

Standard Operating Procedure #006

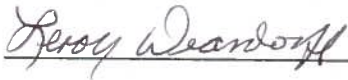



Chloride Sample Collection

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Prepared for:
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REVISION RECORD

Approval	Date	Responsible Person	Description of Change	Location of Change
1	October 2018	Kara Kuhlman	Initial Approval and Release of Version 1.0	N/A
2				
3				

SIGNATURE PAGE

Document: Chloride Sample Collection SOP #006

Version 1.0

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

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1. INTRODUCTION

This document, the Standard Operating Procedures (SOP) for chloride sample collection, should be used any time a chloride sample is collected for laboratory analysis. This document describes the standard operating procedures and best practices for chloride sample collection, including preparation of the sample site, 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

Chloride samples are collected in containers prepared and provided by an independent, contracted laboratory using instructions provided by the laboratory and summarized in this SOP. The well to be sampled is flushed and the chloride sample is collected without causing contamination of the sample. Analysis of the chloride sample is conducted by an independent, contracted laboratory using ion chromatography. Quality assurance/quality control (QA/QC) activities include chain of custody forms, holding times, appropriate sampling techniques, 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 2015a) requirements and guidelines are followed at all times while conducting fieldwork.

1.3 Quality Assurance/Quality Control (QA/QC)

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 the chloride analysis is provided by the laboratory and listed in Table 1.1.

Table 1.1 Range, Accuracy, and Readability of Chloride Analysis

Range ^a	Accuracy ^b	Precision ^c	Readability
1 mg/L +	± 10%	± 1%	mg/L (1-10) 1 mg/L (10+)

^a No maximum for this analysis. Results above 200 mg/L are diluted and actual concentration is calculated.

^b Accuracy is based on maximum QA/QC acceptance limits.

^c Precision is based on typical results of duplicate analysis. Maximum allowable difference for duplicates is 20%.

2. PREPARATION AND EQUIPMENT

This section describes the equipment needed to collect a chloride 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 chloride samples:

- Unopened chloride sample bottles (provided by the laboratory)
- Pen or permanent felt-tip marker (e.g., Sharpie)
- Hose (dedicated to groundwater sample collection)
- Chain of custody form

2.2 Sample Bottles

Clean sample bottles are provided by the independent contracted laboratory at which the chloride samples will be analyzed (Figure 2.1).

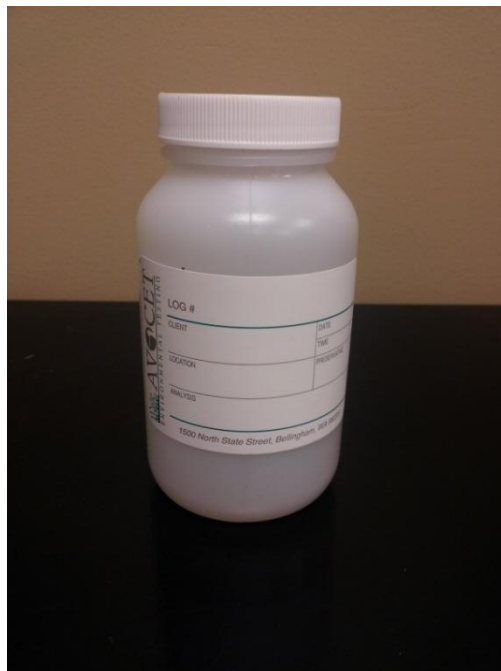


Figure 2.1 Example of Chloride Sample Bottle Provided by contracted laboratory

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

Damaged bottles, bottles missing lids, or previously used bottles are disposed of in the LNR laboratory garbage or recycled. Laboratory-supplied bottles are not rinsed prior to sample collection unless specifically indicated by the laboratory. All laboratory bottles are securely stored in an upright position prior to and after use.

Bottles that are used in sampling unsuccessful water samples are marked with an “X” on the label and lid, and are not used for a second attempt at collection of a successful sample.

2.2.2 Sample Bottle Labeling

Laboratory-supplied chloride sample bottles are labeled using permanent marker or waterproof pen prior to collecting a water sample.

Included on the sample label are the sample site identifier, date, time (using 24-hour format), laboratory analysis requested, and agency collecting the sample. See Figure 2.2 for an example bottle label.

The image shows a sample bottle label from AVOCET Environmental Testing. The label is a rectangular form with a grid structure. On the left side, there is a vertical logo for AVOCET Environmental Testing. The main body of the label contains the following handwritten information: LOG # Gooseberry 5, CLIENT Lummi, DATE 8/18/15, TIME 11:52, LOCATION GW419, PRESERVATIVE (blank), and ANALYSIS chloride. At the bottom of the label, there is a printed address: 1500 North State Street, Bellingham, WA 98225.

LOG #	Gooseberry 5
CLIENT	Lummi
DATE	8/18/15
TIME	11:52
LOCATION	GW419
PRESERVATIVE	—
ANALYSIS	chloride

1500 North State Street, Bellingham, WA 98225

Figure 2.2 Example Chloride Sample Bottle Label for Analysis at Edge Analytical

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.

2.3 Equipment Maintenance

Sampling equipment are kept ready for use. The water sampling hose is kept in working order and unopened bottles provided by the contracted laboratory are inspected before use to ensure that bottles are not damaged or contaminated (Section 2.2.1).

3. SAMPLE COLLECTION

Chloride samples are collected at groundwater sites as part of the Lummi Peninsula Groundwater Settlement Agreement, Ambient Groundwater Quality and Quantity Monitoring Project, and on an as-needed basis.

Each time a chloride sample is collected, the well must be flushed before collecting the sample.

1. Flush source from designated tap:
 - For active wells, adequate flushing is determined by stabilization of the temperature or by flushing the well for three minutes, whichever is longer.
 - For wells not pumped regularly (*i.e.*, supply wells that are not currently in production), it is recommended that at least three casing volumes be pumped prior to sample collection.
 - Where well production is inadequate to flush the source as described above, flush source as much as possible and note sampling conditions in Water Database or on field datasheets. Assign data qualifier due to potentially incomplete flushing. See Quality Management Plan (QMP) (LWRD 2018c) and Water Database User Guide (LWRD 2018d) for details.
 - Chloride samples should be collected using a dedicated groundwater hose or directly out of the spigot.
2. Collect chloride sample:
 - Label closed (never opened) and undamaged laboratory-supplied sample containers as described in Section 2.2.2.
 - Open chloride 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.
 - Fill bottle to nearly full. If sample is collected successfully, cap bottle and place upright. The chloride sample does not need to be refrigerated or kept on ice. Record sample collection in Water Database or on field datasheet.
 - If sample is not collected successfully, place an “X” on the bottle label and lid, and collect another sample. Record sample collection in Water Database or on field datasheet.

3.1 Successful Sample Collection

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

- The source was adequately flushed
- Laboratory instructions are followed

- The bottle is not contaminated by contact with sampler's hands or other foreign materials
- The cap is not contaminated by contact with sampler's hands or foreign materials

In cases where well production precludes full flushing, note incomplete flushing in Water Database or on field datasheet and assign a data qualifier to the sample result due to potentially incomplete flushing (see QMP and Water Database User Guide for details).

3.2 Storage of Samples

After sample collection, sample bottles are stored upright with lids screwed on tightly (unless laboratory instructions indicate otherwise) and packed to avoid breaking prior to delivery to the laboratory. Chloride samples do not need to be refrigerated or stored on ice.

4. LABORATORY ANALYSIS

As of the writing of this SOP, the independent contracted laboratory for chloride analysis is Edge Analytical, Incorporated (Edge). Edge uses ion chromatography for chloride analysis.

4.1 Holding Times and Specifications

Chloride samples collected by LWRD staff are sent to Edge Analytical, Incorporated (Bellingham and Burlington, WA). Table 4.1 lists the methods, sample requirements, upper and lower detection limits, and maximum holding times for the chloride samples analyzed by the independent, contracted laboratory.

Table 4.1 Chloride Laboratory Analysis Methods

Method	EPA300.0
Sample Container	250 ml, plastic bottle with screw top. Provided by Edge.
Sample Preservation	None
Maximum Holding Time	28 days
Lower Detection Limit	1.0 mg/L
Upper Detection Limit	None

Chloride samples are delivered to the laboratory within the holding time specified by the laboratory. If holding time is exceeded, samples are discarded and recollected.

4.2 Transportation to Laboratory and Chain of Custody

Chloride samples are transported to the laboratory within the specified holding time. Detailed transportation and chain of custody information for delivery to the laboratory are provided below.

Samples do not need to be stored on ice or refrigerated prior or during transportation to the laboratory. Details regarding sample drop-off times are available directly from the contracted laboratory and in the Field Reference Manual (LWRD 2015b). Samples and chain of custody form (see Appendix A) are transferred to laboratory staff. The chain of custody form should be completed to include the Lummi Indian Business Council's (LIBC) contact information, a contact name in the LWRD, sample identification (GW well number), Location (well name), sample matrix (DW for drinking water), grab, date and time of sample collection (in 24-hour format), the number of containers, and type of laboratory analysis requested (chloride). For samples collected under the Lummi Peninsula Groundwater Settlement Agreement, request results on separate reports in the remarks section of the chain of custody form. Laboratory staff will provide a LWRD staff a copy of the chain of custody form.

4.3 Results

Edge emails final chloride results to the Water Resources Specialist II and Water Resources Technician II. Preliminary results are available online at the contract laboratory's website upon completion of the analysis.

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

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

5.1 Duplicates

Duplicate chloride samples are not routinely collected to quantify precision. Where duplicate chloride samples are collected, as required by the project QAPP, field and laboratory variability are assessed.

5.2 Sampling Techniques

Field staff will ensure that all chloride samples are collected using appropriate techniques. This includes inspecting the laboratory-provided sample bottles for contamination prior to use (Section 2.2.1) and proper handling of the sample bottle during sample collection (Section 0). In particular, proper handling includes ensuring that:

- The source water is fully flushed
- The bottle is not contaminated by contact with sampler's hands or foreign materials
- The cap is not contaminated by contact with sampler's hands or foreign materials

5.3 Holding Times

Laboratory holding times are observed for all chloride samples collected. Table 4.1 denotes the holding times for chloride sample analysis.

5.4 Chain of Custody Form

Chain of custody forms are used to handle and track samples from field collection to delivery 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 provide a copy of the chain of custody form to the sampler. The number on the chain of custody form will follow the samples through analysis to final reporting.

The 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
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


7. REFERENCES

- Lummi Water Resources Division (LWRD). 2015a. Health and Safety Plan. Prepared for the Lummi Indian Business Council. April.
- LWRD. 2015b. Lummi Nation Water Quality Monitoring Program: Field Reference Manual. Internal Document. July.
- LWRD. 2018a. Quality Assurance Project Plan: Ambient Ground Water Quality and Quantity Monitoring Project. Version 1.0. Prepared for the Lummi Indian Business Council. Lummi Reservation, Washington. October.
- LWRD. 2018b. Quality Assurance Project Plan: Lummi Peninsula Groundwater Settlement Agreement Compliance Project. Version 1.0. Prepared for the Lummi Indian Business Council. Lummi Reservation, Washington. October.
- LWRD. 2018c. Quality Management Plan for the Lummi Nation Water Quality Monitoring Program. Version 1.0. Prepared for the Lummi Indian Business Council. Lummi Reservation, Washington. October.
- LWRD. 2018d. Water Database User Guide. Prepared for the Lummi Indian Business Council. Lummi Reservation, Washington. October.

8. APPENDICES

Appendix A: Edge Chain of Custody Form

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CHAIN OF CUSTODY / ANALYSIS REQUEST (PLEASE COMPLETE ALL APPLICABLE SHADED SECTIONS)
17-31155
 67491 - 67495

Report To: LIBC
 Billing Email: jammie@lummi-nsn.gov and hanna@lummi-nsn.gov

Address: 2665 Kwina Road State: WA Zip: 98226
 City: Bellingham
 Altn: Hanna Winter Address: 2665 Kwina Road State: WA Zip: 98226
 City: Bellingham
 Phone: 360-312-2312 Fax: P.O.#: 1000458
 Report Email: hanna@lummi-nsn.gov Card: VISA MIC Expires:
 Project Name: Supply Wells Card#:

INSTRUCTIONS "PLEASE READ"

- Use one line per sample location.
- Be specific in test requests.
- List each metal individually.
- Check off analysis to be performed for each sample location.
- Enter number of containers.

Analysis Requested

Turn Around Time Required
 Standard
 Half-Time (50% Surcharge)
 Quickest (100% Surcharge) Phone Call Req.
 Emergency (Phone Call Required)

Sample ID	Location	Sample (See Below)	Grab Composite	Date	Time	Number Of Containers	Special Instruction/ Conditions on Receipt
1	Kinley #1	DW	Grab	10/31/17	13:09	1	Chloride EPA 300.0 Please provide separate report for each site Please provide result below the SRL
2	Kinley #2			14:00	1		
3	Kinley #3			14:15	1		
4	Balch			15:15	1		
5	Honzon			15:45	1		
6							
7							
8							
9							
10							

Sampled By: Hanna Winter Phone: 360-312-2312 Fax: Email: hanna@lummi-nsn.gov Total Containers: 5

* Sample Matrix
 W - Water SW - Surface Water WW - Wastewater OL - Oil
 DW - Drinking Water GW - Ground Water S - Soil Other:

Relinquished By: Hanna Winter Date: 10/31/17 Time: 10:25
 Received By: Hanna Winter Date: 10/31/17 Time: 10:25
EDGE 16.7c

Custody Seals Intact Yes No N/A

Sample Temp 18.2c Satisfactory Yes No

Evidence Of Cooling Yes No

Samples Received Intact Yes No

Chain Of Custody & Labels Agree Yes No

Figure 8.1 Example Chain of Custody Form for Chloride Samples Submitted to Edge