities the team should have a throw bag and be trained in its use.
- After monitoring, wash your hands with soap.
- Wear high visibility clothing when working along roads.

When using chemicals:

- Know your equipment, sampling instructions, and procedures before going out into the field. Prepare labels and clean equipment before you get started.
- Avoid contact between chemical reagents and skin, eyes, nose, and mouth. Never use your fingers to stopper a sample bottle (e.g., when you are shaking a solution). Safety glasses or safety goggles should be worn when performing any chemical test or handling preservatives.
- Know chemical cleanup and disposal procedures. Wipe up all spills when they occur. Return all unused chemicals to your program coordinator for safe disposal. Close all containers tightly after use. Do not switch caps.

Section B

DATA GENERATION AND ACQUISITION

SAMPLING DESIGN

Detailed maps and information about stormwater monitoring sites, including location, type, sample parameters, sample frequency, etc. can be found in PUA's stormwater monitoring plan (City of Pocatello, 2020).

Continuous monitoring - Turbidity (PME cyclops with Turner Designs turbidity fluorometers) and conductivity (HOBOware U24) loggers will be deployed in the PUA stormwater system. These will be calibrated in the lab before initial deployment and QC checks will be conducted biweekly.

Grab samples - Grab samples will be collected for *E. coli*, suspended sediment, chloride, and total phosphorus. Sample containers are provided by the analytical laboratories. Samples will be collected from surface water and storm drains. Some locations will require use of a swing sampler with an extension rod (if needed) to directly sample into bottles. All samples are handled and preserved based on laboratory recommendations and following standard water quality sampling procedures (APHA, 2017). See Appendix E for details on grab sampling methods.

Discharge - The City of Pocatello or its consultant will maintain the flow meters and water level loggers. At sites where discharge is measured with a flow meter (Hach Flo-Dar AV Sensor recorded with a Hach FL900 Flow Logger), the sensor will be calibrated upon installation at each site. At sites where water level loggers (HOBOware U20) are deployed, loggers will be calibrated prior to deployment. Manual discharge measurements will be made periodically at these sites to develop a robust stage-discharge relationship to facilitate continuous discharge monitoring from water level readings. See Appendix D for protocols for manual discharge measurement.

SAMPLE HANDLING AND CUSTODY

The site name, date and time of collection, and analyses requested are used as a sample identifier. Immediately following collection, water samples are preserved as necessary to limit chemical, biological and physical reactions that may alter monitoring parameters. Some samples require additions of acid for preservation. Personal protective equipment (e.g., goggles and gloves) is worn when working with acids to reduce the risk of contamination and for safety reasons. Glass containers are placed in padded sleeves to prevent breakage. All samples are placed on ice in a cooler to maintain sample temperature between 0°C and 4°C for transport back to the laboratory.

Pertinent data (e.g., station identification, date, time, analyses requested, sample preparation) are entered on Chain of Custody forms. One form is filled out for each group of samples being billed to a particular agency. For parameters that are not tested at the

Pocatello WPC laboratory, samples will be sent to either BYU Environmental Analytical Laboratory, Energy Labs, Inc., or IAS EnviroChem. Example Chain of Custody forms are provided in Appendix B. Chain of custody procedures are intended to ensure that sample integrity is maintained during all phases of sample handling and analysis, and that these procedures are documented with an accurate written record. Chain of Custody forms are completed by technical staff and supervised by the City of Pocatello Laboratory Coordinator.

Samples to be analyzed at the Pocatello WPC lab, Energy Labs, Inc. or IAS EnviroChem are generally sent out to the contract laboratory on the same day that they are collected, or transported directly to the lab in the case of the Pocatello WPC lab. Samples are shipped under chain of custody in sealed ice chests by 2-day courier service. Samples to be analyzed at BYU Environmental Analytical Laboratory will be frozen and shipped 2-3 times per year. Procedures for receiving, storing, and handling of samples in the laboratory are provided in the respective laboratory's QA Plan (City of Pocatello, 2019; Energy Labs, 2019; IAS-EnviroChem, 2019) or can be provided upon request from BYU Environmental Analytical Laboratory.

ANALYTICAL METHODS

Constituents to be determined for both stormwater and riverine samples are listed in Table 3. The laboratory equipment, regulatory citations and instruments needed for the procedures identified in Table 3, as well as corrective action if failures occur, are provided in the respective laboratory's QA plan (City of Pocatello, 2019; Energy Laboratories, Inc., 2019) or by request at BYU Environmental Analytical Lab. Physical addresses of each laboratory are listed in Table 4.

Table 3. Laboratory Analyses of Water Quality Samples.

Parameter	Method	Detection Limit mg/L (except where noted)	Sample Volume (oz) & Preservative (If needed)	Sample Holding Time (days)	Laboratory
Nitrogen, ammonia	E350.1	0.05	16[a]; H_2SO_4	28	ELI
Nitrogen, nitrate + nitrite	E353.2	0.05	16[a]; H_2SO_4	28	ELI
Phosphorus, orthophosphorus	E365.1	0.005	4; Filter immediately	2	ELI
Phosphorus, total	A4500-P E	0.05	8	28	Pocatello WPC
Chloride	Method 8113	0.05	1	180 (frozen)	BYU
Suspended Sediment Concentration	A2540 D	2	Volume varies based on turbidity	7	Pocatello WPC
Solids, total suspended	A2540 D	2	32	7	Pocatello WPC
Turbidity	A2130; E180.1	0.01 NTU	8	2	Pocatello WPC
Fecal coliform	A9222 D	1 colony	8[b]	0.25	Pocatello WPC
Escherichia coli	A9222 E	1 colony	8[b]	0.25	Pocatello WPC
*Oil and Grease	E1664A	1	64, H_2SO_4	28	ELI

A = Standard Methods; E = EPA; ELI =Energy Laboratories, Inc.; WPC = Water Pollution Control Lab; BYU = Brigham Young University Environmental Analytical Lab. Identical superscript letters associated with sample volumes indicate that analyses are taken from the same sample container. All sample containers are cooled to 4°C. An additional preservative is used where indicated (i.e. H_2SO_4 to pH<2). Preservation and holding times are taken from 40 CFR Ch. 1 Section 136.3. Volume is adjusted for suspended sediment sample to allow filtration of the entire sample. *See Appendix E

Table 4. Analytical Laboratory Addresses.

Analytical Laboratory	Address
Energy Laboratories, Inc.	1120 South 27th Street, Billings, MT 59101
City of Pocatello Water Pollution Control	10733 North Rio Vista Road, Pocatello, ID 83202
BYU Environmental Analytical Laboratory	871 N 580 E St, Provo, UT 84606
IAS EnviroChem*	3314 Pole Line Rd, Pocatello, ID 83201

*Will be used as a backup laboratory

QUALITY CONTROL

Field QC consists of routine calibration checks of continuous monitoring equipment as well as regular collection of field QC samples, which consist of blanks and duplicates.

Continuous monitoring - Data logger clocks will be checked every time the data is downloaded, and will be corrected if needed. Stage readings will be reviewed at the site after being downloaded to make sure there are no issues that need to be addressed while at the site. During each biweekly site visit, all sondes and loggers will be cleaned and QC checks will be performed following methods described in Appendix C. A drift correction will be applied as needed.

Grab samples - A field blank is a sample that is prepared in the field using deionized water and appropriate preservatives. The field blank is carried in the same cooler and delivered to the laboratory with the field samples simultaneously to check the cleanliness of the field conditions at the time of sampling. A duplicate serves as a second aliquot sample that is collected at the same time and in the same manner as the first aliquot. Duplicate samples shall be labeled with unique identifiers that are not indicative of collection location; however, it is imperative that information clearly defining these samples shall be recorded in field notes. Following analyses of duplicates, each duplicate's results shall be noted and labeled with the actual location and time of sampling in the data set. The duplicate sample provides information about the repeatability of the sampling and analysis.

Laboratory QC samples are prepared and analyzed at the laboratories to assess analytical precision, accuracy, and representativeness. These laboratory QC measures include method blanks, laboratory control samples (also called blank spikes), matrix spikes, matrix spike duplicates, and laboratory duplicate samples. The method blanks provide information on the degree of contamination of field samples that may occur in the laboratory during sample preparation and analysis. Blank spikes and laboratory duplicate analyses enable the laboratory to determine the accuracy and precision of the analytical system. Analysis of matrix spike and matrix spike duplicates are standard laboratory practices for determining the suitability of an analytical method for a particular environmental sample matrix. Laboratory control and duplicate samples are generally analyzed at a frequency of ten percent of the total samples submitted for analysis.

EXCEEDANCE OF A QUALITY CONTROL LIMIT

Field – If exceedance of a quality control limit is observed, field staff will document the condition and determine what factors may have caused the discrepancy. Factors may include sensor fouling (ice, siltation, macrophyte growth) leading to sensor drift, or a dead battery. Data quality is ensured through regular cleaning and calibration of the instruments, and data review upon downloading.

Lab - Implementation of the laboratory component of the QC program is the responsibility of each laboratory. QC reports and data provided by the laboratories will be reviewed for compliance with data quality objectives. If control limits are exceeded, an inquiry will be initiated to determine the source of the problem.

INSTRUMENT TESTING, INSPECTION, AND MAINTENANCE

During low flow conditions, macrophytes, filamentous algae and sediment can accumulate on the sondes and impact readings. Routine removal of debris is carried out to minimize the effects of non-representative conditions. Sondes will be downloaded biweekly while deployed, during which time they will be visually inspected and cleaned if necessary.

Sondes and loggers may be removed from stormwater during prolonged periods of subfreezing daytime temperatures, when ice formation can damage the electrodes, and data is likely not to be representative. Because flow conditions associated with thaw events can result in significant transport of suspended material, weather and river stage conditions are monitored closely for timely re-deployment of sondes to capture data during runoff.

DATA MANAGEMENT

All field activities must be documented to aid in data processing and evaluation phases. At a minimum, documentation must include:

1) Field calibration details.
2) Removal of any debris, including what type of debris.
3) Recent weather which may have impacted sonde readings.
4) Observations of anything out of the ordinary at the site.

Logs of documented field activities are maintained by the City and ISU's Socio-Eco-Hydrology lab. These logs provide a history of calibrations, sensor changes, and repairs for each instrument used for monitoring purposes. Calibration solution records are also maintained to assure standards are traceable.

Section C

DATA VALIDATION AND USABILITY

VERIFICATION AND VALIDATION METHODS

Data must be verified and validated prior to publication.

Verification is the process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements (EPA, 2002).

Validation is an analyte- and sample-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance (i.e., data verification) to determine the analytical quality of a specific data set (EPA, 2002).

All data collected and analyzed in the PSMP will be reviewed to check for errors in transcription, calculation, or input to spreadsheets. All data will be saved electronically. Data will be subject to the following general validation procedures:

Grab Sample Data

- Confirm that results of all method blanks and spikes fall within the limits set by the indicated laboratories.
- Review results from analytical laboratories, including chain of custody forms, for completeness.
- Conduct graphical review of the data.
- Investigate possible causes of data that appear to be anomalous or outside of expected ranges (e.g., laboratory or database entries, atypical conditions at the time of sampling, etc.).
- Note modifications to the data in comment fields.

Continuous Monitoring Data

- Data are downloaded on a regular basis and trend charts are maintained.
- Data and time ranges considered anomalous are noted including the reasons why.
- Data are considered anomalous when:
  - Sensors have obstructions or operational requirements are not met, and therefore equipment is reporting incorrect data,
  - Data spikes during the downloading or during field calibration, and
  - Periods when instruments are known to be out of calibration.
- Data are not removed from the primary data set. Data that are not acceptable, including data that are noted as anomalous, are rejected from inclusion in the final data set.
- A careful graphical review of the data is performed.
- All modifications and limitations of the data are noted.

Project staff will be responsible for conducting data verification procedures to ensure that published data are accurate, complete, and scientifically reasonable. Missing or suspect data will be explained or identified by data qualifiers given in the database. A project senior scientist will approve the data before it is published.

ASSESSMENT AND RESPONSE ACTIONS

Assessment activities are critical to the successful implementation of the quality assurance program. The PSMP QAPP will be reviewed annually by the QA Manager for assessment of compliance with the outlined protocols and procedures. To aid in this review, when sampling problems arise, personnel shall seek advice from their immediate supervisor for guidance. Problems are documented and communicated to the QA Manager.

If the annual review identifies any needed corrective actions, they will be discussed by City staff. Corrective actions will depend on the type and severity of the finding. The City shall be responsible for verifying that this corrective action has been accomplished. Any corrective action will be described in an annual self-assessment report.

REFERENCES

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U.S. Environmental Protection Agency (EPA). 2002. U.S. EPA Guidance on Environmental Data Verification and Data Validation.

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APPENDIX A – STATE OF IDAHO SURFACE WATER QUALITY CRITERIA

For full code, visit: https://adminrules.idaho.gov/rules/current/58/580102.pdf

Common numeric criteria supportive of designated beneficial uses in Idaho water quality standards.

Parameter	Primary Contact Recreation	Secondary Contact Recreation	Cold Water Aquatic Life	Salmonid Spawning[a]
Water Quality Standards: IDAPA 58.01.02.250–251				
Bacteria				
Geometric mean	<126 *E. coli*/100 mL[b]	<126 *E. coli*/100 mL	—	—
Single sample	≤406 *E. coli*/100 mL	≤576 *E. coli*/100 mL	—	—
pH	—	—	Between 6.5 and 9.0	Between 6.5 and 9.5
Dissolved Oxygen (DO)	—	—	DO exceeds 6.0 milligrams/liter (mg/L).	**Water Column DO**: DO exceeds 6.0 mg/L in water column or 90% saturation, whichever is greater. **Intergravel DO**: DO exceeds 5.0 mg/L for a 1-day minimum and exceeds 6.0 mg/L for a 7-day average.
Temperature[c]	—	—	22 °C or less daily maximum; 19 °C or less daily average ***Seasonal Cold Water**: Between summer solstice and autumn equinox: 26 °C or less daily maximum; 23 °C or less daily average.	13 °C or less daily maximum; 9 °C or less daily average **Bull Trout**: Not to exceed 13 °C maximum weekly maximum temperature over warmest 7-day period, June–August; not to exceed 9 °C daily average in September and October.
Turbidity	—	—	Turbidity shall not exceed background by more than 50 nephelometric turbidity units (NTU) instantaneously or more than 25 NTU for more than 10 consecutive days.	—
Ammonia	—	—	Ammonia not to exceed calculated concentration based on pH and temperature.	—
EPA Bull Trout Temperature Criteria: Water Quality Standards for Idaho, 40 CFR 131				
Temperature	—	—	—	7-day moving average of 10 °C or less maximum daily temperature for June–September

a. During spawning and incubation periods for inhabiting species
b. *Escherichia coli* per 100 milliliters
c. Temperature exemption: Exceeding the temperature criteria will not be considered a water quality standard violation when the air temperature exceeds the 90th percentile of the 7-day average daily maximum air temperature calculated in yearly series over the historic record measured at the nearest weather reporting station.
*The Portneuf River is not designated as a seasonal cold water.

APPENDIX B – CHAIN OF CUSTODY FORMS

BYU Environmental Analytical Laboratory
Soil · Water · WasteWater · BioSolids · Tissue

Sample Submission Form

Lab Use Only

Lab Number: ______________

Work Order: ______________

Date Sent: ______________

Off-Campus Customer Information: PO#: ________

Contact: ______________

Company: ______________

Address: ______________

City: ________ State: ________ Zip: ________

Phone: ______________

Fax: ______________

E-mail: ______________

On-Campus Customer Information:

Student: ______________

Faculty/Staff: ______________

Address: ______________

Phone: ______________

E-mail: ______________

Account: ______________

Project: ______________

Number of samples: ________ Sample ID(s): ______________

Sample type: ________ Crop: ______________ Recommendations: ☐ Yes ☐ No

Sample location: ________ Priority: ☐ A: 4–5 business days ☐ B: 2 weeks ☐ C: Date Needed ________

Packages:

S=soil P=plant W=water

$3 will be assessed per sample for sample preparation.

- ☐ [S1] pH, salinity, P, K ($16)
- ☐ [S2] pH, salinity, P, K, NO_3^-–N, OM (organic matter) ($27)
- ☐ [S3] pH, salinity, P, K, NO_3^-–N, OM, Zn, Fe, Mn, Cu ($40)
- ☐ [UDOT topsoil] pH, salinity, SAR, OM, texture, gravel ($40)
- ☐ [LDS Church topsoil] pH, salinity, SAR, OM, NO_3^-–N, P, K, Fe, texture, gravel ($60)
- ☐ [P1] Total N, P, K, Ca, Mg, S, Na, Zn, Fe, Mn, Cu, B ($35)
- ☐ [W1] pH, EC, SAR, P, K, S, Zn, Fe, Mn, Cu, B, Cl, HCO_3^- ($40)

Results and invoice will be delivered by e-mail. Bills can be paid by credit card or check.

Individual/ Other tests:

Comments or Special Instructions:

Completed By: ______________

Date Received: ______________

Please ship all samples with this form to:

Environmental Analytical Lab
4105 LSB
701 E. University Parkway
Brigham Young University
Provo, UT 84602

THIS INFORMATION WILL BE USED FOR REPORTING/BILLING* (SEE BELOW)	CHAIN OF CUSTODY RECORD
NAME: Pocatello Water Pollution Control ADDRESS: PO Box 4169 Pocatello Idaho 83205-4169 ATTENTION: Christi Rowe TELEPHONE/FAX: (208)234-6256 / 237-3927 SAMPLER: SIGN: PRINT:	DATE PAGE OF

TYPE	SAMPLE ID	DATE	TIME													NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

1. USE ONE LINE PER SAMPLE
2. INDICATE SAMPLE TYPE (C)COMPOSITE OR (G) GRAB .
3. BE SPECIFIC IN TEST REQUESTS.
4. CHECK OFF TEST TO BE PERFORMED FOR EACH SAMPLE.

RELINQUISHED BY: ______________ RECEIVED BY:

DATE/TIME: ______________ DATE/TIME:

RELINQUISHED BY (SIGN AND PRINT)	DATE/TIME	RECEIVED BY (SIGN AND PRINT)	DATE/TIME	TOTAL # CONTAINERS
SIGN: PRINT:		SIGN: PRINT:		

ENERGY LABORATORIES
Trust our People. Trust our Data.

Chain of Custody & Analytical Request Record

www.energylab.com

Page _____ of _____

Account Information *(Billing information)*

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Invoice ☐Hard Copy ☐Email	Receive Report ☐Hard Copy ☐Email
Purchase Order / Quote / Bottle Order	

Report Information *(if different than Account Information)*

Company/Name	
Contact	
Phone	
Mailing Address	
City, State, Zip	
Email	
Receive Report ☐Hard Copy ☐Email	
Special Report/Formats: ☐ LEVEL IV ☐ NELAC ☐ EDD/EDT *(contact laboratory)* ☐ Other________	

Comments

Project Information

Project Name, PWSID, Permit, etc.	
Sampler Name	Sampler Phone
Sample Origin State	EPA/State Compliance ☐ Yes ☐ No

URANIUM MINING CLIENTS MUST indicate sample type.
☐ NOT Source or Byproduct Material
☐ Source/Processed Ore (Ground or Refined) **CALL BEFORE SENDING
☐ 11e.(2) Byproduct Material (Can ONLY be Submitted to ELI Casper Location)

Matrix Codes
A - Air
W- Water
S - Soils/ Solids
V - Vegetation
B - Bioassay
O - Other
DW - Drinking Water

Analysis Requested

See Attached

All turnaround times are standard unless marked as RUSH.

Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

Sample Identification *(Name, Location, Interval, etc.)*	Collection Date	Collection Time	Number of Containers	Matrix *(See Codes Above)*											See Attached	RUSH TAT	ELI LAB ID *Laboratory Use Only*
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Relinquished by (print)	Date/Time	Signature	**Received by Laboratory (print)**	**Date/Time**	**Signature**

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals	Intact	Receipt Temp	Temp Blank	On Ice	Payment Type	Amount	Receipt Number *(cash/check only)*
		Y N C B	Y N	°C	Y N	Y N	CC Cash Check________	$	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

ELI-COC-10/18 v.3

IAS EnviroChem - 3314 Pole Line Rd • Pocatello, ID 83201
P: (208) 237-3300 F: (208) 237-3336 • Email: iasec3308@iasenvirochem.com

Company Name

Address

City, State, Zip

Phone

Email

Special Instructions

Send Bill or Receipt To:

Payment due with samples unless credit has been established

Email Invoice to:

☐ **Cash** ☐ **Bill** ☐ **Check#** ☐ **PO #**

☐ **Other**

Amount ______ Received by ______

Analyses Requested

Comments

SAMPLE INFORMATION

TRK # (Lab use)	Sample Description	Date/Time Collected	Number of Containers															Comments

RELINQUISHED BY	RECEIVED BY	*Lab Use Only*
Signature ______	Signature ______	Temp ______ °C
Printed Name ______	Printed Name ______	Received in a cooler? YES NO
Date/Time ______	Date/Time ______	Labels and Chain Agree? YES NO

APPENDIX C – CALIBRATION PROCEDURE FOR WATER QUALITY SONDES

To first determine if calibration is necessary, QC checks will be conducted during every biweekly site visit. A turbidity probe that has been recently calibrated in the lab (and has not be deployed in the field since that time) will be used to compare with each deployed sonde. If the deployed sonde receives a poor rating based on the following table, the deployed sonde will be recalibrated before redeployment.

Table 18. Accuracy ratings of continuous water-quality records.

[≤, less than or equal to; ±, plus or minus value shown; °C, degree Celsius; >, greater than; %, percent; mg/L, milligram per liter; pH unit, standard pH unit]

Measured field parameter	Ratings of accuracy (based on combined fouling and calibration drift corrections applied to the record)			
	Excellent	**Good**	**Fair**	**Poor**
Water temperature	≤±0.2 °C	>±0.2–0.5 °C	>±0.5–0.8 °C	>±0.8 °C
Specific conductance	≤±3%	>±3–10%	>±10–15%	>±15 %
Dissolved oxygen	≤±0.3 mg/L or ≤±5%, whichever is greater	>±0.3–0.5 mg/L or >±5–10%, whichever is greater	>±0.5–0.8 mg/L or >±10–15%, whichever is greater	>±0.8 mg/L or >±15%, whichever is greater
pH	≤±0.2 units	>±0.2–0.5 units	>±0.5–0.8 units	>±0.8 units
Turbidity	≤±0.5 turbidity units or ≤±5%, whichever is greater	>±0.5–1.0 turbidity units or >±5–10%, whichever is greater	>±1.0–1.5 turbidity units or >±10–15%, whichever is greater	>±1.5 turbidity units or >±15%, whichever is greater

Turbidity sonde calibration (Turner Designs turbidity fluorometer)

These sections have been modified from their respective manuals. For more details, see manuals at https://www.pme.com/wp-content/uploads/2014/07/Manual1.pdf and https://www.onsetcomp.com/files/manual_pdfs/15070-C-MAN-U24x.pdf.

Calibration consists of an experiment where the sensor is exposed to two solutions, the first having 0 concentration of the sensed material (in this case, turbidity) and a second solution having a known concentration created by the customer. Cyc7Control software records sensor output in each solution and creates a linear fit to these two points. After calibration the Cyclops 7 Logger will measure sensor output and record it in engineering units using this linear fit.

While connected by USB, begin program operation by clicking on Cyc7Control.jar. When correctly connected the Logger will display a constant green light. Click the Connect button. The software will contact the logger. If the connection is successful the button will turn green and display “Connected”.

The current Logger sample interval will be displayed next to the Set Sample Interval button. If you want to reset the interval, enter an interval between 1 minute and 1 hour. Click the Set Sample Interval button.

In order for these optical sensors to operate correctly, use the sensor cover which protects the sensor from damage and also establishes the field of view. This cover has slots near where it covers the sensor so that exterior water can enter and be sensed. The sensor cover must be in position when the sensor is calibrated and must be in the same position when the sensor is used. Calibrate the sensor in black containers. Exterior light such as room lighting or sunlight can enter through the slots and cause a very small measurement effect. Attempt to calibrate in the same lighting as the system will experience in field use. Be sure that there are no bubbles trapped in the cover or stuck on the sensor.

Calibration proceeds by dipping the system in one solution and then the next. Take care not to transport one solution to the next. Mix two 0 solutions and two solutions of the sensed material. Label one each as the "calibration" and one each as the "wash" When moving the sensor back and forth first dip the sensor in the wash then into the calibration. The most noticeable effect is when the 0 solution is contaminated prior to calibration.

Cyc7Control requires that the host computer be connected to the Cyclops 7 Logger at the time the calibration is performed. The logger must be open at this time. When calibration is completed, verify calibration results by logging in each calibration solution. Enter the appropriate unit of measure for the sensor and the calibration value for the solution. Click on the Calibrate button. The adjacent scroll bar shows how far the program has progress through the calibration procedure.

A dialog window appears instructing you to place the sensor in the zero solution. At this time the software reads information from the sensor, selecting all three ranges of the sensor sensitivity. When this is completed a Zeroing of sensor completed dialog appears. Click OK.

A "Please place sensor in calibration standard of ()" dialog appears. This information is taken from the Unit of Measure and Calibration Value text boxes and will be whatever is entered in the boxes. Place the sensor in the calibration solution. Click OK. At this time the software reads information from the sensor, selecting the best sensitivity range. When this is completed a "Calibration completed" dialog window appears along with the actual calibration results.

Notice that calibration information is displayed in the bottom window. Also, this information is automatically transmitted to the Cyclops-7 Logger. The Logger is now calibrated. Click OK. At this time the calibration is saved on the Cyclops-7 Logger SD card. Note that the calibration has been installed in the sensor and the sensor is calibrated no matter if the results are saved on disk or not.

Conductivity Logger Calibration (HOBOware U24)

The conductivity calibration readings should be the actual conductivity without temperature compensation (not in specific conductance at 25°C).

Two known concentrations (a high standard and a low standard) are measured at the beginning and end of deployment to assess sensor drift. Due to the length of this deployment, recalibrations will occur quarterly, or as needed based on QA checks.

To read out the logger in the field:
1. Calibrate the field conductivity meter before using it to take field readings.
2. Measure the actual conductivity and temperature values with the field meter
3. Remove the logger from the water (if it hasn't already been removed for the calibration measurement).
4. Read out the data from the logger using a shuttle.
5. Relaunch the logger.
6. Clean the sensor (see Maintenance on page 6 for more details).
7. Redeploy the logger in the stream, and take another calibration measurement.

Use HOBOware to calibrate data and convert to specific conductance or salinity:
1. Offload the most recent data files from the shuttle or loggers to your computer.
2. Open a data file in HOBOware.
3. Use the HOBOware Conductivity Assistant to calibrate the readings and adjust for drift caused by fouling. You will need to enter the field meter conductivity and temperature readings and times from the beginning and, optionally, the end of that segment of the logger's deployment. Refer to the Help for the Conductivity Assistant for more details. Save your changes to a project file.
4. Repeat steps 1 through 3 for all data files.

A handheld YSI will be used to verify sensor calibration in the field. This will be checked quarterly. If the YSI and field loggers do not agree, loggers will be recalibrated.

Presence/Absence Logger Calibration (HOBOware UA-002)

These loggers have been adapted from their original purpose as light intensity and temperature loggers to measure electrical resistivity. As such, there is not a developed calibration process for these loggers. However, testing the functioning of these loggers is quite simple.

When the loggers are exposed to dry conditions (just air), the electrical resistivity should be zero. When loggers are submerged in water (not DI water), resistivity increases dramatically. Since this an adapted logger for light intensity, the units will read Lux or lumens/ft^2. The units are meaningless, and the specific number registered when exposed to water will vary between loggers. However, there should be a significant difference in the data between when the logger is exposed to air (zero) and water and should be easily observed in the data

To ensure each logger is working properly, test the loggers in lab prior to deployment.

1) Launch the logger and set the logging to a high frequency interval (~30 seconds).
2) Start with the logger sitting in the open air. After at least 10 logging intervals, submerge the logger in a water bath. You may have to weigh the logger down with something. Just ensure the electrodes are fully submerged below the surface. Note the time.

3) After at least 10 logging intervals, remove the logger and place in the open air for another 10 intervals. Note the time.
4) Repeat steps 2 and 3 at least three times.
5) Stop the logger and readout the data.

Compare the data with your notes about when the logger was exposed to air versus the water. You should see large immediate jumps or drops in the numbers when switching between air and water. Note the average value observed when the logger is in the water. This may be useful later for data review.

APPENDIX D – DISCHARGE MEASUREMENT PROCEDURE

FloDar Flow Meter

Sites that use a Hach FloDar to measure flow will be calibrated upon installation. The manual contains the detailed steps for calibrating the instrument (https://www.hach.com/asset-get.download-en.jsa?id=58037106101). The following is a short-hand version for setting up and calibrating the flow logger.

Setting up the Flow Logger to Deploy in Manhole

1. Use the recommend Energizer (model 529) metal cased 6-Volt batteries for longest life. The next longest life battery is the Rayovac alkaline model 808. You can either place 2 batteries in either A-A position or B-B position. For long term (months) flow study you can fill all four positions with batteries.
2. Measure Inside Diameter (I.D.) vertically and horizontally and then average. Note: Typically have the Flodar aiming upstream (preferred), however it can also be aimed downstream depending on the flow characteristics.
3. Open FSDATA Desktop, then click on Connect in the top right corner of the screen.
4. If you want to start from default settings make sure you Click on Restore Logger (which will erase any data in the Logger and reset all settings to factory default).
5. Enter a new Site Identification. Port 1 should show that a FloDar sensor is connected.
6. Select Channel to log. Check all the below boxes and select 15 minutes for both the primary logging and secondary logging intervals.
    a. Logger
        i. Power Supply
    b. Port1 (Flo-Dar):
        i. Level
        ii. Velocity
        iii. Flow
        iv. Note: For troubleshooting purposes, turn on all the quality parameters. Thus, check the boxes for remaining channels (temp, surface vel, distance, distance reading count, surcharge level, PMR, NOS).

7. Click Sensors Flow Setup. If you are measuring flow in a circular pipe then under Primary Device select Area Velocity (circular). Type in the average I.D. of the pipe being measured where it asks for the Diameter.

8. Click Sensor Basic Setup. Then enter Sensor Height. Sensor Height is from the top of the FloDar mounting bracket to the bottom of the invert. If using a standard FloDar sensor (Non SVS) then mount the bottom of FloDar sensor at the same level as the top of the pipe you are aiming at.

9. Write to Logger (set FL900 clock, synchronize to computer if laptop has correct time).

10. Save to File.

11. To calibrate the level Click Sensors Basic Setup. Then under Level Calibration click on button to the right of Level Calibration and follow the steps. Note: It is important when calibrating the level that the tape measured water level is the water level inside the pipe where the velocity is being measured. It will be easier to measure from the top inside of the pipe down to where the tape measure breaks the water surface and then subtract this from the I.D. of the pipe to get the Actual Water Depth.

12. Write to Logger if you did a new level calibration.

13. Click Save Program to File (located near bottom of page). This will save all of the above entry onto your laptop. This saves the (.bin extension) file to the FL9XX/Data directory.

14. Click on Current Status to check battery levels. Operate between 9.5 and 13 volts.

15. Click on Diagnostics, then click on Sensors, then click on Take Measurement. Take 2 or 3 Measurements and after each Measurement make sure the Sensor Water depth is the same as the Actual Water Depth being measured. Note: After each Measurement also look at the Velocity Profile that you have a bell shaped curve. If you have a Velocity Profile with two large peaks then you will have to adjust your FloDar position (or possible aim downstream or go to another manhole up or downstream). Note: Later if you want to review the Measurements go to Utilities: Log Viewer and then open file and click on Sensor Diagnostic. Note: if you are trying to troubleshoot your flowmeter then under Diagnostic page make sure your turn on to log sensor diagnostics (the maximum is a week) and every time the sensor is recording a sensor reading then it will recording Velocity Profile along with quality parameters.

16. Click Save Program to File (located near bottom of page). This will save all of the above entry onto your laptop.

17. Click on Write to Logger to Activate the Flow Logger with all the above information. Note: From this point on if you make any changes you will need to Click on Save Program to File and then again click on Write to Logger.

18. Then click on upper right Disconnect button.

Electromagnetic flow meter

Sites without a Hach FloDar Flow Meter and Flow Logger will measure discharge using a portable electromagnetic flow meter (Sontek FlowTracker) in conjunction with a top setting wading rod. The following procedure shall be used.

1. A tape is strung tightly across the stream or river, perpendicular to the flow. The cross-section selected should generally be free of large rocks, debris, and aquatic macrophytes that may influence flow measurements.

2. Record the distance and depth at the left and right water's edge. Divide the total distance across the stream by a minimum of 20 to determine the approximate target distance between measurements. Record the time of beginning flow measurements.

3. Record distance along the tape, water depth, and water velocity (keeping the velocity sensor directed parallel with the flow) at each of the ~20 locations. Water velocity is averaged over a 40 second period at each location. Water velocity is measured at 0.6 x the water depth when water depth is ≤ 2.5 feet, or at 0.2 x water depth AND 0.8 x water depth when water depth is > 2.5 feet.

In water depths > 2.5 feet, an additional velocity measurement will be taken at 0.6 x water depth if either a) water velocity at 0.8 x water depth is > water velocity at 0.2 x water depth OR b) water velocity at 0.2 x water depth is > twice the water velocity at 0.8 x water depth

4. If the technician estimates > 10% of the total flow is passing through any measurement section(s) or detects other distinctly changing cross-sectional conditions (e.g. dramatic bed elevation changes or other hydraulic anomalies), additional measurements should be taken to each side of that location. The objective is to have no more than 5% of stream flow within an individual panel.

5. Upon completion of all distance, depth, and water velocity measurements, note the completion time and record both electronic and float stage measurements at the site (if available).

APPENDIX E – SAMPLING PROCEDURES

Grab samples

To collect grab samples in flowing streams, dip the sample container (sterile, unrinsed) to a depth of about 4 in. with the open end facing upstream. Push the mouth of the container upstream at this depth until the container is nearly full. The mouth of the container should at all times be upstream of the sample collector, sampling apparatus, and any disturbed sediments. Leave enough airspace (5 to 10 mL) in the top of the sample container to help mix the sample when it is shaken just before filtration. Immediately chill samples in an ice chest or refrigerator at 1 to 4°C. Below, review specific requirements for each parameter.

E. coli - Be sure to grab at least two samples from the same location, taking care not to disturb sediments. Begin analyses as quickly as possible, preferably within 1 hour but not more than 6 hours after sample collection, to minimize changes in indicator bacteria density (Lurry and Kolbe, 2000).

Suspended Solids - If the sample is very turbid, < 250 mL should be poured into the SSC sample bottle. For relatively clear samples, the SSC sample bottle should be filled with approximately 900 ml.

Chloride: Samples are collected in new bottles or bottles washed with dilute nitric or phosphoric acid. Bottles and caps are triple rinsed with sample water. Then collect the sample leaving some head space so samples can be frozen.

Total Phosphorus: Bottles and caps are triple rinsed with sample water. Then collect the sample leaving some head space so samples can be frozen. Immediately preserve with sulfuric acid.

Oil and grease: As a general rule, samples should be collected in 4-ounce glass jars with Teflon lined caps. Samples should be collected to be representative. The jars should be completely filled to eliminate headspace, tightly capped, labeled and immediately placed in a refrigerator or a cooler with ice until delivery to the laboratory. Some combinations of analyses may require more sample to be collected.

Transferring samples to the Laboratory

After collection into containers, samples are placed into coolers containing wet ice and transported to the Pocatello WPC Laboratory. A sufficient quantity of wet ice is to be used to lower the water samples to approximately 4°C; more ice will be required in summer than winter.

In the headroom of the laboratory, samples are removed from coolers and sorted, with information entered on Chain of Custody forms. Samples to be analyzed at the Pocatello Laboratory are checked in to the laboratory using the appropriate Chain of Custody form. Those samples to be analyzed at Energy Laboratories are prepared for shipping by two-day courier. Pack the sample bottles in a cooler and add cubed wet ice. Samples to be analyzed at BYU Environmental Analytical Laboratory will first be transported to the Socio-Eco-Hydrology Lab at ISU and placed in the freezer. Chloride samples will be filtered prior to freezing. Bulk frozen samples will be shipped to BYU Environmental Analytical Lab 2-3 times per year. Any samples sent to IAS Envirochem will be dropped off at the office the same day of collection.

APPENDIX F – CURRICULUM VITAE OF AUTHORS

Jenna Dohman

Environmental Technician
City of Pocatello
Science and Environment Division
P.O. Box 4169
Pocatello, ID, 83205
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Education

Geosciences, Emphasis in Hydrology	Idaho State University	M.S.	2018
Environmental Toxicology	Western Washington University	B.A.	2013

Employment History

Environmental Technician, City of Pocatello, 2019 – present
Research Assistant, Idaho State University, 2016 – 2018
Fisheries Field Biologist, California Sea Grant, 2015-2016
Wildlife Biology Technician, AmeriCorps, 2015
Backcountry Field Technician, AmeriCorps, 2014
Lab Technician, Shannon Point Marine Center, 2011-2013
Young Women in Science Intern, Pacific Northwest National Laboratory, 2009

Publications

Van Alstyne, K.L., Gifford, S.A., **Dohman, J.M.**, and Savedo, M.M. (2016). Effects of environmental changes, tissue types, and reproduction on emissions of dimethyl sulfide from seaweeds that form green tides. Environmental Chemistry, In press.

Dohman, J., Godsey, S., and Hale, R. (Submitted) Three-dimensional subsurface controls on stream intermittency in a semi-arid landscape.

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Education

Resource Policy and Behavior	University of Michigan	M.S.	2002
Curriculum Development	University of Michigan	M.A.	2002
Neuroscience	Colgate University	B.A.	1996

Employment History
Science & Environment Division Manager, City of Pocatello, 2012 – present
Environmental Educator, City of Pocatello, 2008-2012
Executive Director, Portneuf Greenway Foundation, 2005-2008
Graduate Students in K-12 Education Coordinator, Idaho State University, 2004-2008
Public Programs and Exhibits Director, Kalamazoo Nature Center, 2003-2004

Awards
William Stapp Award for Excellence in Environmental Education, University of Michigan, 2002.
Thomas J. Watson Fellowship, Thailand, Burma, Australia, 1996-1998.
Overachiever under 40 award, Idaho State Journal, 20076.
Put Water First award, Portneuf Resource Council, 2017.

Skills & Certifications
Erosion & Sediment Control Instructor
Certified in Public Participation, International Association for Public Participation, 2012.
Certified Master Naturalist, Idaho Master Naturalists, 2012.
Leadership Pocatello Participant, Greater Pocatello Chamber of Commerce, 2012.