Standard Operating Procedure #005 Nutrient, Metal, and Hydrocarbon Sample Collection

Version 1.0a
December 2020

Prepared by:
Water Resources Division
Natural Resources Department
Lummi Indian Business Council

Prepared for:
EPA Region 10

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REVISION RECORD

Approval	Date	Responsible Person	Description of Change	Location of Change
1.0	October 2018	Kara Kuhlman	Initial Approval and Release of Version 1.0	N/A
1.0a	December 2020	Kara Kuhlman	Correct Total Volatile Solids to Volatile Suspended Solids	Table 2.1

SIGNATURE PAGE

Document: Nutrient, Metal, and Hydrocarbon Sample Collection SOP #005

Version 1.0a

The following technical staff have read this manual. A copy of this page will be distributed to the employee training record file.

Signature	**Date**
Name (printed)	**Title**

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

This document, the Standard Operating Procedures (SOP) for nutrient, metal, and hydrocarbon sample (hereafter "laboratory sample") collection, should be used any time these types of samples are collected for laboratory analysis. This document describes the standard operating procedures and best practices for laboratory sample collection, including appropriate sample collection technique, selection of a representative location, equipment needed, and appropriate sample collection procedures. This document is to be used in conjunction with the relevant project Quality Assurance Project Plan (QAPP) and instructions from the laboratory at which the sample will be analyzed.

1.1 Method Summary

Laboratory samples are collected in containers prepared and provided by an independent, contracted laboratory using instructions provided by the laboratory and summarized in this SOP. Laboratory samples are collected using appropriate techniques by field staff and transported to the laboratory for analysis. Quality assurance and quality control (QA/QC) procedures include chain of custody forms, maximum holding times, and laboratory QA/QC procedures.

1.2 Health and Safety Warnings

No water quality measurement is worth risking injury or death. Field personnel must be aware of the environment, use common sense and training, and not exceed their abilities or limits. Field work is never conducted alone. All Lummi Natural Resources (LNR) Water Resources Division (LWRD) Health and Safety Plan (LWRD 2015) requirements and guidelines are followed at all times while conducting fieldwork.

During laboratory sample collection, field personnel are exposed to water that is potentially contaminated with bacteria and other pathogens, oil and petroleum products, and other hazardous constituents. Field personnel must use good hygiene and good sense in undertaking sampling activities. Rubber or latex gloves are available for use if desired. Hands are washed thoroughly with soap and water or appropriate sanitary wipes as soon as possible after sampling at sites that may be contaminated, and again prior to eating or drinking. Sampling equipment are rinsed and dried after use.

Hydrochloric acid (HCl) and sulfuric acid (H_2SO_4) are used to preserve samples for hydrocarbon and TOC analysis. Hydrochloric acid and sulfuric acid are corrosive and an irritant; skin, eye, and mouth contact can cause severe injury and burns. Sample bottles containing hydrochloric or sulfuric acid preservative are handled with care, and bottles are not filled to overflowing with sample water to avoid spilling acid into the environment or onto the sampler. A safety data sheet for hydrochloric acid and sulfuric acid are stored in the wet lab.

1.3 Quality Assurance/Quality Control

Quality assurance/quality control activities include chain-of-custody forms, holding times, appropriate sampling techniques, and laboratory QA/QC procedures.

1.4 Range, Accuracy, Readability

The range, accuracy, and readability of laboratory measurements are not presented in this SOP as they vary with the matrix and interfering compounds. The lower detection limits and practicable quantification limits for each parameter are reported by the laboratory and summarized in QMP Appendix C.

2. PREPARATION, EQUIPMENT, AND SITE CONDITIONS

This section describes the equipment needed to collect a laboratory sample, how to determine if a site is representative for collection of a sample, and how to minimize site disturbance.

2.1 Equipment

The following equipment are needed for collection of laboratory samples:

- Clean sample bottles (provided by the laboratory)
- Blue sampling wand
- Yellow sampling wand and black adjustable holding rings
- Ice chest with ice
- Pen or permanent felt-tip marker (*e.g.,* Sharpie)
- Chain of custody form

2.2 Sample Bottles

Clean sample bottles are provided by the laboratory at which the laboratory samples will be analyzed. As of the writing of this SOP, the LNR independently contracted laboratory for nutrient, metal, and hydrocarbon sample analysis is Edge Analytical, Incorporated (Edge) located in Bellingham and Burlington, WA. ALS-Kelso (Kelso, WA) and/or IEH Analytical Laboratories (Seattle, WA) are subcontracted by Edge to provide certain laboratory analyses.

Sample bottles are ordered from Edge's Burlington, WA location by email (sent to lab@edgeanalytical.com). The contracted laboratory will provide sampling kits in a cooler. For each nutrient or metal/hydrocarbon site, the required sampling bottles are pre-labeled with the analyses and stored in a plastic bag. The sampling kits also include chain of custody forms with analyses pre-filled in. For the nutrient suite, four 1L plastic bottles, one 250ml plastic bottles, and one 60ml glass vial are provided. For the metals and hydrocarbons suite, two 500ml glass amber bottles, one 500ml plastic bottle, and one 250ml plastic bottle are provided.

Table **2.1** summarizes the parameters and bottles needed per site for nutrient, metal, and hydrocarbon analyses. Figure 2.1 and Figure 2.2 show images of the sample bottles used for collection of or storage of laboratory samples.

Table 2.1 Sample Bottle Size and Material, Preservative Used, and Number of Bottles Collected Per Site for Nutrient, Metal, and Hydrocarbon Analyses

Parameters		Bottle size	Bottle material	Preservative
Nutrients				
pH, alkalinity, ortho-phosphate, nitrite-N,* nitrate-N,* nitrate+nitrite-N, total suspended solids, volatile suspended solids		1L	Plastic	<4°C
Biochemical oxygen demand		1L	Plastic	<4°C
Chlorophyll a, pheophytin		1L	Plastic	$MgCO_3$ <4°C darkness
Chemical oxygen demand, ammonia, total Kjeldahl nitrogen, total phosphorus		1L	Plastic	<4°C H_2SO_4 pH<2
Iron		250 ml	Plastic	<4°C
TOC	For collection	250 ml	Plastic	None (for collection)
	For storage and transport to lab	60 ml	Amber glass	HCl pH<2 <4°C
Metals				
Metals (marine and freshwater)	pH	250 ml	Plastic	<4°C
Metals (marine)	Arsenic, copper, mercury, tin, zinc, hardness	1L	Plastic	None
Metals (freshwater)	Chromium, copper, lead, zinc, hardness	500 mL	Plastic	HNO_3 pH<4 (in lab)
Hydrocarbons				
Diesel and lube oil range hydrocarbons (NWTPH-G/Dx)		500 ml (x2)	Amber glass	HCl pH<2 <4°C

*The marine nutrient suite does not include nitrate-N or nitrite-N but is otherwise identical to the freshwater nutrient suite

Figure 2.1 Example of Bottles for Collection of Nutrient Samples

Figure 2.2 Example of Bottles for Collection of Metal and Hydrocarbon Samples

2.2.1 Inspection of Bottles

Laboratory-supplied bottles are inspected upon receipt from the laboratory and prominently marked with an "X" on the bottle label and lid if:

- The bottle cap is off or loose
- The cap or bottle are damaged
- Bottles with HCl have no visible liquid or the HCl has spilled onto the outside of the bottle

Damaged bottles, bottles missing lids, and bottles with broken seals are disposed of in the LNR laboratory garbage or recycled if they do not contain hazardous materials. Unusable bottles with HCl, even if none is visible, are returned to the independent, contracted laboratory for disposal.

Laboratory-supplied bottles are not rinsed prior to sample collection unless specifically indicated by the laboratory. However, if the outside of laboratory-supplied bottles are dirty, the outside can be rinsed off in the sink at the wet lab and dried with clean paper towels prior to sample collection. All laboratory bottles are securely stored in an upright position prior to and after use.

Bottles that are used in unsucessful water sample collection are marked with an "X" on the bottle label and lid, and are not used for a second attempt at collection of a sucessful sample. Used amber glass bottles and TOC vials can be returned to Edge for reuse; used plastic bottles can be recycled.

2.2.2 Sample Bottle Labeling

Laboratory supplied sample bottles are labeled using a permanent marker or waterproof pen prior to collecting a water sample. Typically, the laboratory analysis, preservative, project and client name are already filled in (Figure 2.3). Prior to sampling, the bottle label is completed by filling out the sample site identifier in the Location and/or Field ID areas (e.g., SW118), date, time (using 24-hour format), and sampler (LNR or initials).

When a site is sampled more than once during a day, the sample identifier is the sample site number followed by a letter starting with the letter "A" moving sequentially through the alphabet for each subsequent sample collected at that site on that day. This facilitates identification of samples collected at different times throughout a day.

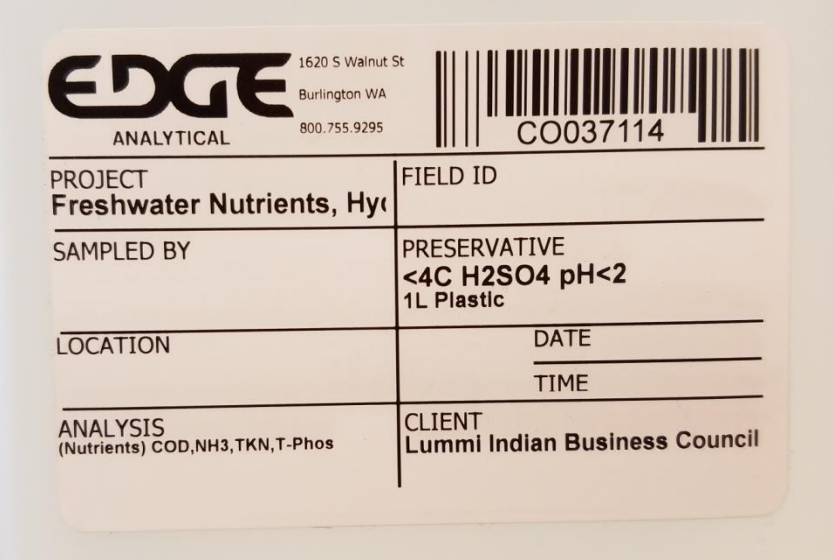

Figure 2.3 Example of Nutrients Label

2.3 Representative Location

Laboratory samples are collected at a representative location. The following are considered when selecting a representative location at the sampling site:

1. Avoid areas along margins, where debris accumulates, and other areas at the sample site that are not characteristic of the waterbody.
2. Select an area that minimizes disturbance to the waterbody (Section 2.4).
3. For wading sites, unless safety precludes wading into the water, avoid collecting samples along the shoreline where waves are breaking and washing across the beach.
    - Sample seaward of debris and seaweed generally found in the water close to the shoreline.
    - If samples are collected from within the wave or debris zone, assign qualifier to the sample results with the reason in Water Database or on field datasheets. See Quality Management Plan (QMP) (LWRD 2021b) and Water Database User Guide (LWRD 2018) for details.
    - Avoid areas of entrained air in the wave-wash zone.
4. If a representative location cannot be found, use professional judgment to determine whether the site should be sampled.
    - If the site is not sampled due to inability to find a representative location, note this in Water Database or on field datasheets.
    - If the site is sampled, assign qualifier to the sample result due to non-representative sampling location in Water Database or on field datasheets.
5. If a site is sampled, and the site is recognized as non-representative after the sample is collected:

- Consider discarding previously collected samples. If so, record actions in Water Database or on field datasheets with reason discarded and place a large "X" on the sample bottle label and lid.
- If samples collected from non-representative location are retained for analysis, assign qualifier to the sample result with the reason why in Water Database or on field datasheet.

2.4 Site Disturbance

Laboratory samples are collected after bacteria samples but before measurement of *in situ* water quality parameters. The sample site is examined to determine that it was not disturbed prior to laboratory sample collection. A site is disturbed if sediments or other materials (*e.g.,* plants, benthic algae) settled at the bed of the waterbody are suspended into the water column, or debris falls into the water at the sample site. Strategies for avoiding site disturbance include:

- Avoiding walking in or near the edge of the waterbody
- If wading into the waterbody is required, approach the sample site from the downstream/down-gradient side
- Using a wand to collect samples

Occasionally, it will be necessary to collect a second laboratory sample (*e.g.,* if the first attempt at sampling is unsuccessful or because multiple filled bottles are needed for a particular analysis). If the site was not disturbed by the first attempt at sample collection, the second sample attempt can follow immediately after the first with a new, clean bottle. If the area appears disrupted by the first sample collection attempt, consider the following when collecting subsequent samples:

1. Subsequent samples should be at a different, but representative location at the sample site.
2. If overall conditions at the sample site are stable, the disturbance will dissipate within a few minutes, and if water quality is not likely to change from when sampling started, the disturbed location may be re-sampled after the disturbance has passed. If this approach is taken, record in Water Database or on field datasheet.
3. If subsequent samples cannot be relocated or sampled at a later time, consider sampling in the disturbed (non-representative) location and assign qualifier to sample result with the reason in Water Database or on field datasheet.
4. If subsequent samples cannot be relocated or sampled at a slightly later time, consider a complete re-sampling of the site at a later time in the sample run. If this approach is taken, record in Water Database or on field datasheet.

3. SAMPLE COLLECTION

Laboratory samples are collected at marine and freshwater as outlined in the relevant project QAPP. Laboratory samples are always collected prior to measurement of *in situ* water quality parameters. If bacteria samples are collected, the laboratory samples are always collected after bacteria samples.

When arriving at a sample site, determine where the laboratory sample will be collected based upon visual assessment of the waterbody and previous experience:

1. Determine the path of sample collection in the waterbody prior to physically collecting the sample. The sample is collected at a representative location (Section 2.3).
2. Minimize disturbance to waterbody (Section 2.4).
3. Use a sampling wand to collect nutrient, metal, and TOC samples (Section 3.1 and 3.2) unless unsafe or impractical. Hydrocarbon samples are always collected by hand, as are nutrient, metal, and TOC samples if site conditions prevent sampling using the wand (Section 3.3). Special sampling instructions are followed for sampling of very shallow water (Section 3.4).
4. Sample upstream/up-gradient of any influences of the sampler.
    - When sampling from the boat, sample water from near the bow (front of the boat) while slowly moving forward over water that the boat has not previously come into contact with during the sample run. When sampling by hand, collect sample from the transom (back of the boat).
    - Sample outside of the zone of influence of the sampler(s) if the sample site requires wading. Water and sediments can be entrained by the movement of the sampler.

Nutrient, metal, and hydrocarbon samples are collected directly into the sample bottle using a sample wand (Section 3.1). Total Organic Carbon samples are collected using a sample wand followed by hand-transfer into TOC vials containing hydrochloric acid preservative (Section 3.2). If use of the sample wand is not possible, samples are collected by hand (Section 3.3). Samples collected for the ZAPS Project are collected out of a spigot (Section 3.5).

3.1 Laboratory Sample Collection

The yellow sample wand with black adjustable holding rings is used to collect laboratory samples in 1L and 500ml plastic bottles (nutrients, metals samples) as well as 500ml amber glass bottles (hydrocarbons samples). The sample wand with wire bottle holder is used to collect laboratory samples in 250ml plastic bottles (nutrients, metals samples). Sample wands are used for sample collection unless impractical or unsafe. If use of the sample wand is not possible, samples can be collected by hand (Section 3.3).

1. Do not rinse sample bottle unless specifically instructed to do so by the laboratory.

2. Label closed (never opened) and undamaged laboratory-supplied sample container as described in Section 2.2.2.
3. Attach capped sample bottle to wand.
    - The black adjustable holding ring holds the 1L and 500ml plastic bottles on the swivel end of the yellow sampling wand. Occasionally, rubber bands may be used to secure bottles to the swivel end and to keep the end from swiveling.
    - The top of the sample bottle should be at least several inches upstream/up-gradient of every part of the sample wand (*i.e.,* no sample water will touch any part of the wand before flowing into the sample bottle).
4. Open sample container. Do not place bottle or cap on ground and do not touch or allow any foreign materials to come into contact with bottle opening or threads, or the inside of the bottle cap.
5. Vertically dip the sample bottle, opening first, into the water column and then in one motion, rotate the bottle in the direction of the current (upstream) so that trapped air can escape as the bottle fills in an upstream/up-gradient arc.
    - The bottle should be no deeper than 12 inches below the water surface.
    - The water from the surface should not enter the bottle, unless low flows prevent sampling of water below the surface.
    - Ensure that bottle opening is always upstream/up-gradient of wand.
6. Continue the motion until bottle is nearly full, then rotate the bottle to remove it vertically from the waterbody.
    - Some bottles contain acid preservative (hydrochloric or sulfuric acid). Take care to not overfill these bottles in order to avoid spilling acid preservative into the waterbody.
7. If the sample was collected successfully (Section 3.6), cap bottle and place upright in cooler with ice. If bottle cannot be placed on ice immediately after collection, place bottle in sheltered area out of direct sunlight and place in cooler as soon as possible. Record sample collection in Water Database or on field datasheet and on chain of custody form. For nutrient samples, write specific conductivity of *in situ* sample water on the bottle.
8. If the sample is not collected successfully, place an “X” on the bottle label and cap, and collect another sample. Do not collect sample from waters that were disturbed during collection of the unsuccessful sample (Section 2.4).
9. Always collect laboratory samples prior to measuring *in situ* water quality parameters. If bacteria samples are also collected at the site during the same visit, bacteria samples are collected first.

3.2 TOC Sample Collection

Total organic carbon (TOC) is a nutrient parameter that is sampled separately from the remainder of the nutrient parameters. TOC samples are collected into a sterile 250 ml bacteria

sample bottle using the blue sampling wand unless impractical or unsafe (Figure 3.1). If use of the sample wand is not possible, samples can be collected by hand following the instructions for hydrocarbon sample collection in Section 3.3. Following sample collection, the sample water is transferred into the TOC vial. Detailed instructions follow:

1. Label sterile 250 ml bacteria sample bottle "TOC."
2. Attach capped sample bottle to wand. The top of the sample bottle should be at least several inches upstream/up-gradient of every part of the sample wand (*i.e.,* no sample water will touch any part of the wand before flowing into the sample bottle).
3. Follow steps 5-9 in Section 3.1.
4. Label unused TOC vial as described in Section 2.2.2.
5. Carefully transfer water sample from the 250 ml sample bottle into the labeled 60ml TOC vial containing hydrochloric acid preservative. The vial is filled to the top, without overflowing, while avoiding creation of bubbles during transfer. There should be no headspace or bubbles in the vial when the lid is in place.
6. Place upright in the cooler with ice for transfer to the laboratory.

Figure 3.1 TOC Sample Collection Using a Sampling Wand

3.3 Sample Collection by Hand

Occasionally, laboratory samples cannot be collected using the sampling wand, for example if use of the sampling wand would cause site disturbance. Laboratory samples can be collected by hand. Detailed instructions follow:

1. Do not rinse sample bottle unless specifically instructed to do so by the laboratory.
2. Label closed (never opened) and undamaged laboratory-supplied sample containers as described in Section 2.2.2.
3. Consider wearing gloves.

4. Hold capped sample bottle near base with hand. The top of the sample bottle should be at least several inches upstream/up-gradient of the sampler's hand (*i.e.,* no sample water will touch the sampler's hand before flowing into the sample bottle).
    - When sampling from the boat, samples are collected from the transom (back of the boat).
5. Follow steps 5-9 in Section 3.1.
6. Place upright in the cooler with ice for transfer to the laboratory.

3.4 Sample Collection in Extremely Shallow Waters

If the water at a sample site is too shallow to fully immerse a sample bottle, document the field conditions in Water Database or on field datasheet and use one of the following approaches while minimizing disturbance of the bottom of the waterbody. Do not allow water that has potentially or actually contacted the bottle and/or that has flowed past the bottle opening to enter the bottle. When filling the bottle, be careful not to create a wave at the container opening that can bring water from downstream of the opening back to the opening, and also not to entrain bottom materials in the vicinity of the bottle opening.

- For still waters, fill the bottle carefully by moving it slowly, opening-first, into the waterbody and then slowly moving it so that the bottle fills. Only water that has not been disturbed by the sampling is collected. Disturbed water includes water that has come into contact with the sample bottle. Do not stop movement of the bottle during filling.
- For moving waters, fill the bottle by carefully placing the bottle, opening first and pointed upstream, into the waterbody and then lowering the bottom of the bottle so that the bottle can fill. Depending upon the flow, the bottle can remain stationary or be moved upstream.

3.5 ZAPS Technologies LiquID Station Sampling

Nutrient and hydrocarbon samples collected from the ZAPS Technologies LiquID Station are collected from the sample spigot at the bottom of the ZAPS unit. The spigot is opened and flushed for approximately 30 seconds prior to sample collection to allow the lines to be cleared of sediment and other debris. Flush water is drained to the ground.

3.6 Successful Sample Collection

Bacteria samples must be collected successfully if they are to be delivered to the laboratory for analysis. Successful sampling means:

- The sample is representative
- The sample site was not disturbed prior to sample collection
- Laboratory instructions are followed

- The bottle is not contaminated by contact with sampler's hands or foreign materials such as plants and substrate of waterbody
- The cap is not contaminated by contact with sampler's hands or foreign materials

In cases where conditions preclude successful sampling (*e.g.,* the channel bottom was disturbed and a second sample could not be collected from a representative location or at a later time) and nutrient, metal, or hydrocarbon sample analysis is desired, a data qualifier must be assigned to the sample result in Water Database or on field datasheet due to the conditions of the sampling. See Section 2.4 for details on sampling a disturbed site. See the Quality Management Plan and Water Database User Guide for details on assigning data qualifiers and entering comments into Water Database.

3.7 Storage of Samples

After sample collection, sample bottles are stored upright in a cooler on ice with lids screwed on tightly (unless laboratory instructions indicate otherwise) and packed to avoid breaking prior to delivery to the laboratory. Glass sample bottles may be wrapped in bubble wrap to avoid breaking during transport.

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4. LABORATORY ANALYSIS

Nutrient, metal, and hydrocarbon samples are collected at marine and freshwater surface water sites as outlined in the relevant project QAPP. Laboratories used for these analyses must be certified by Washington State.

As of the writing of this SOP, the independent LNR contracted laboratory for surface water nutrient, metal, and hydrocarbon analysis is Edge Analytical, Incorporated (Edge). Edge contracts with ALS-Kelso (Kelso, WA) for the analysis of chlorophyll a and pheophytin.[1] Laboratory analysis methods, lower detection limits, and practical quantitation limits are provided in QMP Appendix C.

4.1 Holding Time and Laboratories

Laboratory samples are delivered to the laboratory as soon as possible after collection, typically within 8 hours. Note that holding times specified by the laboratory for the different analyses vary. If samples are not delivered to the laboratory within the specified holding time, a data qualifier is assigned to the sample results with the additional elapsed time recorded and reason why recorded in Water Database or on field datasheet (see QMP and Water Database User Guide for details).

4.2 Transportation to Laboratory and Chain of Custody

Nutrient, metal, hydrocarbon, and TOC samples are stored in a cooler on ice during sample collection and transportation to the laboratory. Details regarding sample drop-off times are available directly from the contracted laboratory and in the Field Reference Manual (LWRD 2019). Samples are dropped off at Edge's Bellingham, WA location and the laboratory transports the samples to their Burlington, WA location for analysis. Upon arrival at the lab, samples in Edge coolers and a chain of custody form (see Appendix A) are transferred to laboratory staff. The chain of custody form has been pre-filled by Edge to include client name (LIBC) and contact information and the laboratory analyses. The laboratory analyses are listed in batches to match up with the sample bottles. The chain of custody form should be completed to include account number (LUM05), a contact name in the LWRD, the project name (typically the run name), sample identification (site ID), matrix (SW for surface water), the number of containers, and date and time of sample collection (24-hour format). Laboratory staff will check the temperature of the samples and provide a LWRD staff a copy of the chain of custody form.

4.3 Results

Edge emails final laboratory results to the Water Resources Specialist II and Water Resources Technician II as soon as all results are available. Given the maximum holding time for the various laboratory analyses, results are typically available within one month.

[1] Edge will subcontract with IEH Analytical Laboratories for these analyses upon their accreditation.

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5. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Quality assurance/quality control activities include using appropriate sampling techniques, observing holding times, chain of custody forms, and laboratory QA/QC procedures.

5.1 Duplicates

Field duplicate nutrient, metal, and hydrocarbon samples are not regularly collected to quantify precision due to the cost of laboratory analysis. Where duplicate field samples are collected, it is to assess field variability rather than laboratory variability. For laboratory duplicate information, see QMP Appendix C.

5.2 Sampling Techniques

Field staff will ensure that all laboratory samples are collected using appropriate techniques. This includes inspecting the laboratory-provided sample bottles for contamination prior to use (Section 2.2.1), proper handling of the sample bottle and lid during sample collection to avoid contamination (Section 3), and proper collection of the sample in a representative location, avoiding sampling of the top surface layer of the waterbody (Section 2.3).

5.3 Holding Times

Laboratory holding times are observed for all laboratory samples collected. Laboratory samples are dropped off at the contracted laboratory within 8 hours of collection.

5.4 Chain of Custody Form

Chain of custody forms are used to handle and track samples from field collection to delivery (by hand or shipped) to the laboratory. A chain of custody form is provided by the independently contracted laboratory (see Appendix A for example of completed chain of custody form for Edge). The form is filled out while the sampler is in possession of the samples either during the sample run as information is recorded in Water Database or on field datasheets, or at the laboratory prior to releasing the samples. When the samples are transferred to the laboratory, the sampler signs and dates the chain of custody form to release the samples to the laboratory, and a designated representative from the laboratory signs and dates the form upon receipt of the samples. Laboratory staff examine the temperature of the samples received, record the average temperature on the chain of custody form, and provide a copy of the form to the sampler. The number on the chain of custody form will follow the samples through analysis to final reporting.

All chain of custody forms are saved in three-ring binders in the LWRD offices and electronically on LIBC servers.

5.5 Laboratory QA/QC

The independent contracted laboratory is responsible for maintaining data quality for laboratory-analyzed results. Quality assurance samples may include blanks, matrix spikes, laboratory duplicates, and/or standards. Quality assurance practices will meet or exceed method and accreditation requirements as outlined in the laboratory QAPP or method SOP. A summary of laboratory QA/QC requirements are provided in the Quality Management Plan (QMP Appendix C).

6. ACRONYMS AND ABBREVIATIONS

EPA	Environmental Protection Agency
HCl	Hydrochloric Acid
LIBC	Lummi Indian Business Council
LNR	Lummi Natural Resources
LWRD	Lummi Water Resources Division
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QMP	Quality Management Plan
SOP	Standard Operating Procedure
TOC	Total Organic Carbon

7. REFERENCES

Lummi Water Resources Division (LWRD). 2015. Health and Safety Plan. Prepared for the Lummi Indian Business Council. April.

LWRD. 2018. Water Database User Guide. Prepared for the Lummi Indian Business Council. Lummi Reservation, Washington. October.

LWRD. 2019. Lummi Nation Water Quality Monitoring Program: Field Reference Manual. Internal Document. July.

LWRD. 2021a. Quality Assurance Project Plan: Nutrient, Metal, and Hydrocarbon Monitoring Project. Version 1.1a. Prepared for the Lummi Indian Business Council. Lummi Reservation, Washington. July.

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8. APPENDICES

Appendix A: Edge Chain of Custody Form

Chain of Custody / Analysis Request (Please complete all applicable shaded sections)

Page 1 of 1

34960

EDGE ANALYTICAL
Main Lab (800-755-9295)
1620 South Walnut St. Burlington, WA 98233
Microbiology (888-725-1212)
805 W. Orchard Dr. Suite 4 Bellingham, WA 98225
Wilsonville Lab (503-682-7802)
9150 SW Pioneer Ct. Suite W Wilsonville, OR 97070
Corvallis Lab (541-753-4946)
540 SW 3rd St. Corvallis, OR 97333

18-07001
14591 - 14593

CO034960

Report to:	Lummi Indian Business Council (LUMOS)	Bill to:	
Ship Address:	2665 Kwina Road	Address:	Same
City:	Bellingham St: WA Zip: 98226	City:	St: Zip:
Attn:	Hanna Winter	Phone:	FAX:
Phone:	. FAX:	P.O.#:	Attn:
Email:	hannaw@lummi-nsn.gov; jamiem@lummi-nsn.gov	☐ Visa ☐ M/C ☐ A/E	Expires /
Project	Nutrients, Hydrocarbons, Metals	Card#:	

Check Regulatory Program
- ☐ Safe Drinking Water Act
- ☒ Clean Water Act
- ☐ RCRA / CERCLA
- ☐ Other

Instructions
1. Use one line per sample Location.
2. Be specific in analysis requests.
3. *(NEW)* **List each metal individually** *(NEW)*
4. Check off analyses to be performed for each sample Loaction.
5. Enter number of containers.

Turn Around Time Required
- ☒ Standard
- ☐ Half-time (50% surcharge)
- ☐ Quickest (100% surcharge) Phone Call Req.
- ☐ Emergency (Phone Call Req.)

Analyses Requested

	Field ID	Location	Grab/ Comp.	Sample Matrix*	Date	Time	(Diesel & Lube Oil Range) NWTPH-Dx	(Nutrients) BOD (ONLY)	(Nutrients) Chlorophylla, Pheophytin	(Nutrients) COD,NH3,TKN,T-Phos	(Nutrients) Iron	(Nutrients) TOC	(Nutrients)(M.AR.O-phos,NO2,NO3,NO2+NO3) N,TSS,TVS	Metals (As,Cu,Hg,Sn,Zn,Hard)	Number of Containers	Special Instructions Conditions on Receipt
1		SW003	Grab	SW	3/1/18	14:05	☐	☒	☒	☒	☒	☒	☒	☐	5	
2		SW014	↓	↓	↓	14:28	☒	☐	☐	☐	☐	☐	☐	☒	4	
3		SW118	↓	↓	↓	15:47	☐	☒	☒	☒	☒	☒	☒	☐	5	
4							☐	☐	☐	☐	☐	☐	☐	☐		
5							☐	☐	☐	☐	☐	☐	☐	☐		
6							☐	☐	☐	☐	☐	☐	☐	☐		
7							☐	☐	☐	☐	☐	☐	☐	☐		
8							☐	☐	☐	☐	☐	☐	☐	☐		
9							☐	☐	☐	☐	☐	☐	☐	☐		
10							☐	☐	☐	☐	☐	☐	☐	☐		

Sampled by: Hanna Winter Phone: 3603122312 FAX: Email: Hannaw@lummi-nsn.gov 14 Total Containers

Sample Receipt Request (Must include FAX or Email) ☐

* W - water, DW - drinking water, SW - surface water, GW - Ground water, WW - waste water, S - soil, OL - oil, Other____

Relinquished by	Date	Time	Received by	Date	Time
Hanna Winter	3/1/18	1703	JLN	3/1/18	1703
			BP	3/2/18	1323

	Yes	No	N/A
Custody seals intact 1.2°c	☐	☐	✓
Sample temp 3.1 C satisfactory	✓	☐	☐
Samples received intact	✓	☐	
Chain of custody & labels agree	✓	☐	

Edge

FORM COC 01-06-2009

Figure 8.1 Example Chain of Custody Form for Nutrients, Metals, Hydrocarbons, and TOC Samples Submitted to Edge Analytical