DRINKING WATER QUALITY MONITORING MANUAL

PHYSICAL AND CHEMICAL PARAMETERS

Department of Environment and Climate Change
Water Resources Management Division
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TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 Background

Since the early 1990's, the Water Resources Management Division (WRMD) has been responsible for all routine aspects of source water quality monitoring. This water quality monitoring was a component of the Protected Water Supply Areas Program. Its objective was:

(i) to document the background water quality of water flowing into a public water supply treatment/distribution system, and
(ii) to assess the impact of watershed activities on water quality.

Water quality monitoring was undertaken on a regular basis, and the frequency of sampling was dependent upon available funding. Information was made available to the municipalities, engineering consultants, and the public upon request.

In 1996, in order to have inorganic results to accompany the bacteriological and chlorine residual (monitored by Service NL), the WRMD began to monitor the inorganic and organic chemistry of tap water. The tap water quality data was used to assess tap water in comparison with the *Guidelines for Canadian Drinking Water Quality* (*GCDWQ*). Information was made available to municipalities, including owner/operators of other public water supply systems, engineering consultants and the public upon request.

All tap water data prior to 2000 was dropped due to incorrect flushing protocol.

1.2 Purpose

This manual outlines the protocols for the various components of the WRMD’s drinking water quality monitoring activities. It is an integral component of the in-house Quality Assurance/Quality Control (QA/QC) program.

The manual was prepared to:

(i) Serve as a reference guide for staff involved in drinking water quality monitoring; and
(ii) Ensure a consistent approach to drinking water quality monitoring.

This manual is intended to be dynamic in nature and will be modified as the program and activities develop or change.

1.3 Scope

Drinking water quality monitoring consists of regular sampling and testing of drinking water from both the source and the tap. The extensive monitoring program for drinking water quality in the province is a joint responsibility shared by the Departments of Environment and Climate Change, Health and Community Services, and Digital Government and Service NL (bacteriological water quality and chlorine residuals). This manual depicts monitoring for inorganic and organic chemistry of source and tap water.

The WRMD's monitoring program has evolved from a simple semi-annual sampling of source water from selected sources, to a multifaceted and integrated program aimed at documenting all aspects of water quality from water supply source to the consumer's tap.

The policy on *Drinking Water Quality Monitoring and Reporting for Public Water Supplies* is available in **Appendix A**.

It must be noted that this program deals with **public and potable water dispensing unit (PWDU)** water supply systems only. It does not apply to **private** or **communal** water systems.

2.0 LABORATORY CERTIFICATION AND SELECTION

2.1 Certification

All laboratories contracted to analyze water samples (including QA/QC samples) as part of the drinking water quality monitoring program must be accredited with Canadian Association for Laboratory Accreditation (CALA).

During an open tendering process, all laboratories in Canada have the opportunity to bid on work, pursuant to the specifications and requirements prescribed by this Department, as listed in **Appendix B**.

2.2 Selection

As a result of the last public tendering process, Bureau Veritas Canada Inc. has been contracted to provide regular drinking water analysis until March 31, 2024.

3.0 PLANNING AND PREPARATION

3.1 Background

Effective coordination, planning, and preparation are crucial for the successful completion of the drinking water quality program, which has experienced significant growth since the early 1990s. From less than 100 records per year, the program now generates tens of thousands of records annually, with lab results transitioning from paper to digital reporting.

Any drinking water quality sample is useless unless its collection has been well planned and documented as outlined below. Adequate planning and documentation of field observations are prerequisites for meaningful interpretation of water quality results.

3.2 Sampling Frequency

As per drinking water standards:

- Tap water samples are collected semi-annually (2x/year) for surface water supplies
- Tap water samples are collected semi-annually (2x/year) for groundwater supplies
- Source water samples are collected every three years
- In certain circumstances (e.g. population > 5000), source and tap water samples may be collected quarterly (4x/year).

In water systems where both source and tap samples are to be collected, it is recommended to collect the samples subsequently.

For drinking water sampling purposes, the four seasonal sampling windows for the island portion of the province are as follows:

Spring	**May 16th - June 30th**
Summer	**August 1st - September 30th**
Fall	**November 1st - December 15th**
Winter	**January 15th - March 15th**

The four seasonal sampling windows for Labrador are as follows:

Spring	**May 1st - June 30th**
Summer	**July 1st - August 30th**
Fall	**October 1st - November 15th**
Winter	**January 1st - March 15th**

Samples that are not collected within the assigned season sampling windows will be considered “out of season” and will **<u>not</u>** be reported in the desired season. The sampling schedule will not be modified to accommodate samples that have been taken out of season.

Drinking water quality monitoring requirements for each public water supply will be determined annually by using available water quality data, the size of the system, and the nature and type of water quality issues.

3.3 Bottles and Consumable Supplies

Based upon the annual sampling schedule, it is possible to closely estimate the requirements for the various sample bottles and consumable supplies.

Each season, the appropriate laboratory should be consulted to determine the correct quantity, size, and type of bottles needed for sample collection. Environmental Scientists in each region coordinate bottle orders for their respective areas. The laboratory is responsible for ensuring timely delivery of ordered bottles, covering shipping costs, and paying for the return shipments of filled bottles for analysis. To save on courier expenses, it is advisable to provide the laboratory with ample notice, typically a few weeks, so that empty bottles can be shipped via ground.

Each sampler is responsible for their own consumable supplies:

- coolers,
- ice packs,
- chlorine reagents (free and total),
- delicate task wipes,
- fine tip sharpies,
- packaging tape & material,
- thermometers,
- stopwatch, etc.

Samplers are responsible for ensuring that they have an ample supply of *Chain of Custody Record* forms, which can be obtained from Headquarters (located in the St. John's office).

Appendix C contains a checklist of materials required for all drinking water quality fieldwork.

3.4 Performance Verification for Colorimeters for Chlorine Residual Testing

HACH® Pocket Colorimeters are used by all sampling staff to measure the free and total chlorine residual at the time of sampling. Prior to the start of each sampling season, all staff should check the performance of their colorimeters against the appropriate secondary standard set according to the instructions provided in **Appendix D.**

In addition, all staff should record these performance checks in a log, as provided in **Appendix D**. The date of the performance verification (or Chlorine Accuracy Check) must be included in the End of Season Email.

3.5 Calibration of Handheld pH meters

Many staff have access to handheld pH meters for in situ measurements during sampling. These meters typically require weekly calibrations during periods of usage and proper storage during non-use periods, such as between sampling seasons. Please refer to the specific manual for your pH meter for more details on procedures for calibration and storage.

3.6 Sample Location Record Form

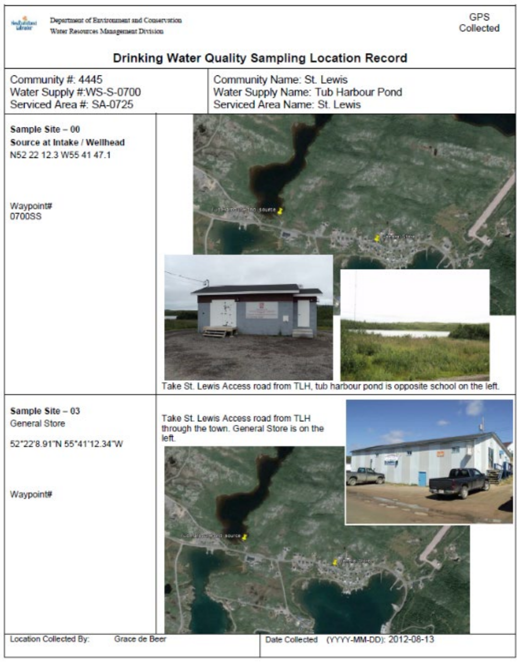
Each public water supply has a corresponding *Sample Location Record* to assist field staff in locating each source and tap sampling site. The *Sample Location Record* contains helpful information such as:

- photos,
- coordinates,
- maps, and
- descriptions of the sampling site.

All other structures of interest should also have GPS coordinates (e.g. dams, chlorinators, towers, chlorine boosters, etc.). These forms make up the site documentation for the drinking water program.

A blank *Sample Location Record Form* is available in **Appendix E**.

Should any details change, the *Sample Location Record Form* must be updated accordingly. Updated *Sample Location Records* must be sent to Headquarters at the end of the sampling season.



Department of Environment and Conservation
Water Resources Management Division

GPS Collected

Drinking Water Quality Sampling Location Record

Community #: 4445 Water Supply #:WS-S-0700 Serviced Area #: SA-0725	Community Name: St. Lewis Water Supply Name: Tub Harbour Pond Serviced Area Name: St. Lewis

Sample Site – 00
Source at Intake / Wellhead
N52 22 12.3 W55 41 47.1

Waypoint#
0700SS

Take St. Lewis Access road from TLH, tub harbour pond is opposite school on the left.

Sample Site – 03
General Store

52°22'8.91"N 55°41'12.34"W

Waypoint#

Take St. Lewis Access road from TLH through the town. General Store is on the left.

Location Collected By: Grace de Beer

Date Collected (YYYY-MM-DD): 2012-08-13

3.7 Sampling Organization Protocol

Drinking Water Quality Sampling Field Records and labels are provided to staff for all regular drinking water sampling.

The sampling organization protocol is as follows:

- Field sheets and bottle labels should be placed in a binder or clipboard.
- Sample numbers are to be used in sequential order (according to the date of sampling) while in the field.
- Keep a record of the last sample number used and use the next sequential number for the next sampling day.
- Ensure handwriting on field sheets and bottle labels is neat, legible, and uses proper grammar.

3.8 Sample Number and the Drinking Water Database

All drinking water quality data stored in the drinking water database has a unique sample number.

Appendix F outlines the nomenclature for sample numbering. All samples collected must comply with this format so that they will fit into similarly structured databases, and comply with QA/QC protocol.

Each unique sample number is associated with a community name, water supply number, and serviced area number. These terms are defined in **Appendix G**.

A global *Public Water Supply Database* containing community names, water supply numbers, serviced area numbers, and other information, is maintained by the WRMD and is available to all staff (read-only). This database is maintained by the drinking water program lead and a senior environmental scientist within the Water Rights, Investigations, and Modelling (WRIM) section of the WRMD. Only they have the authority to make changes, as any changes have to be agreed upon by the Departments of Health and Community Services and Service NL through the Safe Drinking Water Technical Working Group. Any significant errors or required changes in this database should be communicated after each sampling season through the end-of-season email.

The protocol for the addition of a new supply to the database is available in **Appendix H**.

The protocol for the removal of a supply from the database is available in **Appendix I**.

3.9 Sample Bottle Labels

The purchase of labels in bulk is completed by staff in Headquarters. All labels for regular drinking water quality sampling are pre-printed prior to the beginning of each sampling season, and mailed to the respective samplers. All pre-printed labels reflect information from the latest version of the *Public Water Supply Database*. At the bottom of the pre-printed labels, blank labels are provided to allow for additional, unanticipated samples, or errors made on the original pre-printed sheets. An example of a pre-printed sheet of labels is given in **Appendix J**.

It is important to note that all information contained on each label must comply with the nomenclature outlined in **Appendices F** and **G**. An incorrect or inaccurate label may result in the sample results being discarded. Similarly, the handwritten information on the label must be legible.

Typical fields to be handwritten in black ultra-fine point permanent Sharpie marker or waterproof ink on each pre-printed label are shown below in bold type.

Source Sample

Samp#: 2021 - **2149** - 00 - SI - RE
WS#: WS-S-0291
Date: 2021 - **06** - **27**
Desc: Grand Falls-Windsor - Northern Arm Lake

Tap Sample

Samp#: 2021 - **2149** - **01** - TI - RE
SA#: SA-0298
Date: 2021 - **06** - **27**
Desc: Grand Falls-Windsor - Northern Arm Lake

Samp#: Sample number (completed by the sampler).
WS# / SA#: Source samples must have a Water Supply Number (**WS#**).
Tap water samples must have a Serviced Area Number (**SA#**).

Two example labels are shown below:

Source Sample

Samp#: 2023 -   - 00 - SI - RE
WS#: WS-S-0291
Date: 2023 -   -
Desc: Grand Falls-Windsor - Northern Arm Lake

Tap Sample

Samp#: 2023 -   -   - TI - RE
SA#: SA-0298
Date: 2023 -   -
Desc: Grand Falls-Windsor - Northern Arm Lake

Date: Sample date, must be in the following format: **YYYY-MM-DD**
Desc: The sample description differs for source and tap samples.

Source

Samp#: 2023 -   - 00 - SI - RE
WS#: WS-S-0291
Date: 2023 -   -
Desc: Community Name – Source Name

Tap

Samp#: 2023 -   -   - TH - RE
WS#: SA-0298
Date: 2023 -   -
Desc: Serviced Area(s) – Source Name

For any samples which are not part of the regular drinking water quality sampling (e.g. resamples or special samples), it may be necessary to complete labels from a sheet of blank labels. In these cases, all fields on the label would have to be handwritten.

Samp#: Sample number, must be completed by the sampler in accordance with the *Drinking Water Quality Sample Numbers* nomenclature in **Appendix F**.

WS# / SA#: Complete the appropriate **WS#** or **SA#** in accordance with the global *Public Water Supply Database*. For unidentified supplies that are not included in the *Public Water Supply Database* and have no **WS#** or **SA#** assigned, enter **0000** as the four-digit number:

- **WS-S-0000** for surface water,
- **WS-G-0000** for groundwater, and
- **SA-0000** for the serviced area.

Date: Sample date, must be completed by sampler in the following format:

- **YYYY-MM-DD**

Desc: The description of the sample differs for source and tap:

- **Community Name – Source Name** for a source sample and
- **Serviced Area(s) – Source Name** for a tap sample.

If the water supply is unidentified (i.e. WS-S-0000, WS-G-0000, SA-0000) use a unique name/identifier which is not likely to be confused with a community name currently in the *Public Water Supply Database*.

Under the present contract with Bureau Veritas (BV Labs), there are:

- Seven bottles for each inorganic source (or tap) sample, requiring seven identical labels on each of the bottles.
- Two vials for each THM sample, requiring two identical labels on each of the vials.
- Two vials for each HAA sample, requiring two identical labels on each of the vials.

3.10 Drinking Water Quality Sampling Field Records

The accurate completion of the *Drinking Water Quality Sampling Field Record* is an important component of the entire drinking water quality sampling process. This record is the vital link between the actual collection of a sample, and the data report from the laboratory. The data is verified with the *Drinking Water Quality Sampling Field Records* for quality assurance and quality control (QA/QC).

Drinking Water Quality Sampling Field Records are pre-printed and distributed to the appropriate sampler at the same time as the pre-printed labels. Pre-printed *Drinking Water Quality Sampling Field Records* contain information from the latest version of the *Public Water Supply Database*.

The field sheets include information such as population serviced and chlorination/treatment type. It is important to note that this additional information is up to date from when the field sheets are printed. Always check the BWA status before heading in to the field.

Each pre-printed *Drinking Water Quality Sampling Field Record* should include all information in the following fields:

- Community #
- Water Supply #
- Serviced Area #
- Community Name
- Water Supply Name
- Serviced Area Name

Prior to leaving the office, it is useful to match up the appropriate labels with the *Drinking Water Quality Sampling Field Records*. Keeping these documents paired together can save time and is useful in identifying any potential errors or mistakes.

For any samples which are not part of the *regular* drinking water quality sampling, it will be necessary to complete a blank *Drinking Water Quality Sampling Field Record* (**Appendix K**). In these cases, the following fields in the top box of the record would have to be completed prior to leaving the office:

- Community #
- Water Supply #
- Serviced Area #
- Community Name
- Water Supply Name
- Serviced Area Name

In the most current *Public Water Supply Database* and in subsequent versions, Community #s are listed as LGP #s (Local Government Profile).

On the *Drinking Water Quality Sampling Field Record*, the Sample Site is different for source and tap samples:

- **Sample Site – 00** for source sampling,
- **Sample Site – 01, 02, 03, 04** for tap sampling.

The following boxes indicate the type of sample that is being taken:

- **00-SI-RE** source inorganic – **regular** sample,
- **00-SI-SP** source inorganic – **special** sample (e.g. QA/QC)
- **00-SI-RS** source inorganic – **resample**.

Other fields that must be completed include:

- **Temperature** of the tap and source water.
- **Time** the sample was taken (24hr format).
- **Sample location (**e.g. Town Council Office bathroom)**.**
- **Free** and **total chlorine**.
- **Remarks** (to record special circumstances).

Information included in the space provided on the field sheet for the above noted fields will be placed in the database. Anything written outside the space provided will not be included in the database.

3.11 Chain of Custody Forms

Each *Chain of Custody (COC)* form has a preprinted sequential serial number. *Chain of Custody* forms are legal documents.

- *Drinking Water Quality Sampling Field Record*s should be used for all information when filling out COC forms.
- Do not rely on the sampling schedule to fill out the *COC* as this may have changed.
- Ensure bottle labels match the *Drinking Water Quality Sampling Field Records* and *COCs*.
- Write clearly and press hard when writing on the *COC*.
- Be sure to add your office and cell phone numbers on the *COC*.
- Ensure page numbers are inserted.
- Add column totals for each page.
- If there is a bottle missing in a regular shipment, indicate on the *COC* that it is not being shipped and provide instructions (i.e. "Only one THM vial. Please proceed with THM analysis on the one available vial.")
- For resamples, tick off "RUSH" column to indicate that this sample must be analyzed as soon as possible.
- Send the white copy of the *COC* to the lab, yellow to Headquarters, and keep the pink copyfor the sampler.

If any significant changes need to be made, a new *Chain of Custody (COC)* should be completed. If a minor change needs to be made, ensure that it is legible, and the correction initialed so that it can still be used as a legal document.

A blank example of a *Chain of Custody (COC)* is provided in **Appendix L**.

3.12 Logistics

The objectives of the drinking water quality monitoring program are:

- To assess the effectiveness of the treatment and/or disinfection system.
- To assess the impacts of the distribution system in the community on water quality.
- To assess the impacts of the plumbing in local homes, public buildings or businesses on water quality.

This is done by comparing tap water quality with source water quality. Accordingly, tap and source samples should be collected subsequently (within a few hours of each other). Raw water quality or treated water quality can vary from season to season, day to day, and hour to hour, depending upon a variety of factors. This is particularly important in terms of THM/HAA precursors, pH, turbidity, temperature, and other parameters.

Regularly scheduled THM/HAA samples do not have to be taken if the town/operator verifies that the chlorination system is **not** in operation.

3.13 End of Sampling Season E-mail

All sampling staff must send an end of sampling season e-mail within one week of the end of sampling for that particular season. This e-mail should include details pertaining to deviations from the sampling schedule, or any other notable items. Once all e-mails have been received, they will be combined and used for completion of QA/QC protocols and procedures.

The end of season email should follow the Word template in **Appendix M**.

4.0 SAFETY AND SECURITY

Field work activities may require sampling staff to access water bodies during open water and ice conditions, enter confined spaces, enter disinfection facilities, enter water and wastewater treatment facilities, visit project sites, conduct regulatory inspections, handle bottles preserved with chemicals, expose themselves to chemicals, etc. All staff must ensure that they are fully aware of all required precautionary measures, safety requirements, required gear, and training in order to access or undertake the above mentioned activities.

Staff safety and well-being is of paramount importance, and it should not be compromised under any circumstances.

It is the Manager's responsibility to provide staff with the required training and tools to ensure their safety and well-being. It is the staff's responsibility to identify safety related needs and training to the Manager.

4.1 Preservatives and Reagents

For many of the analytical procedures that are required, the analyzing laboratory may require that one or more preservative or reagent be added to the sample bottles/vials to preserve the sample or to prevent additional chemical reactions from taking place. These preservatives can be hazardous and should be treated with care. WRMD will provide the training and safety equipment needed to properly and safely handle preservatives and reagents. Safety equipment includes safety glasses, acid resistant gloves, and lab coats/aprons. It is the sampler's responsibility to wear the safety equipment. Failure to do so may absolve the Department of any responsibility or liability in the event of mishap.

Currently under the contract with Bureau Veritas the following bottles contain preservatives:

Bottle / Vial Type	Preservative
1 x 40 mL glass vial used for Ammonia	Sulfuric Acid (H_2SO_4)
1 x 100 mL clear glass bottle used for Mercury	Hydrochloric Acid $HCl_{(aq)}$
1 x 120 mL plastic used for metals	Nitric Acid (HNO_3)
1 x 120 mL plastic used for nutrients	Sulfuric Acid (H_2SO_4)
1 x 120 mL plastic used for TOC	Sulfuric Acid (H_2SO_4)
2 x 40 ml glass vials used for THM	Sodium Thiosulphate ($Na_2S_2O_3$)
2 x 40 ml glass vial used for HAA	Ammonium Chloride (NH_4Cl)

It is necessary to determine the free and total chlorine residual for systems (surface water and groundwater) that are chlorinating. This is generally done using a HACH® Pocket Colorimeter filter photometer. The use of this meter requires two powdered reagents;

- DPD Free Chlorine Reagent
- DPD Total Chlorine Reagent.

These white powders may cause eye and respiratory tract irritations, as well as allergic skin reactions.

The *Safety Data Sheets (SDS)* for each of the above mentioned preservatives/reagents are found in **Appendix N**. *SDS* sheets should be available in an easy to access location in the departmental laboratories for each region. All staff who handle these bottles, preservatives, or reagents in any way must have WHMIS (Workplace Hazardous Materials Information System) training.

4.2 Chlorine and Water Treatment

The collection of source water samples from some wet wells, drilled wells, and water treatment plants necessitates entering into buildings where chlorine or other chemicals are used and stored. Entry into such premises must only be done with the owner/operator of the facility present. The owner/operator should know the risks and warning signs.

The presence of chlorine is obvious by its smell. Chlorine gas can cause respiratory tract irritation, eye irritation, and death. Chlorine liquid can cause respiratory tract irritation, eye, and skin irritation. It will also bleach any clothes that it comes in contact with.

Chlorination is the most common form of disinfection used in Newfoundland and Labrador. However, other forms of water treatment can be found such as ozonation, ultravilot (UV) radiation and mixed oxidant systems. Check with the owner/operator if you have any concerns regarding the safety procedures appropriate in each facility.

4.3 Sample Nabber Safety

In some cases, it is necessary to collect water samples from wet wells in pump houses. The use of a long pole (sample nabber) can be hazardous, particularly with respect to electrical wires, light fixtures, and electrical outlets. Sample nabber poles should be made of plastic, fiberglass, or some other non-conductive material.

4.4 Water and Ice Safety

The collection of source water samples requires that a sample be taken directly from a pond, lake, reservoir, stream, river, wet well, drilled, or dug well. The collection of these samples has some inherent risks. Appropriate safety precautions must be employed.

Workplace Health and Safety Regulations specify that under certain circumstances, work around water and ice necessitates:

- having a second person,
- having a means of rescue,
- having a means of communication, and
- wearing of personal flotation devices.

If a second person is deemed necessary then it must be planned in consultation with the Program Lead. Having a means of rescue only applies to a situation with two or more people.

Maintaining a means of communication applies in all circumstances. Field staff have been provided with cell phones or satellite phones, and (in some scenarios) a SPOT Satellite GPS Messenger. A lone worker monitoring service called *SafetyLine* is utilized as part of the WRMD's safety precautions for work in the field. It is utilized via mobile application and includes important safety procedures such as check-in intervals and emergency response protocols.

However, in some locations there is no signal and communication is impossible. Always use good judgment and be cautious if communication is lost. Cell phones need to be protected (with doubled zip-lock bags, or similar means) when working around water. The SPOT Satellite GPS Messenger comes with an armband that enables you to transport it in the field "hands free".

Wearing a personal flotation device (floater suit, floater jacket, life jacket, or vest) should be done under **all circumstances** when a person is working in or around any water body. The provision of this personal safety equipment is the responsibility of the employer. However it is the worker's responsibility to ensure that he/she has one that fits appropriately, and wears it.

The following gear is also recommended for the field:
- helmets,
- throw rope,
- whistle,
- carabineers,
- bear spray/bear bell,
- reflective vest
- quick release harness, etc.

Some important notes for water safety:
1. be aware of your surroundings,
2. your personal safety always comes first,
3. always use the right equipment,
4. always have a backup plan,
5. never go on ice covered intake ponds,
6. never tie a rope around yourself,
7. never stand in the loop of a rope,
8. always stand upstream of a rope,
9. never put your feet down should you be swept away.

5.0 SOURCE WATER QUALITY MONITORING

5.1 Description

Source water quality is the quality of water prior to any treatment, disinfection, or distribution. In most cases, source water quality samples are collected directly from a pond, lake, reservoir, stream, river, or well, depending on the source of public water supply for a particular community.

A sample is considered to be a **source** sample if:

- It is collected from a dug or drilled well with a hand pump, electric pump, or gravity flow, and
- there is no treatment, disinfection, or distribution.

5.2 Parameters

The parameters monitored under this component of the program may include but may not be limited to the following:

- Physical Parameters
    - Temperature
    - Conductivity
    - pH
    - Colour
    - Turbidity
    - Total Dissolved Solids;
- Chemical Parameters
    - Inorganic
        - Metals
        - Major Ions
        - Nutrients; and
    - Organic
        - Total Organic Carbon
        - Hydrocarbons
        - Pesticides
        - Other organic parameters as required.

Inorganics analysis - Under present contract with Bureau Veritas, a complete listing of Inorganic parameters is included in **Appendix B**.

Temperature of the source water is a required measurement. It must be recorded on the *Drinking Water Quality Sampling Field Record*.

5.3 Sample Location

To assess the quality of water flowing into a treatment and distribution system and ensure the integrity of a public water supply, it's essential to collect source water samples directly from the source (e.g. ponds, lakes, reservoirs, streams, rivers, or wells before any disinfection or treatment). These samples are analyzed to determine the health of the ecosystem within the natural drainage basin, watershed, or groundwater recharge area. Monitoring the quality of source water is a critical tool in evaluating the impact of land use changes and comparing it with tap water quality to determine the effectiveness of the treatment and disinfection systems and the distribution network.

Source water samples must accurately represent the quality of the water that is being sampled. Therefore, surface water samples are to be taken as grab samples directly from the source body of water, as close as is practical to the water supply intake. At times, site inaccessibility, adverse weather, or ice conditions make this dangerous, physically impractical, or impossible.

When sampling drilled and dug water wells, it desirable to have the person who operates the well and associated infrastructure with you, or be very familiar with these various and variable systems yourself. The operator is likely familiar with the sampling procedure, equipment and operational details. If possible, have that person turn valves, shut down or bypass pumps and chlorinators, isolate holding or pressure tanks, and operate specialized hatches and doors. If you are taking a water sample without the operator present, a thorough understanding of water systems and associated issues regarding electricity, pressure, cross connection, water quality and quantity, and confined space is essential. For many sites, a length of garden hose (20 – 30 feet long) is necessary for the flushing process. In a few cases, two or more lengths or hose is needed. This should be brought with you. To maintain consistency, make sure all samples are taken as close to the water well as possible. Dug wells require a telescopic water sampling pole with a bottle holder attached. If possible, water samples are taken directly from a dug well.

It is important to realize that a grab sample represents only one instant in time. Water quality can vary from season to season, day to day, and hour to hour depending upon a variety of factors.

5.4 Protocol

The source sampling protocol is utilized to ensure that everyone involved in drinking water monitoring collects a sample in the same way. This ensures accurate results, consistency of data, and reduces the number of systematic errors.

While conducting source sampling ensure that safety is your priority. If a source is unsafe to access do not take the sample. Indicate in the Remarks field on the *Drinking Water Quality Sampling Field Record* why the site was inaccessible.

Label the bottles before taking the sample as labels will not stick to a wet surface. Labeling the bottle prior to its filling ensures that the bottle is labeled and is less likely to get mixed up with another bottle later.

Grab samples are, where possible, to be taken directly from source waters. Source samples should be true source samples taken near the intake. The sample bottle is to be plunged directly into the water in an inverted position. Once below the surface, approximately 30 cm, the bottle is turned upright so that the air is allowed to escape and the water to run in. This avoids the inclusion of any floating debris or organic matter to enter the bottle.

Any bottle containing preservatives must not be rinsed or over filled, as this would wash out the preservatives. A non-preserved bottle shall be used to fill up any preserved bottle. For example, the 500mL plastic bottle for general chemistry analysis may be used to fill the remaining bottles as they have preservatives. There is no need to rinse out the 500ml plastic bottle as it is sterile.

Inorganics - Under the present lab contract, there are seven bottles to be filled for each inorganic source water sample:

1. Ammonia (40 mL clear glass vial with sulphuric acid): Ammonia ($N\text{-}NH_3$)
2. General (250 mL plastic – no preservative): anions (Bromide, Chloride, Sulfate)
3. Mercury (100 mL clear glass container with hydrochloric acid): Mercury
4. Metals (120 mL plastic with nitric acid): Metals Water Total MS (Aluminum, Antimony, etc.)
5. Nutrients (120 mL plastic with sulphuric acid): Total Kjeldahl Nitrogen in Water, Total Phosphorus (Colorimetric)
6. RCAP general chemistry (250 mL plastic – no preservative): Alkalinity, Colour, DOC, etc.
7. TOC (120 mL plastic with sulphuric acid): TOC

The *Drinking Water Quality Sampling Field Record* needs to be filled out accurately and at the same time that the samples are being taken.

- Sample Serial Number – see **Appendix F** for nomenclature
- Sample Site - Site numbers should reflect the location of the sample:
    - **00** – sample collected at the source.
- Sample Suffix:
    - **-RE** – if the sample is a regularly scheduled sample (and considered to be representative of typical water quality for the supply)
    - **-SP** – if the sample is part of a special project (mitigation and control, QA/QC, etc.) or in response to an event (e.g. oil spill).
    - **-RS** – if the sample is a re-sample.
- Location – describes the sampling location
    - physical description of the location,
    - name of the building's occupant or owner, or
    - street address, etc.
- Temperature – required for calculating Langelier Index
- Time – 24hr format
- Remarks - the location on the Field Sheets used to record special circumstances. This information can be critical for interpreting samples. With the exception of source wells, the remarks field will not be reported on community reports.
- Signature & Date

Note for Source samples: Field Sheet Remarks appear in the DWQ Search Engine "Remarks" Column.

Optional measurements and information can be recorded in a field book, including:

- Conductivity using a portable conductivity meter;
- pH using portable pH meter; and
- Dissolved oxygen using portable DO meter.

When sampling at a source, collect GPS coordinates and take pictures of the following:

- Intake and surrounding area.
- Dam or water control structure.
- Pump house or other structures of interest.

When a "new supply" is found in the field, do **<u>not</u>** sample it immediately as it needs to be added to the *Public Water Supply Database*. Samplers are required to collect all relative information as it pertains to the *Public Water Supply Database* as outlined in the Protocol for New Public Water Supplies. Only after a new supply is added to the *Public Water Supply Database* will a new Serviced Area(s) number and Water Supply number be assigned. If it is added, the supply can be sampled during the next visit.

The Protocol for New Public Water Supplies is found in **Appendix H.**

The Protocol for Removal of Public Water Supplies is found in **Appendix I**.

5.5 Sampling Protocol for Municipalities/LSDs (Remote Sampling)

Under special circumstances (i.e. remote location), the WRMD will request that drinking water samples be collected by municipal/LSD staff. In these instances, WRMD staff should ensure that the sampler has been provided with the appropriate information and materials to collect and handle the sample in accordance with our protocol.

A copy of the sampling instructions from **Appendix O** should be forwarded to the sampler, along with the appropriate bottles and necessary materials to allow for proper and prompt return shipment.

6.0 TAP WATER QUALITY MONITORING

6.1 Description

Tap water quality is the quality of water at the consumer's tap following any treatment, including disinfection. In most cases, tap water quality samples are collected from faucets inside local homes, public buildings, or businesses.

6.2 Parameters

The parameters monitored under this component of the program may include, but may not be limited to the following:

- Physical Parameters
    - Temperature
    - Conductivity
    - pH
    - Colour
    - Turbidity
    - Total Dissolved Solids;
- Chemical Parameters
    - Inorganic
        - Metals
        - Major Ions
        - Nutrients
    - Organic
        - Chlorination Disinfection By-Products (CDBPs)
            - Trihalomethanes (THMs)
            - Haloacetic Acids (HAAs)
        - Total Organic Carbon
        - Hydrocarbons
        - Pesticides
        - Other organic parameters as required
    - Chlorine Residual Testing (Free and Total)
- THMs
- HAAs

Inorganics analysis - Under the current lab contract, a complete listing of Inorganic parameters is included in **Appendix B**.

Temperature of the water is a required measurement. It must be recorded on the *Drinking Water Quality Sampling Field Record*.

Chlorine Residual Testing - A chlorine residual test shall be conducted for all systems (surface water and groundwater) that are using chlorination as a form of disinfection. This is generally done using a HACH® Pocket Colorimeter filter photometer. Procedures for determining the free and total chlorine residual are outlined in the Operation Manual included with the meter.

There will be cases when the free or total chlorine levels are higher than the maximum recording limit of the chlorine measurement kit (2.2 mg/L) when measuring in "low range". Typically the numbers will flash when the maximum recording limit has been reached. When this happens, retake the reading in the "high range" setting using the procedures outlined in the Operation Manual. Record all values in field sheets. Note chlorine readings greater than 2.2 mg/L in the End of Season email. Notify the town of the high chlorine readings, as well as the OETC Regional Staff responsible for that area.

6.3 Sample Location

Tap water quality is monitored so that it can be compared with the *GCDWQ*, as amended, and the *Standards for Chemical and Physical Monitoring of Drinking Water*, as listed in the Policy for Drinking Water Quality Monitoring and Reporting (**Appendix A**), or any other guidelines which might be adopted or legislated. Furthermore, tap water quality can also be compared with the source water quality in order to identify the cause of any observed water quality problem. Any variation between source and tap water quality represents the effectiveness of the treatment and/or disinfection system, the influences of the distribution system in the community, and the plumbing in local homes, public buildings, or businesses.

Inorganic samples are typically taken two times per year (four times a year for populations greater than 5000). THM and HAA samples are taken four times a year from all surface water systems that have chlorination; and all groundwater systems that have chlorination and have been determined to have a presence of THM and HAA (i.e. initial samples taken were greater than 10 μg/L).

Samples of tap water for inorganic parameters, THMs, and HAAs are usually collected from one location, at the point of maximum THM/HAA formation. This is usually approximately 3/4 of the way through the distribution system.

Flushing protocol is very important. For residential buildings, cold tap water must be run for at least 5 to 10 minutes. Cold and clear water running at a constant temperature indicates that all standing or stagnant water is flushed from the plumbing system, and water has been drawn from the community's distribution system. However, in some circumstances, it is necessary to run the water for much longer periods of time:

- when the service line is longer than average (e.g. homes that are a long way from the street or water main),
- when the building is quite large (lots of interior plumbing), or
- when there is very little water use in a building.

In the interest of time, it is beneficial to choose tap water sampling locations which are close to the road (or water main), and where there is expected to be considerable water use. In addition, before collecting the tap samples, ensure that there is no filter in the household system and that it is in fact hooked up to the public water supply you are trying to target. If there is a filter, or the location has a private supply, find a different location to take your sample.

Regularly scheduled THM/HAA samples do not have to be taken if (and only if) the town/operator verifies that the chlorination system is not in operation. See **Appendix P** for Protocol for THM and HAA Collection and Reporting.

It is important to realize that a grab sample represents only one instant in time. Water quality can vary from season to season, day to day, and hour to hour depending upon a variety of factors.

6.4 Protocol

Tap water quality sampling protocol is utilized to ensure that everyone involved in drinking water monitoring collects a sample in the same way. This ensures accurate results, consistent data, and reduces the number of systematic errors.

Label the bottles before taking the sample. Labels will not stick to a wet surface. Labeling the bottle prior to its filling ensures that the bottle is labeled and is less likely to get mixed up with another bottle later.

Grab samples are taken from all tap waters. For this type of sample, the tap must be run for several minutes as per the **flushing protocol**, described above. Once the water runs clear and cold, reduce the flow to a small stream or trickle to allow the water to flow into the bottle. Any bottle containing preservatives must not be rinsed or over filled, as this would wash out the preservatives.

Inorganics - Under the present contract with the lab there are seven bottles to be filled for each inorganic tap water sample:

1. Ammonia (40 mL clear glass vial with sulphuric acid): Ammonia ($N\text{-}NH_3$)
2. General (250 mL plastic – no preservative): anions (Bromide, Chloride, Sulfate)
3. Mercury (100 mL clear glass vial with hydrochloric acid): Mercury
4. Metals (120 mL plastic with nitric acid): Metals Water Total MS (Aluminum, Antimony, etc.)
5. Nutrients (120 mL plastic with sulphuric acid): Total Kjeldahl Nitrogen in Water, Total Phosphorus (Colorimetric)
6. RCAP general chemistry (250 mL plastic – no preservative): Alkalinity, Colour, DOC, etc.
7. TOC (120 mL plastic with sulphuric acid): TOC

THMs - Under the present contract with Bureau Veritas, there are two vials to be filled for each inorganic tap water THM sample:

- 2 - 40 ml glass vials - sodium thiosulphate (white powder / solution)

HAAs - Under the present contract with Bureau Veritas, there are two vials to be filled for each inorganic tap water HAA sample:

- 2 – 40 ml glass vials – ammonium chloride (white powder)

The THM & HAA vials need to be filled slowly. Do not rinse or overflow so as to flush out the preservative. Fill each vial completely so that there is no head space (air bubbles). Sometimes it is helpful to let water flow into the cap and then use the cap to top-up the vial. If air bubbles are present, they can be seen by inverting the bottle.

See **Appendix P** for the THM and HAA Collection and Reporting protocol.

The *Drinking Water Quality Sampling Field Record* needs to be filled out accurately and at the same time that the samples are being taken.

- Sample Serial Number – see **Appendix F** for nomenclature
- Sample Site - Site numbers should reflect the location of the tap sample in the distribution system:
    - **01** – sample collected at the beginning of the distribution system,
    - **02** – sample collected in the middle of the distribution system,
    - **03** – sample collected approximately ¾ of the way along the distribution system, and
    - **04** – sample collected at the end of the distribution system.
- Sample Suffix:
    - **-RE** – if the sample is a regularly scheduled sample,
    - **-SP** – if the sample is part of a special project (mitigation and control, QA/QC, etc.)
    - **-RS** – if the sample is a re-sample.
- Location – describes the sampling location
    - physical descrip-tion of the location,
    - name of the building's occupant or owner, or
    - street address, etc.
- Temperature – required for calculating Langelier Index
- Time – 24hr format
- Free & Total Chlorine – as described above
- Remarks - the location on the Field Sheet to record special circumstances. This information can be critical for interpreting samples. With the exception of source wells, the remarks field will not be reported on community reports.
- Signature & Date

Note for Tap, THM/HAA samples: Field Sheet Remarks and Field Sheet Location appear in the DWQ Search Engine "Remarks" Column.

Optional measurements and information can be recorded in a field book, including:

- Conductivity using a portable conductivity meter;
- pH using portable pH meter; and
- Dissolved oxygen using portable DO meter.

Samples that show contaminant exceedances must be resampled according to the Exceedance Reporting Protocol in **Appendix S** and **Appendix T**.

6.5 Sampling Protocol for Municipalities/LSDs (Remote Sampling)

Under special circumstances (i.e. remote location), the WRMD will request that drinking water samples be collected by municipal or LSD staff. In these instances, WRMD staff should ensure that the sampler has been provided with the appropriate information to collect and handle the sample in accordance with our protocol. A copy of the sampling instructions from **Appendix O** should be forwarded to the sampler, along with the appropriate bottles and necessary materials to allow for proper and prompt return shipment. Organization will ensure that the sample is collected properly.

6.6 Quality Assurance/Quality Control

The QA/QC sampling schedule consists of blind duplicate and blind spikes/knowns. Blind duplicate sampling is the responsibility of core staff in all regions, while blind spikes/knowns are the responsibility of core staff at Headquarters.

Blind Duplicates: A second sample is collected at the same time and location in separate sample containers and submitted to the laboratory without identifying them as duplicates. The purpose of this QA/QC check is to evaluate laboratory analytical precision, field precision and sample homogeneity. The acceptance level for all parameters have a pre-determine level of acceptance based on historical data.

Blind Knowns: A purchased CRM with known parameter values for metals is submitted to the analyzing laboratory blind (like any regular sample). The purpose of this QA/QC check is to evaluate laboratory accuracy and precision on a known set of metal values. The acceptance level for all parameters have a pre-determine level of acceptance based on historical data.

7.0 SAMPLE HANDLING

7.1 Sample Storage

All samples are transported from the field to the departmental lab in coolers with ice packs, making every effort to keep the samples in the dark and chilled. Samples must remain below 10 ºC for the laboratory to accept them for analysis.

Do not allow the samples to freeze as this will compromise sample integrity.

Once samples are at the departmental lab, all samples are stored in a refrigerator, in a secure location (locked) until shipment to the analyzing laboratory.

Maximum holding times, including shipment, are followed as prescribed by the analyzing laboratory and are included in **Appendix Q.**

Under the present contract with the lab, samples should be shipped within five (5) days of collection. There are circumstances where samples must be stored for longer periods:

- travel to remote locations (islands, Labrador, south coast of Newfoundland),
- long weekends,
- transportation/weather delays, etc.

No samples should be greater than 7 days old when received by the laboratory. If remote samples are returned to the regional offices after 7 days from the day of sampling, the sample is not to be sent to the laboratory. In this case, staff are required to send correspondence to the Town in the form of a letter to inform them that the sample was not sent to the laboratory due to sample hold time exceedances. This letter is to be cc'd to the Manager of the Drinking Water program.

Depending upon courier service, shipping samples on Friday is not advisable in the regions due to unavailability of Saturday shipping. It is better to store samples in a controlled environment (fridge), rather than in a cooler stored in a van, truck, warehouse or hanger, where it may be subject to extreme changes in temperature.

7.2 Drinking Water Quality Sampling Field Records

Prior to the samples being shipped, it is important to double-check that information on the *Drinking Water Quality Sampling Field Record* is consistent with the bottle labels and *Chain of Custody Record*.

Drinking Water Quality Sampling Field Records are to be photocopied. The original copies are sent to the Program Lead (Head Office), and the copies kept by the sampler. It is recommended that the field sheets and corresponding COC's are sent to Head Office at the same time the samples are shipped to the lab.

7.3 Sample Shipping

Samples from the St. John's office are to be dropped to the Bureau Veritas office in St. John's (49-55 Elizabeth Avenue, Office #101a). Samples from Grand Falls-Windsor and Corner Brook are to be sent via Purolator to the Bureau Veritas office in St. John's. Samples are shipped from Labrador via PAL Airlines to the Bureau Veritas office in St. John's.

The laboratory pays for all shipping costs.

Package coolers so that bottles will not break, use bubble wrap or shredded paper. THM/HAA bottles can be shipped in the bubble envelopes as long as they are well packaged within the cooler. All samples are shipped in coolers with ice packs, making every effort to keep the samples in the dark and chilled. Samples must remain below 10°C for the laboratory to accept them for analysis.

- Do not forget to fill out the date, the number of coolers, and signature.
- Indicate that the coolers are to be sent by air, and type of package as other.
- No insurance is required.

A completed *Chain of Custody Record* is required to be sent with the sample. Before the samples are shipped, make sure the *Chain of Custody Record* has the following information:

  - Region from which samples are being shipped from.
  - For source samples: Water supply number (WS#)
  - For tap samples: Serviced Area number (SA#).
  - Column totals are noted on each individual page.
  - Name of the courier (Purolator),
  - Waybill number/identification number.
  - Date shipped.
  - Page numbering.
  - Name.
  - Contact phone numbers (work and cell).

Including the name of the courier, the date shipped, and the waybill number/identification number ensures continuity and sample security can be guaranteed. Lost or missing shipments can be easily tracked, and sample delivery and turn-around time can be determined. If shipping on a Wednesday or later day in the week, it is recommended that online waybills be used. These can be completed online with a Purolator account, printed and attached to the cooler.

Saturday delivery is only available for shipments sent directly to the Purolator Dartmouth Depot. This shipping option should only be used for rush/urgent samples being sent on Friday. Any submissions to the Bedford Nova Scotia lab sent by Purolator for Saturday delivery should be sent to the following address: Bureau Veritas, 200 Bluewater Road, Suite 105, Bedford, NS, B4B 1G9.

8.0 SPECIAL PARAMETERS

8.1 Special Parameters Monitoring

Staff may be required to take special samples for specific parameters outside of the regular inorganics package. These special parameters may require unique bottle(s) and handling instructions. Usually staff will be required to take a full inorganics suite in addition to the special parameter for comparative purposes.

Detailed information for special parameter monitoring will be provided by the drinking water program lead.

9.0 DATA MANAGEMENT AND REPORTING

9.1 Paper Work

When the sample season is complete, ensure all relevant paper work (field sheets, COCs) is sent to the Head Office. It is not necessary to wait until the end of the season to send in paper work. Sending paper work as it is completed facilitates the exceedance notification protocol.

9.2 Data Input

Water quality data will be received from the laboratory(s) in printed and digital form. This data is verified with *Drinking Water Quality Sampling Field Records* for quality assurance and quality control (QA/QC). After completion of the QA/QC process, the digital data is imported into the appropriate databases according to pre-defined protocols.

9.3 Data Storage

Paper copies of all laboratory reports are filed at the Head Office in the Confederation Building. The digital data is archived in one of six databases, as follows:

- Raw Water Quality Database (Physical and Inorganic Parameters)
- Raw Water Quality Database (Organic Parameters)
- Tap Water Quality Database (Physical and Inorganic Parameters)
- Tap Water Quality Database (Organic Parameters)
- THMs Database
- HAAs Database

9.4 Data Retrieval

Data can be retrieved from the Drinking Water Quality Search Engine: https://www.wrmd.env.gov.nl.ca/DWQSearchEngine/Default.aspx

This is an internal search engine. The Drinking Water Quality Search Engine and digital databases are updated on a seasonal basis. Software and protocols have been developed to generate *Contaminant Exceedance Reports*, drinking water quality summary reports, seasonal reports, and exceedance summaries.

9.5 Data Reports

Data reports are generated in a prescribed format using customized software that has been developed by the WRMD. All reports can be retrieved using the Water Resources Portal: https://maps.gov.nl.ca/water/

This is a public website that provides a wealth of information relating to water quality monitoring results, seasonal and annual reports and protected public water supplies.

9.6 Data Reporting

9.6.1 First Indication of Exceedances (Exceedance Reports)

The general exceedance reporting protocol is as follows:

a) The laboratory will inform the WRMD by fax and email whenever a parameter exceeds a maximum acceptable concentration or interim maximum acceptable concentration based on the *GCDWQ*. The WRMD is required to acknowledge receipt of this information by return email. This protocol does not apply to parameters such as pH, turbidity, aluminum, aesthetic parameters or other water quality objectives. It also does not apply to THMs and HAAs since the guideline value is based on a running average of four seasonal samples.

b) If the exceedance is for a source sample: protocol outlined in **Appendix R**.

c) If the exceedance is for a tap sample (lead): protocol outlined in **Appendix S.**

d) If the exceedance is for a tap sample (parameter other than lead): protocol outlined in **Appendix T.**

e) The *Contaminant Exceedance Report* will include a section on the sheet which will contain a signature area. An acknowledgment of receipt must be signed by the community representative and sent back to the WRMD to confirm transmission of the results. In cases where fax access is not available to the community, the report will be mailed. The community is required to provide this information to their residents and other consumers.

f) The *Contaminant Exceedance Report* will be e-mailed concurrently to the Medical Officer of Health and representatives from the Department of Health and Community Services, and Digital Government and Service NL.

g) The staff of the WRMD will be available to provide a detailed explanation of the *Contaminant Exceedance Report*, and the communities will be encouraged to contact the staff for additional information.

9.6.2 Seasonal Data Reporting

a) After the completion of the QA/QC process for a given season, the results are published on the Department's webpage and the Water Resources Portal.
https://www.gov.nl.ca/ecc/waterres/quality/drinkingwater/
http://maps.gov.nl.ca/water/

b) An email is sent to all communities that were sampled to notify them that the seasonal results are available on the Department's webpage. The communities are required to provide this information to their residents and other consumers.

c) The staff of the WRMD are required to review the seasonal data reports using the following check protocols:

    a. Source water data
        i. Aesthetic exceedances (A) – is there anything outside the normal (normal, pH, iron and manganese)?
        ii. Contaminant exceedance (C) – are there any contaminant exceedances and were they reported to the Town as per the exceedance protocol?
    b. Tap water data
        i. Aesthetic exceedances (A) – is there anything outside the normal (normal, pH, iron and manganese)?
        ii. Contaminant exceedance (C) – are there any contaminant exceedances and were they reported to the Town as per the exceedance protocol?
    c. THM data
        i. Running THM average – is there anything outside the normal values reported?
    d. HAA data
        i. Running HAA average – is there anything outside the normal values reported?
    e. Langelier index
        i. Is there anything outside the normal values expected?
    f. DWQI
        i. Is there anything outside the normal values expected?

d) Staff of the WRMD will be available to provide a detailed explanation of the data, and the communities are encouraged to contact the regional staff for additional information.

Appendix A

Policy for Drinking Water Quality Monitoring and Reporting for Public Water Supplies

Newfoundland
Labrador

Department of Environment and Conservation

POLICY DIRECTIVE

Division:	Water Resources Management		P.D.	W.R. 09-1
Prepared By:	Annette Tobin, Haseen Khan, P.Eng		Issue Date:	Jan. 2, 2009
Approved By:	Martin Goebel, P.Eng	Director	Re-Issue Date:	
Approved By:		ADM	Review Date:	
Authorized By:		DM	Superseded:	
		Minister	Cancelled:	

Subject:

Drinking Water Quality Monitoring and Reporting for Public Water Supplies

1.0 Objectives:

This policy establishes the Department of Environment and Conservation's drinking water quality monitoring and reporting requirements for all public water supplies.

2.0 Legislation

Water Resources Act, SNL 2002 cW-4.01, Section 39

3.0 Policy

The water quality monitoring and reporting activities for public water supplies will be subject to the following policy guidelines established under Section 39 of the *Act*.

4.0 Background

The Government of Newfoundland and Labrador utilizes the Multi-Barrier Strategic Action Plan (MBSAP) to ensure the public is provided with clean and safe drinking water. The MBSAP is considered the most effective method to manage drinking water systems because it provides multiple levels of security against potential water contamination. The MBSAP has three levels;

(1) Source water protection; drinking water treatment; drinking water distribution system;
(2) Monitoring; inspection and enforcement; data management and reporting; operator education, training and certification;
(3) Legislative and policy frameworks; public involvement and awareness; guidelines, standards and objectives; research and development; and corrective measures.

This policy addresses monitoring and reporting in Level Two and legislative and policy frameworks and guidelines in Level Three.

5.0 Drinking Water Quality Monitoring

5.1 Regular Monitoring

All public water supply systems shall be monitored for drinking water quality purposes.

5.1.1 Sampling Seasons

There are four seasons (winter, spring, summer and fall) that water quality monitoring occurs. There is a six to eight week sampling window within each season.

The four sampling windows for the Island portion of the province are:

Spring	May 16th – June 30th
Summer	August 1st – September 30th
Fall	November 1st – December 15th
Winter	January 15th – March 15th

The four sampling windows for Labrador are:

Spring	May 1st – June 30th
Summer	July1st – August 30th
Fall	October 1st – November 15th
Winter	January 1st – March 15th

5.1.2 Monitoring Parameters

Inorganic parameters analyzed for both source and tap water samples may include but are not limited to:

- Alkalinity
- Aluminum
- Ammonia
- Arsenic
- Barium
- Boron
- Bromide
- Cadmium
- Calcium
- Chloride
- Chromium
- Colour
- Conductivity
- Copper
- Dissolved Organic Carbon
- Fluoride
- Hardness
- Iron
- Kjeldahl Nitrogen
- Lead
- Magnesium
- Manganese
- Mercury
- Nickel
- Nitrate and Nitrite
- pH
- Potassium
- Selenium
- Sodium
- Sulphate
- Total Dissolved Solids
- Total Phosphorus
- Turbidity
- Uranium
- Zinc

Disinfection by-products analyzed for tap water samples may include but are not limited to:

- Trihalomethanes
- Haloacetic Acids

Monitoring parameters may be added or changed due to site-specific circumstances.

5.1.3 Sampling Frequency

Source water shall be sampled every two to three years. During the year the sources are sampled, the frequency is semi-annually.

Tap water shall be sampled a minimum of semi-annually for inorganic parameters. Tap water shall be sampled seasonally for large population centers with populations greater than 5,000.

Disinfection by-products shall be sampled four times per year for all surface water supplies that utilize chlorine as a disinfectant. The four samples must encompass the four seasons.

Disinfection by-products shall be sampled at least once for all groundwater supplies that utilize chlorine as a disinfectant to establish background levels. If the value is below 10 µg/L no further sampling is required. If the value is above10 µg/L then it will be sampled four times per year and will encompass the four seasons.

Sampling rotations occur over a three-year period. Groundwater samples are taken during the summer and winter months and surface water samples during the spring and fall months for a three year period. During the next three year period, groundwater samples are taken during the spring and fall months and surface water samples during the summer and winter months. This ensures that seasonality of samples is assessed for all public drinking water supplies.

5.1.4 Performance Monitoring

Performance monitoring shall be completed on water treatment plants on a site-specific basis to determine the effectiveness of the water treatment systems. For comparative purposes, samples are to be taken before and after the water treatment system. To determine the effectiveness of the water treatment systems, monitoring for extreme variations in flows and water quality are to be conducted. Performance monitoring shall include parameters in section 5.1.2 along with other parameters deemed relevant.

5.1.5 Monitoring Protocols

Source water samples shall be collected directly from the source prior to disinfection or any other treatment. The sample shall be collected in close proximity to the intake as possible to ensure it represents the quality of water that flows into a treatment and/or distribution system.

Tap water samples shall be collected from a consumer tap using a grab sample method. The tap must be run for five minutes, or until it runs cold and clear and at a constant temperature, indicating that all standing or stagnant water is flushed from the plumbing system, and water has been drawn from the community's distribution system. Samples shall be typically taken from one location, approximately 2/3rd of the way through the distribution system.

Disinfection by-products should be sampled at the point of maximum formation. The maximum formation for THMs is typically 2/3rd of the way through the system. The maximum formation of HAAs is typically towards the beginning of the system.

Samples shall be received by the laboratory a maximum of five days after sampling occurred. This is required to ensure sample hold times are met.

5.2 Special Monitoring

A review of emerging water quality parameters is to be completed on a yearly basis. Parameters that are determined to have potential impact for Newfoundland and Labrador are to be scheduled for special monitoring to determine the possible extent of the emerging parameter. On a site-specific basis emerging parameters are to be considered when there is a potential concern of a water quality parameter throughout the year. Emerging water quality parameters are to be added to the monitoring schedule as required.

Special monitoring shall be completed in the event of water quality issues, contamination events, special studies, evaluation of compromise to water distribution systems, environmental monitoring, pilot monitoring, or any other issue deemed necessary for water quality monitoring.

6.0 Drinking Water Quality Reporting

6.1 Exceedance Reports

Exceedance reports shall be provided to all communities when a laboratory result is above the *Guidelines for Canadian Drinking Water Quality* for contaminant parameters. These reports shall be faxed and/or mailed to the community as soon as the results are received by the Department. The community shall acknowledge the correspondence and fax and/or mail a signed copy of the exceedance report to the Department. An email shall be sent to the Medical Officer of Health, Health and Community Services, Government Services and Municipal Affairs to inform them of the water quality exceedance. A confirmation sample shall be collected for any community that has no history for that exceedance. The community shall be informed of the results of the confirmation sample by fax and/or mail.

6.2 Seasonal Drinking Water Quality Reports to specific communities

All communities with public water supplies shall be provided an interpretative report for any seasonal monitoring conducted. This report will clearly indicate any exceedances of parameters from the Guidelines for Canadian Drinking Water Quality.

6.3 Annual Drinking Water Quality Reports

All communities with public water supplies shall receive an annual interpretative report for all drinking water quality monitoring activities conducted during the calendar year. This report will clearly indicate any exceedances of parameters from the Guidelines for Canadian Drinking Water Quality.

6.4 Annual Drinking Water Safety in Newfoundland and Labrador Reports

A drinking water safety report shall be published annually which outlines accomplishments and activities under the Multi-Barrier Strategic Action Plan for drinking water safety. All communities shall be provided with a copy of the Annual Drinking Water Safety report when it is published.

6.5 Web Documents on Drinking Water Quality

Chemical drinking water quality monitoring schedule shall be published on the WRMD website at the beginning of each fiscal year. This schedule will detail the planned monitoring for the fiscal year for each public water supply. The schedule shall include the type and frequency of monitoring. Drinking water data for the preceding year is available on the WRMD website:
http://www.env.gov.nl.ca/env/Env/water_resources.asp

7.0 Guidelines for Drinking Water Quality in Newfoundland and Labrador

Guidelines used by the Government of Newfoundland and Labrador for drinking water quality are based on the "*Guidelines for Canadian Drinking Water Quality*" developed by Health Canada.

The guidelines listed below do not include all parameters in the *Guidelines* rather only those included in standard chemical analysis and metal scan packages.

Chemical Parameters	MAC	Description
Antimony	0.006 mg/L	Contaminant
Arsenic	0.01 mg/L	Contaminant
Barium	1.0 mg/L	Contaminant
Boron	5 mg/L	Contaminant
Cadmium	0.005 mg/L	Contaminant
Chloride	250 mg/L	Contaminant
Chromium	0.05 mg/L	Contaminant
Copper	1.0 mg/L	Aesthetic
Fluoride	1.5 mg/L	Contaminant
Iron	0.3 mg/L	Aesthetic
Lead	0.01 mg/L	Contaminant
Mercury	0.001 mg/L	Contaminant
Nitrate and Nitrite	10 mg/L	Contaminant
Selenium	0.01 mg/L	Contaminant
Sodium	200 mg/L	Aesthetic
Sulphate	500 mg/L	Aesthetic
Uranium	0.02 mg/L	Contaminant
Zinc	5.0 mg/L	Aesthetic

Physical Parameters		
Colour	15 TCU	Aesthetic
pH	6.5-8.5	Aesthetic
Total Dissolved Solids	500 mg/L	Aesthetic
Turbidity	1.0 NTU	Contaminant

Disinfection By-Products		
Trihalomethanes	100 µg/L*	Contaminant
Haloacetic Acids	80 µg/L*	Contaminant

* Based on a running annual average of quarterly samples, collected at a point of the highest formation potential. A minimum of four samples per year, one in each season are required to determine if a particular water supply meets or exceeds the recommended limit.

Aesthetic Parameters – Aesthetic parameters reflect substances or characteristics of drinking water that can affect its acceptance by consumers but which usually do not pose any health effects.

Contaminant Parameters – Contaminants are substances that are known or suspected to cause adverse effects on the health of some people when present in concentrations greater than the established Maximum Acceptable Concentration (MAC) of the "*Guidelines for Canadian Drinking Water Quality*". Each MAC has been derived to safeguard health assuming lifelong consumption of drinking water containing the substance at that concentration.

Additional information on drinking water quality guidelines is available on the Health Canada website:
http://www.hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/index-eng.php

Radionuclide Parameters

Natural radionuclides	MAC	Artificial radionuclides	MAC
Lead-210	0.1 Bq/L	Cesium-134	7 Bq/L
Radium-224	2 Bq/L	Cesium-137	10 Bq/L
Radium-226	0.6 Bq/L	Iodine-125	10 Bq/L
Radium 228	0.5 Bq/L	Iodine-131	6 Bq/L
Thorium-228	2 Bq/L	Molydenum-99	70 Bq/L
Thorium-230	0.4 Bq/L	Strontium-90	5 Bq/L
Thorium-232	0.1 Bq/L	Tritium	7,000 Bq/L
Thorium-234	20 Bq/L		
Uranium-234	4 Bq/L		
Uranium-235	4 Bq/L		
Uranium-238	4 Bq/L		

Bacteriological Parameters	MAC
Escherichia coli (*E.coli*)	None detectable per 100mL.
Total coliforms	No consecutive samples from the same site or no more than 10% of the samples from each distribution system in a given sample set should show the presence of total coliforms.

See http://www.env.gov.nl.ca/Env/env/waterres/Policies/WQ-Standards-Microbiological.asp

Appendix B

Specifications for Drinking Water Analysis and Data Reporting Services

Invitation to Tender

for

Water Sample Analysis and Data Reporting Services

Department of Environment, Climate Change and Municipalities
St. John's, Newfoundland and Labrador

February 2021

Table of Contents

1.0 Introduction

The Government of Newfoundland and Labrador, under its Multi-Barrier Strategic Action Plan (MBSAP) for drinking water safety, has made a commitment to enhance the protection of public water supplies and the delivery of clean, safe and reliable drinking water to the people of this province. As a part of this commitment, the Department of Environment, Climate Change and Municipalities (hereafter referred to as the “Department”) is responsible for monitoring physical and chemical characteristics of drinking water quality of all public water supplies. This activity is an important proactive component of the MBSAP for drinking water safety.

The drinking water quality monitoring program has three phases:

1) Water sample collection,
2) Analysis of water samples and data reporting,
3) Data management, interpretation and reporting.

The Department is responsible for the first and last phases of the program. The Department is soliciting the services of an accredited analytical water testing laboratory (hereafter referred to as the "Laboratory") for the second phase of the program. The Laboratory must be accredited by the Canadian Association for Laboratory Accreditation (CALA) or the Standards Council of Canada (SCC) for all requested water quality parameters.

This document provides the administrative and technical requirements for the required analytical and data reporting work.

2.0 Objectives and Scope

The main objective of the drinking water quality monitoring program is to determine if public water supplies are meeting the current *Guidelines for Canadian Drinking Water Quality (GCDWQ)*. A secondary objective is to obtain baseline and trend data on the water quality of public water supplies.

The selected Laboratory must perform all work using accredited analytical techniques and instrumentation. The reported data must be thoroughly checked using standard quality assurance and quality control procedures, and must be scientifically acceptable and legally defensible. The Department may conduct a site visit of the selected Laboratory to verify the reported facilities.

The selected Laboratory is required to analyse the collected water samples for all parameters discussed in Section 3.0.

3.0 Service Requirements

3.1 Water Analysis

The selected Laboratory will be required to provide the analysis of water samples for the following parameters:

a. Trihalomethanes (THMs)
b. Inorganics
c. Haloacetic Acids (HAAs)
d. Total suspended solids (TSS)
e. Bromate
f. Polychlorinated Biphenyls (PCBs)
g. Polyaromatic Hydrocarbons (PAHs)
h. Petroleum Hydrocarbons
i. Radiological (Gross Alpha and Gross Beta)
j. Radiological (Lead-210, Radium-226, Polonium-210 and Radon-222)
k. Geosmin
l. Methylisoborneol (MIB)
m. N-Nitrosodimethylamine (NDMA)

3.1.1 Sample Parameter Details

Trihalomethanes (THMs) Analysis

The results are to be reported for the listed parameters in the following units using, at a minimum, the Method Detect Limit (MDL) indicated (see Section 3.5 for more information on MDL requirements):

Parameter	Units	MDL
Chloroform	µg/L	1.0
Bromodichloromethane	µg/L	1.0
Bromoform	µg/L	1.0
Dibromochloromethane	µg/L	1.0

Inorganic Analysis

The results are to be reported for the listed parameters in the following units using, at a minimum, the Method Detect Limit (MDL) indicated (see Section 3.5 for more information on MDL requirements):

Parameter	Units	MDL
Alkalinity	mg/L	5
Aluminium	mg/L	0.01
Ammonia (N-NH3)	mg/L	0.05
Antimony	mg/L	0.001
Arsenic	mg/L	0.001
Barium	mg/L	0.01

Boron	mg/L	0.05
Bromide	mg/L	0.25
Cadmium	mg/L	0.0001
Calcium	mg/L	1.0
Chloride	mg/L	1.0
Chromium	mg/L	0.001
Colour	TCU	5.0
Conductivity	µS/cm	5.0
Copper	mg/L	0.002
Dissolved Organic Carbon	mg/L	0.5
Fluoride	mg/L	0.1
Hardness	mg/L	1.0
Iron	mg/L	0.05
Lead	mg/L	0.001
Magnesium	mg/L	1.0
Manganese	mg/L	0.01
Mercury	mg/L	0.0001
Nickel	mg/L	0.005
Nitrate (N-NO3)	mg/L	0.1
Nitrite (N-NO2)	mg/L	0.1
pH	-	-
Potassium	mg/L	1.0
Selenium	mg/L	0.001
Sodium	mg/L	2.0
Strontium	mg/L	0.002
Sulphate	mg/L	2.0
Total Dissolved Solids	mg/L	1.0
Total Kjeldahl Nitrogen	mg/L	0.10
Total Organic Carbon	mg/L	0.5
Total Phosphorus	mg/L	0.005
Turbidity	NTU	0.1
Uranium	mg/L	0.001
Zinc	mg/L	0.01

Haloacetic Acids (HAAs) Analysis

The results are to be reported for the listed parameters in the following units using the Method Detect Limit (MDL) indicated (see Section 3.5 for more information on MDL requirements):

Parameter	Unit	MDL
(Mono) Chloroacetic acid	µg/L	5.0
(Mono) Bromoacetic acid	µg/L	5.0
Dichloroacetic acid	µg/L	5.0
Trichloroacetic acid	µg/L	5.0
Dibromoacetic acid	µg/L	5.0

Total Suspended Solids (TSS) Analysis

The results are to be reported for the listed parameters in the following units using, at a minimum, the Method Detect Limit (MDL) indicated (see Section 3.5 for more information on MDL requirements):

Parameter	Units	MDL
Total suspended solids	mg/L	1.0

Bromate Analysis

The results are to be reported for the listed parameters in the following units using, at a minimum, the Method Detect Limit (MDL) indicated (see Section 3.5 for more information on MDL requirements):

Parameter	Units	MDL
Bromate	mg/L	0.003

Polychlorinated Biphenyls (PCB) Analysis

The results are to be reported for the listed parameters in the following units using, at a minimum, the Method Detect Limit (MDL) indicated (see Section 3.5 for more information on MDL requirements):

Parameter	Units	MDL
Total PCBs	µg/L	0.05

Polyaromatic Hydrocarbons (PAH) Analysis

The results are to be reported for the listed parameters in the following units using, at a minimum, the Method Detect Limit (MDL) indicated (see Section 3.5 for more information on MDL requirements):

Parameter	Units	MDL
1-Methylnaphthalene	µg/L	0.05
2-Methylnaphthalene	µg/L	0.05
Acenaphthene	µg/L	0.01
Acenaphthylene	µg/L	0.01
Anthracene	µg/L	0.01
Benzo(a)anthracene	µg/L	0.01
Benzo(a)pyrene	µg/L	0.01
Benzo(b)fluoranthene	µg/L	0.01
Benzo(b/j)fluoranthene	µg/L	0.01
Benzo(g,h,i)perylene	µg/L	0.01
Benzo(j)fluoranthene	µg/L	0.01
Benzo(k)fluoranthene	µg/L	0.01
Chrysene	µg/L	0.01
Dibenzo(a,h)anthracene	µg/L	0.01
Fluoranthene	µg/L	0.01
Fluorene	µg/L	0.01
Indeno(1,2,3-cd)pyrene	µg/L	0.01
Naphthalene	µg/L	0.2
Perylene	µg/L	0.01
Phenanthrene	µg/L	0.01
Pyrene	µg/L	0.01

Petroleum Hydrocarbons Analysis

Hydrocarbons must be analyzed using analytical methods described in Atlantic RBCA Guidelines for Laboratories (current version) available at: https://atlanticrbca.com/document/atlantic-rbca-guidelines-for-laboratories-version-3-1/. The results are to be reported for the listed parameters in the following units using, at a minimum, the Method Detect Limit (MDL) indicated (see Section 3.5 for more information on MDL requirements):

Parameter	Units	MDL
C6-C10 (less BTEX)	mg/L	0.09
>C10-C16 hydrocarbons	mg/L	0.05
>C16-C21 hydrocarbons	mg/L	0.05
>C21-C32 hydrocarbons	mg/L	0.05
Modified TPH (Tier 1)	mg/L	0.09
Benzene	mg/L	0.001

Toluene	mg/L	0.001
Ethylbenzene	mg/L	0.001
Total xylene	mg/L	0.002

<u>Radiological Analysis (Gross Alpha and Gross Beta)</u>

The results are to be reported for the listed parameters in the following units using, at a minimum, the Method Detect Limit (MDL) indicated (see Section 3.5 for more information on MDL requirements):

Parameter	Units	MDL
Gross alpha	Bq/L	0.1
Gross beta	Bq/L	0.1

<u>Radiological Analysis (Lead-210, Radium-226, Polonium-210, and Radon-222)</u>

The results are to be reported for the listed parameters in the following units using, at a minimum, the Method Detect Limit (MDL) indicated (see Section 3.5 for more information on MDL requirements):

Parameter	Units	MDL
Lead-210	Bq/L	0.1
Radium-226	Bq/L	0.01
Polonium-210	Bq/L	0.01
Radon-222	Bq/L	10.0

<u>Geosmin</u>

The results are to be reported for the listed parameters in the following units using, at a minimum, the Method Detect Limit (MDL) indicated (see Section 3.5 for more information on MDL requirements):

Parameter	**Units**	**MDL**
Geosmin	µg/L	0.005

<u>Methylisoborneol (MIB) Analysis</u>

The results are to be reported for the listed parameters in the following units using, at a minimum, the Method Detect Limit (MDL) indicated (see Section 3.5 for more information on MDL requirements):

Parameter	**Units**	**MDL**
Methylisoborneol	µg/L	0.003

N-Nitrosodimethylamine (NDMA) Analysis

The results are to be reported for the listed parameters in the following units using, at a minimum, the Method Detect Limit (MDL) indicated (see Section 3.5 for more information on MDL requirements):

Parameter	Units	MDL
N-Nitrosodimethylamine	µg/L	0.002

3.1.2 Sample Parameter Hold Times

All sample parameters must meet a 7 day hold time with the exception of pH, turbidity, colour and nitrite.

3.1.3 Estimated Number of Samples

The **estimated** number of samples to be analysed during a given fiscal year (April 1st - March 31st) are as follows:

a. THM Analysis – 1,400
b. Inorganic Analysis – 1,700
c. HAA Analysis – 1,400
d. TSS Analysis – 150
e. Bromate Analysis – 5
f. PCB Analysis – 240
g. PAH Analysis – 240
h. Petroleum Hydrocarbon Analysis – 240
i. Radiological Analysis (Gross Alpha and Gross Beta) – 10
j. Radiological Analysis (Lead-210, Radium-226, Polonium-210 and Radon-222) – 10
k. Geosmin - 10
l. MIB Analysis – 10
m. N-Nitrosodimethylamine Analysis - 2

3.2 Data Reporting - General

The selected Laboratory must meet the following requirements:

- The complete record of Laboratory reports and electronic data for samples analysed for a given season must be provided to the Department within 30 days from the date of the last samples submitted for that season. After two late submissions the Department may cancel the contract as outlined in Section 4.0.

- Seasons are defined as follows:

Winter -	January 1 to March 31
Spring -	April 1 to June 30

Summer - July 1 to September 30
Fall - October 1 to December 31

- Samples will not be taken over the whole season. The Department may designate a shorter period of time, typically six weeks, in each season during which all sampling will occur.

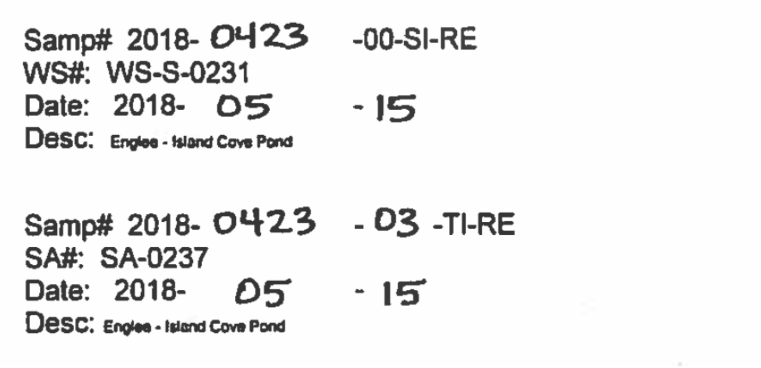
- A printed copy of the analysis report must be provided for every sample tested. Analysis results will be reported with only one sample per page or sample results can be grouped by a single community per page. The four fields from each bottle label discussed below must appear on the analysis report for each sample. Additionally, each parameter must be identified by the full parameter name and also show measurement units using SI, method detect limit, less than detect flag, the parameter result and any related comments. The results sheet must indicate that the results have been approved. For example, signed by a Laboratory official or the Head Chemist.

- Reports must also be grouped by season.

- A digital file of all the sample data must be sent by email at the same time as the printed copy.

- All electronic sample results for a season must be sent in one single digital file unless otherwise requested by WRMD.

- Four data fields will appear on the label of each sample bottle. These four fields must appear as separate fields for each sample in the electronic data file. These four fields must also appear on the paper copy of the results. These fields must appear, electronically and on paper, exactly as presented on the sample label: matching case of letters, hyphens and spaces. Most of this information will be typewritten but parts of it such as the date will be handwritten. An example is shown below.



Samp# 2018- 0423 -00-SI-RE
WS#: WS-S-0231
Date: 2018- 05 - 15
Desc: Englee - Island Cove Pond

Samp# 2018- 0423 - 03 -TI-RE
SA#: SA-0237
Date: 2018- 05 - 15
Desc: Englee - Island Cove Pond

- The specifics of these four fields are as follows:
    - Sample # - Text Field - 18 Characters.
      Full Sample Number: XXXX-XXXX-XX-XX-XX
      e.g. 2018-0423-03-TI-RE

- Water Supply Number **or** Serviced Area Number - Text Field - 9 Characters Maximum.
  Water Supply Number (WS#): WS-X-YYYY e.g. WS-S-0231.
  Serviced Area Number (SA#): SA-YYYY e.g. SA-0237.

- Sample Date - Text Field - 11 Characters.
  In the electronic data file this may be stored in an internal date format.
  YYYY-MM-DD
  e.g. 2018-05-15

- Description - Text Field - 60 Characters.
  Descriptive text may include town names, lake names, etc.

- The Department will perform QA/QC checks on the accuracy of the Laboratory data entry of these four fields and document the frequency of misidentified samples. When, 1% of samples per season are considered by the Department as misidentified then the Laboratory will be notified to take corrective action. After three such incidents, the Department may cancel the contract as outlined in Section 4.0. The QA/QC checks will be reviewed by the Department as a component of the extension of the contract.

- For each sample in the electronic file, the results for each parameter must be recorded on a single line with the following information appearing on each line:
  - Sample#, Parameter, SA/WS#, Description, Sample Date, Units, Method Detection Limit (MDL), Less Than Detect Flag, Value and Comments
  - A partial example for an inorganic sample is shown below:

Sample#	Parameter	SA/WS#	Description	Samp-Date	Units	MDL	Flag	Value	Comments
2018-0423-03-TI-RE	Alkalinity as CaCO3	SA-0237	Englee	2018-05-15	mg/L	5	<	5	
2018-0423-03-TI-RE	Aluminium	SA-0237	Englee	2018-05-15	mg/L	0.01		0.1	
2018-0423-03-TI-RE	Arsenic	SA-0237	Englee	2018-05-15	mg/L	0.001	<	0.001	
2018-0423-03-TI-RE	Boron	SA-0237	Englee	2018-05-15	mg/L	0.05		0.08	
2018-0423-03-TI-RE	Barium	SA-0237	Englee	2018-05-15	mg/L	0.01	<	0.01	
2018-0423-03-TI-RE	Calcium	SA-0237	Englee	2018-05-15	mg/L	1		1.1	
2018-0423-03-TI-RE	Cadmium	SA-0237	Englee	2018-05-15	mg/L	0.0001	<	0.0001	
2018-0423-03-TI-RE	Turbidity	SA-0237	Englee	2018-05-15	NTU	0.1		9	Holding time for turbidity analysis was exceeded.

- All e-mail sent to the Department must be verified as computer virus-free by the contractor using industry accepted computer virus scanning software.

- Electronic data must be archived by the contractor for a period of one year from the date of issue to the Department to account for any data that may be lost during transmission or re-transmission requests by the Department.

- Data can be in the form of an Excel spreadsheet or Comma Separated Value (CSV) file. There is some flexibility for the supplied file format, however, it must be capable of designating less than detection limit values and conceptually be similar to that previously listed.

- The agreed upon file format and structure must remain consistent for the duration of the contract period.

- The file format must remain consistent for any special samples not outlined in Section 3.1 that are subcontracted.

- The Laboratory must have an operational Laboratory Information Management System (LIMS) and supply details on the LIMS as part of their tender response.

- The Department will perform QA/QC checks on the accuracy of the Laboratory data record for all parameters and document the frequency of errors in the data record. When, five (5) samples per season are documented by the Department as an error in data record then the Laboratory will be notified to take corrective action. After two such incidents, the Department may cancel the contract as outlined in Section 4.0. The QA/QC checks will be reviewed by the Department as a component of the extension of the contract.

3.2.1 Confirmation of Sample Receipt Forms

The laboratory will be responsible for submitting a confirmation of sample receipt form for all samples submitted for analysis. This form must be emailed to the Department upon receipt of the samples and shall contain the details of testing to be performed (including, but not limited to: sample #, date of sampling, Laboratory Record #, and requested analyses) and a digital scan of the chain of custody.

3.2.2 Sample Integrity Forms

The laboratory will be responsible for submitting sample integrity forms to the Department. This document must be faxed or emailed to the Department when there is any discrepancy in the paperwork and/or samples submitted to the laboratory. The following information will be required:

1. Chain of custody number
2. Sample ID
3. Issue
    a. This would include but is not limited to: inconsistencies in matching bottle labels and chain of custodies, missing or broken bottles; received temperature is not in the appropriate range; samples received past hold times; incorrect quantity of bottles.
4. Action taken by the laboratory would include but not limited to:
    a. Analysis will proceed as requested.
    b. Analysis will not proceed.
    c. Samples on hold until direction received from the Department.

3.2.3 Early Results Reporting Protocol

- The protocol applies only to samples that are listed as “Early Results” on the chain of custody. Results must be emailed when analysis is complete and approved by a Laboratory official or the Head Chemist.
- Results must also remain in the regular electronic data file.

3.2.4 Rush Service and Reporting Protocol

- The protocol applies only to samples that are listed as “RUSH” on the chain of custody. This will consist of a maximum of 2% of the samples.
- Sample results must be provided within three (3) days of receipt of sample.
- Additional cost cannot be applied for this rush service.
- Results must also remain in the regular electronic data file.

3.3 Data Reporting – Exceedance Reporting Protocol

- The Laboratory must inform the Department by email and by fax immediately (Fax (709) 729-0320) whenever a health related parameter exceeds a MAC guideline based upon the *Guidelines for Canadian Drinking Water Quality*.
    - The protocol does not apply to aesthetic parameters or turbidity.
    - The protocol does not apply to Total THMs or Total HAAs.
- The exceedance report e-mailed and faxed to the Department must include the following sample information:
    - Sample Number;
    - Community Name;
    - Water Supply Name;
    - SA# or WS#;
    - Date of Sampling; and
    - Preliminary lab results as an attachment, later followed by a full set of lab results (when first available).

3.4 Data Reporting – Early Reporting of Large Differences in THM and HAA

- The Laboratory must inform the Department by e-mail whenever the following occurs for an individual sample location:
    - HAA (total) < 5 µg/L and THM (total) > 50 µg/L, or
    - HAA (total) > 50 µg/L and THM (total) < 5 µg/L.

- The e-mail sent to the Department must include the following sample information:
    - Sample Number;
    - Community Name;
    - Water Supply Name;
    - SA# or WS#;
    - Date of Sampling; and
    - Preliminary lab results as an attachment.

- The Department will review these preliminary THM and HAA results to determine if the THM analysis or HAA analysis should be repeated (at no additional cost to the Department).

3.5 Other Requirements

The selected Laboratory must comply with the following requirements:

- **The MDLs used for analysis by the Laboratory must be comparable to those listed above and are subject to the approval of the Department**. The bidder must supply a list of MDLs and testing methods that they will use for the analysis with the tender.

- The Department must be notified of changes in the detection limits or methods used for the analysis of the samples within each sampling season.

- The Laboratory must provide the required number of sampling bottles, ice packs and coolers to four Departmental offices (St. John’s, Grand Falls-Windsor, Corner Brook and Happy Valley-Goose Bay). All sampling bottles must be prepared as per sampling and analytical protocols.

- The Department reserves the right to order a complete second shipment of sample bottles (**at cost to the Laboratory**) if the bottles are expired, incorrectly preserved or preservative is found to be leaking from bottles (due to improper bottle capping or broken bottles). This action is necessary since some sample bottle preservatives are highly corrosive and can burn personnel handling the shipment of bottles.

- The Laboratory must receive unused bottles passed expiry dates for proper disposal of preservatives.

- The Laboratory must provide a protocol detailing the time frames associated with sample storage and shipment for analysis of the various parameters after the contract is awarded.

- The Laboratory must use the Chain of Custody Form that will be supplied by the Department. The “date received” and “received by” blanks on the form must be completed and a copy returned to the Department during the billing process.

- The Laboratory must retain water samples for metals analysis for a period of six (6) months.

3.6 Invoicing

The Laboratory must submit invoices to the Department on a monthly basis. Invoices will be processed after the analytical work has been completed and signed by a Laboratory official or the Head Chemist. The invoice must identify each Chain of Custody number with the quantity of each analysis type.

4.0 Termination of Contract

The Department may terminate any or all components of the work or portions thereof within 30 days by written notice. In the event of such termination notice being delivered, the Laboratory will have no claim against the Department for loss of anticipated profits or damages occasioned by such termination. Upon delivery and acceptance of the portion of the work performed up to the date of termination, the Laboratory will be paid the appropriate portion of the fees owing.

The first season of the contract will be considered a probationary period and at the end of the period the Department reserves the right to cancel the contract as described above. Please note that the first season of the contract includes up to the end of the processing of data for that season by the Department.

5.0 Bidder Qualifications Criteria

In addition to the information described previously, the information outlined in Sections 5.1 to 5.3 must be included in the tender response.

5.1 Accreditation

The bidder must provide documentation confirming current CALA or SCC accreditation for all parameters quoted. In addition, documentation must be provided for proficiency testing for the requested parameters.

5.2 Pricing

Laboratories **must bid** on all parameters types. Complete columns: Unit Price "B", Extended Total "A x B" and row: Sum of Extended Totals column Lines 1-13.

Item	Description	Estimated Quantity (for Evaluation Purposes) "A"	Unit Price "B"	Extended Total "A x B"
1	Trihalomethane	1,400		
2	Inorganic	1,700		
3	Haloacetic Acid	1,400		
4	Total suspended solids	150		
5	Bromate	5		
6	Polychlorinated Biphenyls	240		
7	Polyaromatic Hydrocarbons	240		
8	Petroleum Hydrocarbons	240		
9	Radiological – Gross Alpha and Gross Beta	10		
10	Radiological – Lead-210, Radium-226, Polonium-210, and Radon-222	10		
11	Geosmin	10		
12	Methyl-Isoborneol	10		
13	N-Nitrosodimethylamine	2		
			Sum of "Extended Totals" column Lines 1-13	

The pricing must include:

- The cost of bottles, ice packs and coolers and any bottle preparation and disposal costs.
- The cost of data processing.
- The cost of shipping empty bottles to four Departmental offices (St. John's, Grand Falls-Windsor, Corner Brook and Happy Valley-Goose Bay) and return of samples to the Laboratory via air courier (i.e. sending and receiving bottles).

Low bidder criteria will be based upon the Sum of "Extended Totals" column Lines 1-13.

5.3 Other

The bidder must provide documentation of the following:

- A list of the MDLs for each parameter along with testing methods and equipment used
- An example report of sample results
- An example electronic file of sample results
- A description of the Laboratory's Laboratory Information Management System (LIMS).
- An example of the Laboratory's proposed exceedance report fax.

The successful laboratory will be required to provide details of measurement uncertainty and QA/QC monitoring plan including acceptance criteria, including but not limited to duplicates, surrogates, blanks, etc.

6.0 Contract Duration

The contract is valid from the date of issue to March 31, 2022 (with the option to renew the contract up to an additional two years). Renewal will be based on a review of QA/QC performance.

Appendix C

Field Work Checklist

Drinking Water Sampling Checklist

- ☐ Accommodations

Document Preparation

- ☐ Sample Numbers
- ☐ Sampling Schedule
- ☐ Field Sheets
- ☐ Sample Labels
- ☐ Sampling Manual
- ☐ Sampling Location Records
- ☐ Provincial Road Map
- ☐ Chain of Custody Records
- ☐ Community Contact List
- ☐ Boil Water Advisory List
- ☐ Courier Slips & Contact Info (for shipping)
- ☐ All Documents Checked
- ☐ ______________________________________

Equipment

- ☐ Markers)
- ☐ Pen (s)
- ☐ Thermometer
- ☐ Colorimeter
- ☐ GPS (in correct datum?)
- ☐ Camera
- ☐ Cooler (s)
- ☐ Ice Packs
- ☐ Sample Transport Case
- ☐ Styrofoam Bottle Holders
- ☐ Sample Collecting Pole
- ☐ Cell Phone (vehicle and outlet charger)
- ☐ Axe (cut ice winter sampling)
- ☐ Ice Auger (winter sampling)
- ☐ ______________________________________

Pre – Travel Check

- ☐ Sample Bottles in Good Condition (expired?)
- ☐ Truck in good running condition (tires, wipers, fuel)
- ☐ Truck walk around
- ☐ Ice packs frozen and enough
- ☐ Outlook Calendar marked for sampling period
- ☐ Out of Office on in Calendar
- ☐ Windshield wash
- ☐ Gas
- ☐ ______________________________________
- ☐ ______________________________________

Sample Bottles

- ☐ Inorganic Bottles (7 per kit)
- ☐ Haloacetic Acid (HAA) Bottles (2 per sample)
- ☐ Trihalomethane (THM) Bottles (2 per sample)
- ☐ Extra Bottles (all types)
- ☐ ______________________________________

Pocket Colorimeter

- ☐ Calibration Check
- ☐ Working
- ☐ Reagents (Enough Free and Total Chlorine Packets)
- ☐ ______________________________________

Consumables

- ☐ Paper Towels
- ☐ Batteries (charged?)
- ☐ Ziploc bags
- ☐ Chlorine Reagents (Enough Free and Total Packets)
- ☐ Garbage Bags
- ☐ Packaging tape
- ☐ ______________________________________

Safety Equipment

- ☐ Steel toed boots
- ☐ Hard hat
- ☐ Safety Glasses
- ☐ Lifejacket
- ☐ Winter clothing (gloves, boots)
- ☐ Ice Grips
- ☐ Floater Jacket
- ☐ ______________________________________

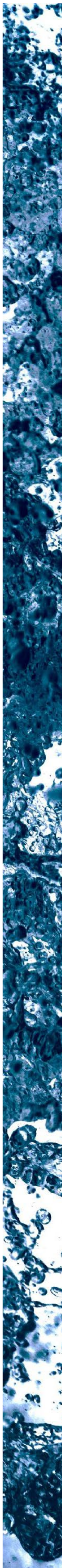
Miscellaneous

- ☐ Date of Check:____________________________
- ☐ Date of Departure:_________________________
- ☐ ______________________________________
- ☐ ______________________________________
- ☐ ______________________________________
- ☐ ______________________________________
- ☐ ______________________________________

Sampler: ______________________________ Date: __________________________

Appendix D

Verification Protocol and Recording Log for Colorimeters



HACH Chlorine Pocket Colorimeter

Check the cat. # on the top of the HACH case. Most likely you will have either # 46700-00 or #58700-00. Follow the procedure below to check your digital colorimeter readings against 3 known standards. Compare your readings to those included in the chart below. Make sure you are looking at the readings and ranges specific to your model number (cat.#).

1. Insert the "blank" into the digital colorimeter slot and zero the colorimeter.

2. Insert STD 1 into colorimeter and press "read". Compare the reading with the chart below.

3. Insert STD 2 into digital colorimeter and press "read". You don't have to "zero" the colorimeter between standards. Compare the reading with the chart below.

4. Insert STD 3 into digital colorimeter and press "read". (Don't "zero" the colorimeter). Compare the reading with the chart below.

The readings are acceptable if they fall within the recommended ranges below. If you obtain readings that lie outside the recommended ranges for each standard, the readings are not reliable and you may need to send the instrument to HACH Company for calibration (or purchase a new instrument at a cost comparable to calibration). Contact information for HACH can be found at www.hach.com.

Instrument	**Blank**	**STD1** (mg/L)	**STD2** (mg/L)	**STD3** (mg/L)
Pocket Colorimeter 11 (LR) PN 58700-00	**0**	**0.21 (+/- 0.09)**	**0.90 (+/-0.10)**	**1.63 (+/-0.14)**
Pocket Colorimeter (LR) PN 46700-00	**0**	**0.19 (+/-0.09)**	**0.83 (+/- 0.10)**	**1.51 (+/-0.14)**

*Complete chart including values for various models of HACH chlorine test kits is provided in Certificate of Analysis, included with Secondary Standards Kit.

Pocket Colorimeter Serial #________________________

Date of Precision Check	Instrument	Blank	STD1 (mg/L)	My Reading	STD2 (mg/L)	My Reading	STD3 (mg/L)	My Reading
	Pocket Colorimeter 11 (LR) PN 58700-00	0	0.21 (+/- 0.09)		0.90 (+/- 0.10)		1.63 (+/- 0.14)	
	Pocket Colorimeter (LR) PN 46700-00	0	0.19 (+/- 0.09)		0.83 (+/- 0.10)		1.51 (+/- 0.14)	
Date of Precision Check	Instrument	Blank	STD1 (mg/L)	My Reading	STD2 (mg/L)	My Reading	STD3 (mg/L)	My Reading
	Pocket Colorimeter 11 (LR) PN 58700-00	0	0.21 (+/- 0.09)		0.90 (+/- 0.10)		1.63 (+/- 0.14)	
	Pocket Colorimeter (LR) PN 46700-00	0	0.19 (+/- 0.09)		0.83 (+/- 0.10)		1.51 (+/- 0.14)	
Date of Precision Check	Instrument	Blank	STD1 (mg/L)	My Reading	STD2 (mg/L)	My Reading	STD3 (mg/L)	My Reading
	Pocket Colorimeter 11 (LR) PN 58700-00	0	0.21 (+/- 0.09)		0.90 (+/- 0.10)		1.63 (+/- 0.14)	
	Pocket Colorimeter (LR) PN 46700-00	0	0.19 (+/- 0.09)		0.83 (+/- 0.10)		1.51 (+/- 0.14)	
Date of Precision Check	Instrument	Blank	STD1 (mg/L)	My Reading	STD2 (mg/L)	My Reading	STD3 (mg/L)	My Reading
	Pocket Colorimeter 11 (LR) PN 58700-00	0	0.21 (+/- 0.09)		0.90 (+/- 0.10)		1.63 (+/- 0.14)	
	Pocket Colorimeter (LR) PN 46700-00	0	0.19 (+/- 0.09)		0.83 (+/- 0.10)		1.51 (+/- 0.14)	

Appendix E

Sampling Location Record Form

Department of Environment and Climate Change
Water Resources Management Division

GPS
Collected

Drinking Water Quality Sampling Location Record

Community #: Water Supply #: Serviced Area #:	Community Name: Water Supply Name: Serviced Area Name:

Sample Site – 00
Source at Intake / Wellhead
NAD83

Lat: ____o ____' ____"

Long: ____o ____' ____"

Waypoint# ________

Map

Sample Site – 03

____
____
____

NAD83

Lat: ____o ____' ____"

Long: ____o ____' ____"

Waypoint# ________

Map

Location Collected By:

Date Collected (YYYY-MM-DD):

Appendix F

Drinking Water Quality Sample Numbering Scheme

Drinking Water Quality Sample Numbers

Year – Serial Number – Site Number – Sample Type – Sample Class

e.g. **2010-2423-01-TH-RE**

A sample taken in **2008** in **Central** region (the **423rd**) at **Site #1** for **THM** analysis as part of the **regular** sampling program to be recorded in the database. Note that there are no spaces and all letters are uppercase.

YYYY - Calendar year using four digits. This resets every January 1st.

Serial Number - A four digit number that increases by one for each new Drinking Water Quality Sampling Field Record. Ranges of numbers are assigned by Region with each staff member having a unique range. **Each calendar year the number is reset to the start of the range.**

0000 - East 2000 - Central 4000 - West
6000 - Labrador 6500 - 6999 - Groundwater Section

Inside of each regional range, blocks of numbers can be assigned for temporary staff. For example, in Central one staff member would start at 2000 and the next Central staff member could start at 3000 and the next at 3500 etc. This is a simple method to ensure that sample numbers are not duplicated or unnecessarily long. Unique sample numbers are critical to data processing and management.

Site Number - These numbers indicate where in the system each sample is taken.

00 - Source **01** - Site #1 **02** - Site #2 **03** - Site #3 **04** - Site #4

The 00 site number cannot be changed but you can use other site number designations as long as they are used consistently and are only two digits. You can edit your Field Record and Label Word files to reflect these changes.

Sample Type -This two character alphabetic code indicates the type of sample. The codes below are the only ones allowed at present and please use uppercase letters when writing.

SI - Source Inorganic **TI** - Tap Inorganic **TH** – THM **HA** - HAA

Sample Class - Sample class indicates the purpose of the sample and whether or not it is to be stored in the database, is part of a mitigation project or is a QA/QC sample. The codes below are the only ones allowed at present and please use uppercase letters when writing.
RE - Regular **RS** - Resampling (RE and RS samples kept in database)
SP - Special (Mitigation and Control, QA / QC or RTWQ - Not Stored in Database)

Appendix G

Drinking Water Quality Database Dictionary of Terms

Drinking Water Quality Database Dictionary of Terms

Community Name - An official name used by the Department of Municipal and Provincial Affairs (MPA). It's status can be municipality (MUN), local service district (LSD) or an unincorporated area (UNC). Native communities are classified as unincorporated communities. Each of these has been assigned a unique number referred to as the MUN number or LGP (Local Government Profile) number. There are a very small number of communities that have not been assigned MUN numbers by MPA. For these cases the Department has assigned numbers starting at 9000 and incrementing by 10. Both the original MUN number and our modified MUN number have been recorded in the database. The population refers to the census population as recorded under the legal name of the community.

Water Supply - A single physical source of drinking water. The SUPPLY TYPE can be surface water (SW) or groundwater (GW). SUPPLY STATUS can be Municipal or Private. Municipal refers to a public water supply which is funded by the government and operated and maintained by any level of government (federal, provincial, municipal, water committees and citizens groups). Private indicates a supply installed and operated by a non-government entity such as individual homes, a group of private citizens or a commercial operation. The SOURCE TYPE can be Drilled, Dug, Spring, Reservoir, Pond, Lake, Brook, and River.

Water Supplies have been assigned a unique code by the Department of the form WS-X-YYYY where X is either S (surface water), G (groundwater) or P (Private) and YYYY is a four digit number that is padded with leading zeros (e.g. 008). For example, WS-S-0008.

Serviced Area - This is a conceptual description used to undertake the Tap Water Quality Monitoring Program. Serviced area is a combination of legal Community Name or Sub-division Name(s) within a community and water supply source. Its purpose is to link legal community name or sub-division name(s) within a community with a unique water supply source identifier for tap water quality monitoring purposes.

Serviced Areas have been assigned a unique code by the Department of the form SA-YYYY where YYYY is a four digit number that is padded with leading zeros (e.g. 0078)

Field Record - A printed sheet that documents a site visit to a serviced area at a specific date. Each sheet lists several sites each with it's own field data (e.g. water temperature). Additionally, at the top right hand corner of every sheet there is a written master sample serial number as described in the Drinking Water Quality Sample Numbers document.

Sample - A collection of water for a group of analyses such as organics, inorganics, THM, and HAA. Each analyses may generate several parameters.

Parameter - A single test result (or sum of test results for THM and HAA) such as Temperature, pH, colour, alkalinity.

Appendix H

Protocol for New Public Water Supplies

Newfoundland
Labrador

Government of Newfoundland and Labrador
Department of Environment and Conservation
Water Resources Management Division

February 11, 2010

Protocol for New Public Water Supplies

Rationale

The public water supply (PWS) list is maintained by Water Resources Management Division (WRMD) and contains all public water supplies, both surface and ground water, in the province. The list must be updated when a new public water supply is activated.

Current Protocol

A new PWS is initiated when Department of Municipal Affairs agrees to provide funding through Capital Works for the project.

Surface Water

The community must apply for a "Permit to Construct" for water supply related infrastructure such as intake, pumps, chlorination, etc, through the Community Water and Wastewater section of Department of Environment and Conservation. Information or results of a study on water quantity and quality of the supply is required as a component of the application for permit. Upon approval of the permit a tender is issued by Department of Municipal Affairs.

Groundwater

The community must apply for a "Permit to Construct a Non-Domestic Well" from the Groundwater section of Department of Environment and Conservation. Upon approval of the permit a tender is issued by Department of Municipal Affairs. Three documents, the completions report, pump test results and chemical test results of the new well, must be submitted by the proponent when the well drilling is completed.

After the well is drilled, the community must apply for a "Permit to Construct" for water-supply related infrastructure such as pumps and chlorination systems. The application is reviewed by the Community Water and Wastewater section. The Groundwater section provides approval on acceptable yield and quality to Community Water and Wastewater Section.

New Water Supplies

Upon issuing of the permit, Director (WRMD) and Coordinator of Drinking Water Monitoring (SWS) are copied on the "Permit to Construct". Coordinator of Drinking Water Monitoring (SWS) is responsible for informing Environmental Scientists (SWS) of the potential new supplies in their respective communities. The Environmental Scientists (SWS) will be responsible for informing Coordinator of Drinking Water Monitoring (SWS) when the supply is established in their community.

New Water Supply Documentation

When it is determined that a new water supply is established and functioning, the Environmental Scientist (SWS) for the community is responsible for collecting the information required for the PWS list. The information is forwarded to the Director (WRMD) for approval by Safe Drinking Water Committee.

Once approved, the information is forwarded to the Senior Environmental Scientist (HMS). This information is used to generate the water supply number (WS#) and serviced area number (SA#) and then added to the

PWS list. The new supply is entered in the GIS database with the watershed's boundary file. Department of Municipal Affairs is informed of the new PWS to ensure that it is entered in the MIMS database. Department of Government Services in informed of the new water supply to ensure scheduling for bacteriological sampling is established.

The Senior Environmental Scientist (HMS) is responsible for updating the two tables in the Oracle: add SA# to SA_Sampledby and SA_WS_Owned in WRMD_Out.

The new PWS is then scheduled for chemical sampling and integrated into the flow of the sampling schedule. The sampling schedule is updated on the Division's webpage. The Environmental Scientist for the community is responsible for sending a letter advising the community on the Protected Water Supply Area application.

Addendum to Protocol for the New Public Water Supplies – to be sent to Headquarters

---

Checklist for Addition of Public Water Supply to Official List:

Water Supply is maintained by the Town/LSD of:____________________________

Verified by (ie. town clerk; chairperson, etc.): ______________________________

Water Supply type: ☐SW ☐GW ____no. of wells (if a part of a wellfield)

Suggested Water Supply name:____

Water Supply coordinates: (*DD MM SS.SSS*)______________________________

Reason for addition: ____

____

____

____

Date commissioned: ____

Water Supply will replaced (if applicable):_________________________________

____

Additional Comments: ____

____

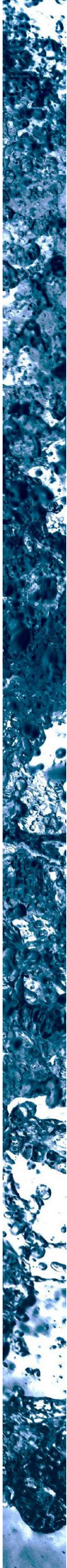
____

WRMD staff name: ____

Please provide additional information if required on a separate page.

Appendix I

Protocol for Removal of Public Water Supplies



Newfoundland Labrador

Government of Newfoundland
and Labrador **Department of**
Environment and Climate Change
Water Resources Management
Division

February 11, 2010
Revised: December 22, 2022

Protocol for Removal of Public Water Supplies

Rationale

The public water supply (PWS) list is maintained by Water Resources Management Division (WRMD) and contains all public water supplies, both surface and ground water, in the province. The list must be updated when a public water supply is decommissioned or no longer fits the definition of a PWS as outlined in the *Drinking Water Treatment Standards for Newfoundland and Labrador* effective April 1, 2017.

Current Protocol

The decommissioning of groundwater supplies requires a completion report to the Groundwater Section from the community. The decommissioning of surface water supplies is usually determined by the Environmental Scientists responsible for drinking water quality monitoring.

The potential removal of a PWS due to reasons outside of decommissioning are typically referred to the community for comment. The final determination will be made in consultation with the community.

Removal of Public Water Supplies

When the Department of Environment and Climate Change confirms that a PWS has been decommissioned the Safe Drinking Water Committee must be notified by the Director (WRMD).

Removal of Public Water Supply Documentation

1. Groundwater Manager is responsible for ensuring all well decommissioning is completed within the “Guidelines for Sealing Groundwater Wells”.
2. Senior Environmental Scientist (Water Rights, Investigations and Modelling Section (WRIM)) and (Surface Water Section (SWS)) are jointly responsible for removing the PWS from the PWS list.
3. Senior Environmental Scientist (WRIM) is responsible for removing the PWS from the drinking water quality monitoring schedule and updating the Division’s webpage.
4. Environmental Scientist (WRIM) is responsible for removing the delineated watershed from the GIS database.
5. Department of Municipal Affairs is responsible for removing the PWS from MIMs.
6. Department of Department of Digital Government and Service NL is responsible for removing the PWS the from bacteriological sampling schedule.
7. The Environmental Scientists (SWS) are responsible for ensuring the protected status, if applicable, of the PWS is repealed.

Addendum to Protocol for Removal of Public Water Supplies – to be sent to Headquarters

---

<u>Checklist for Removal of Public Water Supply from Official List:</u>

Water Supply was maintained by the Town/LSD of: ________________________

____

Verified by (ie. town clerk; chairperson, etc.): ________________________

____

Water Supply type: ∆SW ∆GW____no. of wells (if a part of a wellfield)

Suggested Water Supply name: ________________________________

____

Reason for removal: ____

____

____

____

Date decommissioned: ____

Protection status: ∆Protected ∆Not Protected

∆Should be repealed

∆Should not be repealed

Comments: ____

Water Supply will be replaced by: ______________________________

____

Additional Comments: ____

____

____

WRMD staff name: ____

Please provide additional information if required on a separate page.

Appendix J

Labels for Sampling Bottles

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- -00-SI-RE
WS#: WS-S-0598
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - - -
WS#:
Date: 2021- -
Desc:

Samp# 2021- - - -
WS#:
Date: 2021- -
Desc:

Samp# 2021- - - -
WS#:
Date: 2021- -
Desc:

Community: Pouch Cove
Sampled By: R. Harvey

Samp# 2021- - -TI-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -TI-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -TI-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -TI-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -TI-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -TI-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -TI-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -TI-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -TH-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -TH-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -TH-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -TH-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -HA-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -HA-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -HA-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - -HA-RE
SA#: SA-0619
Date: 2021- -
Desc: Pouch Cove - North Three Island Pond

Samp# 2021- - - -
SA#:
Date: 2021- -
Desc:

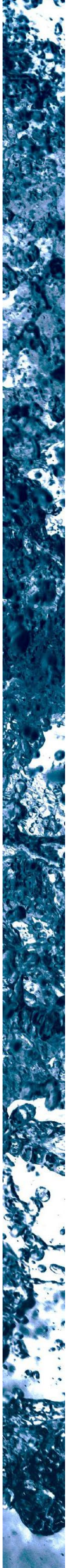
Samp# 2021- - - -
SA#:
Date: 2021- -
Desc:

Samp# 2021- - - -
SA#:
Date: 2021- -
Desc:

Community: Pouch Cove
Sampled By: R. Harvey

Appendix K

Drinking Water Quality Sampling Field Record



Newfoundland Labrador

Department of Environment and Climate Change
Water Resources Management Division

Sample Serial Number: 2021- ___________

Drinking Water Quality Sampling Field Record

Community #: 4015
Water Supply #: WS-S-0598
Serviced Area #: SA-0619
Pop. Serviced: 1866

Community Name: Pouch Cove
Water Supply Name: North Three Island Pond
Serviced Area Name: Pouch Cove

Chlorination / Treatment: Gas / pH

Sample Site -00 -00-SI ☐
-RE ☐
-SP ☐
-RS ☐

Temperature ________________ º C

Time ______________________ (24 Hr)

Remarks____
____

Sample Site - 01 ☐ 02 ☐ 03 ☐ 04 ☐

-TI ☐	-TH ☐	HA ☐
-RE ☐	-RE ☐	-RE ☐
-SP ☐	-SP ☐	-SP ☐
-RS ☐	-RS ☐	-RS ☐

Temperature ________________ º C

Time ______________________ (24 Hr)

Free Chlorine ___________ mg/L Total Chlorine ___________ mg/L Other (_________) ______________

Location ____
____

Remarks____
____

Sample Site - 01 ☐ 02 ☐ 03 ☐ 04 ☐

-TI ☐	-TH ☐	HA ☐
-RE ☐	-RE ☐	-RE ☐
-SP ☐	-SP ☐	-SP ☐
-RS ☐	-RS ☐	-RS ☐

Temperature________________ º C

Time ______________________ (24 Hr)

Free Chlorine ___________ mg/L Total Chlorine ___________ mg/L Other (_________) ______________

Location ____
____

Remarks____
____

Sample Collected By:

Date Sampled (YYYY-MM-DD):

R. Harvey

Appendix L

Chain of Custody

CHAIN OF CUSTODY

Shipped To:	Shipped From:	Report To / Invoice To: 220028978-1
Bureau Veritas (BV Labs) 200 Bluewater Road, Suite 105 Bedford, Nova Scotia B4B 1G9 Tel: 902-420-0203	Department of Environment and Climate Change Water Resources Management Division ☐ St. John's ☐ Happy Valley-Goose Bay ☐ Corner Brook ☐ Grand Falls-Windsor	Department of Environment and Climate Change Water Resources Management Division Confederation Building, P.O. Box 8700 St. John's, NF A1B 4J6

Sample ID	**WS# (Source) SA# (Tap)**	**Sample Date (yy/mm/dd)**	**Time (24 hr)**	**#1 THM**	**#2 Inorg**	**#3 HAA**	**#4 PAH**	**#5 Hydro**	**Other Parameters**	**Rush**	**Lab ID #**
202 - - - -											
202 - - - -											
202 - - - -											
202 - - - -											
202 - - - -											
202 - - - -											
202 - - - -											
202 - - - -											
202 - - - -											
202 - - - -											
202 - - - -											
202 - - - -											
202 - - - -											
202 - - - -											
202 - - - -											
			TOTAL								

Lab Comments:

Sampled/Relinquished by: __________________________ Phone#: ___________________ Cell#: ___________________ Date Shipped (YYYY/MM/DD): _________ / _____ / _____

Waybill#: ____ Received by: __________________________ Date Received (YYYY/MM/DD): _________ / _____ / _____

Copies: White to Laboratory, Yellow to Headquarters & Pink for Sampler

Page ___ of ___

Appendix M

End-of-Season Email Template

END OF SEASON SUMMARY - SPRING 2023 - NAME

MISSED SAMPLES

Community	Region	Parameter Type	WS#	SA#	Justification for Missed Sample
		TI/TH/HA	WS-S-xxxx	SA-xxxx	

EXTRA SAMPLES

Community	Region	SAMPLE#	WS#	SA#	Reason for Taking Sample(s)
		2017-xxxx-xx-xx-xx	WS-S-xxxx	SA-xxxx	

RESAMPLES

Community	Region	SAMPLE#	WS#	SA#	Comments
		2017-xxxx-xx-xx-RS	WS-S-xxxx	SA-xxxx	

Appendix N

Safety Data Sheets

SAFETY DATA SHEET

Version 8.0
Revision Date 27.11.2020
Print Date 25.01.2021

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Ammonium Chloride GR ACS

Product Number : AX1270
Brand : Millipore
Index-No. : 017-014-00-8
CAS-No. : 12125-02-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Reagent for analysis

1.3 Details of the supplier of the safety data sheet

Company : SIGMA-ALDRICH CANADA CO.
2149 WINSTON PARK DRIVE
OAKVILLE ON L6H 6J8
CANADA

Telephone : +1 905 829-9500
Fax : +1 905 829-9292

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA)
+1-703-527-3887 CHEMTREC (International)
24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with Hazardous Products Regulations (HPR) (SOR/2015-17)

Acute toxicity, Oral (Category 4), H302
Eye irritation (Category 2A), H319

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)
H302 Harmful if swallowed.

H319	Causes serious eye irritation.

Precautionary statement(s)

P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P280	Wear eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

- none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula : NH_4Cl
Molecular weight : 53.49 g/mol
CAS-No. : 12125-02-9
EC-No. : 235-186-4
Index-No. : 017-014-00-8

Component	Classification	Concentration *
ammonium chloride		
	Acute Tox. 4; Eye Irrit. 2A; H302, H319	<= 100 %
* Weight %		

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Not combustible.
Fire may cause evolution of:
nitrogen oxides, Hydrogen chloride gas
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters
In the event of fire, wear self-contained breathing apparatus.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions

Tightly closed. Dry.Tightly closed. Dry.

Store at room temperature.
Storage class (TRGS 510): 13: Non Combustible Solids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
ammonium chloride	12125-02-9	TWA	10 mg/m³	Canada. Alberta, Occupational Health and Safety Code (table 2: OEL)
Remarks	Occupational exposure limit is based on irritation effects and its adjustment to compensate for unusual work schedules is not required			
		STEL	20 mg/m³	Canada. Alberta, Occupational Health and Safety Code (table 2: OEL)
	Occupational exposure limit is based on irritation effects and its adjustment to compensate for unusual work schedules is not required			
		TWA	10 mg/m³	Canada. British Columbia OEL
		STEL	20 mg/m³	Canada. British Columbia OEL
		TWAEV	10 mg/m³	Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
		STEV	20 mg/m³	Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
		TWA	10 mg/m³	USA. ACGIH Threshold Limit Values (TLV)
		STEL	20 mg/m³	USA. ACGIH Threshold Limit Values

					(TLV)

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
protective clothing

Respiratory protection
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Crystalline powder Color: white
b)	Odor	odorless

c)	Odor Threshold	Not applicable
d)	pH	5 - 5.5 at 25 °C (77 °F)
e)	Melting point/freezing point	Melting point: 338 °C (640 °F) - (sublimed)
f)	Initial boiling point and boiling range	520 °C 968 °F
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	The product is not flammable. - Flammability (solids)
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	1.3 hPa at 160.4 °C (320.7 °F) 1.3 hPa at 30 °C(86 °F)
l)	Vapor density	No data available
m)	Relative density	1.53 g/cm^3 at 25 °C (77 °F)
n)	Water solubility	372 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances
p)	Autoignition temperature	> 400 °C (> 752 °F) - Relative self-ignition temperature for solidsdoes not ignite
q)	Decomposition temperature	Not applicable
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Bulk density	ca.600 - 900 kg/m^3
Particle size	0.116 mm - Mean particle size

SECTION 10: Stability and reactivity

10.1 Reactivity

No data available

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions

Violent reactions possible with:
alkali hydroxides
acids
Risk of ignition or formation of inflammable gases or vapours with:
halogen-halogen compounds

alkalines
alkaline substances
Risk of explosion with:
nitrates
chlorates
Heavy metal salts
nitrites
Hydrogen cyanide (hydrocyanic acid)
Chlorine
silver salt
Strong oxidizing agents

10.4 Conditions to avoid

no information available

10.5 Incompatible materials

Aluminum, Lead, Iron, Copper, copper compounds

10.6 Hazardous decomposition products

In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 1,410 mg/kg
(OECD Test Guideline 401)
Symptoms: Irritations of mucous membranes in the mouth, pharynx, oesophagus and gastrointestinal tract.
Inhalation: No data available
Symptoms: Possible damages:, mucosal irritations
LD50 Dermal - Rat - male and female - > 2,000 mg/kg
Remarks: (ECHA)
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 24 h
(Draize Test)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation
Remarks: (ECHA)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
No data available
Ames test

Escherichia coli/Salmonella typhimurium
Result: negative
Mutagenicity (mammal cell test): chromosome aberration.
Chinese hamster lung cells
Result: positive
OECD Test Guideline 474
Mouse - male - Bone marrow
Result: negative

Carcinogenicity

IARC:	No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity

No data available

Specific target organ toxicity - single exposure

No data available
Acute oral toxicity - Irritations of mucous membranes in the mouth, pharynx, oesophagus and gastrointestinal tract.
Acute inhalation toxicity - Possible damages:, mucosal irritations

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 90 d - NOAEL (No observed adverse effect level) - 1,695.7 mg/kg
Subchronic toxicity
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

The following applies to ammonium salts in general: after swallowing: local irritation symptoms, nausea, vomiting, diarrhoea. Systemic effect: after the uptake of very large qantities: drop in blood pressure, collapse, CNS disorders, spasms, narcotic conditions, respiratory paralysis, haemolysis.
Other dangerous properties can not be excluded.
Handle in accordance with good industrial hygiene and safety practice.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	semi-static test LC50 - Cyprinus carpio (Carp) - 209.00 mg/l - 96 h Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 101 mg/l - 48 h Remarks: (ECHA)
Toxicity to algae	static test ErC50 - Chlorella vulgaris (Fresh water algae) - 1,300 mg/l

- 5 d
Remarks: (ECHA)

Toxicity to bacteria	static test EC50 - activated sludge - 1,310 mg/l - 0.5 h (OECD Test Guideline 209)

12.2 Persistence and degradability

The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and loc No mixing with other waste. Handle uncleaned containers like the product See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)

Not dangerous goods

IMDG

Not dangerous goods

IATA

Not dangerous goods

Further information

Not classified as dangerous in the meaning of transport regulations.

SECTION 15: Regulatory information

This product has been classified in accordance with the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all the information required by the HPR.

SECTION 16: Other information

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 8.0 Revision Date: 27.11.2020 Print Date: 25.01.2021

Safety Data Sheet

According to Hazardous Products Regulation (SOR/2015-17)

Revision date: 01.04.2020	*Version: 6.3*	*Print date: 01.04.2020*

SECTION 1: Identification

Product identifier

Trade name/designation:	Hydrochloric acid 50% v/v
Product No.:	BDH7418
Synonymes:	none/none
CAS No.:	7647-01-0
Other means of identification:	

Relevant identified uses of the substance or mixture and uses advised against

Recommended Use:	For Further Manufacturing Use Only
Uses advised against:	Not for Human or Animal Drug Use

Details of the supplier of the safety data sheet

Supplier

VWR International

Street	2360 Argentia Road
Postal code/City	Mississauga, Ontario Canada L5N 5Z7
Telephone	+1-800-932-5000 toll-free within US/Canada
Telefax:	+1-610-728-2103

Emergency phone number

Telephone	+1-613-996-6666 (Canutec, 24 hrs/day, 7 days/week, Canada)

Preparation Information

VWR International - Product Information Compliance

E-mail	sds@vwr.com

SECTION 2: Hazard identification

2.1 Classification of the substance or mixture

Classification according to Hazardous Products Regulation (SOR/2015-17)

Hazard classes and hazard categories	Hazard statements
Substance or mixture corrosive to metals, category 1	H290
Skin irritation, category 2	H315
Eye irritation, category 2	H319
Specific target organ toxicity (single exposure), category 3, vascular	H335

2.2 Label elements

Labelling in accordance with (SOR/2015-17)

Hazard pictograms

Signal word: Warning

Hazard statements	
H290	May be corrosive to metals.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.

Precautionary Statements	
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352	IF ON SKIN: Wash with plenty of water/…
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P311	IF exposed or concerned: Call a POISON CENTER/doctor/…

Hazards not otherwise classified (HNOC)
none/none

SECTION 3: Composition / information on ingredients

3.1 Substances

not applicable

3.2 Mixtures

Hazardous ingredients GHS Classification in accordance with (SOR/2015-17)

Substance name	Concentration	Identifier	Hazard classes and hazard categories
Hydrochloric acid	10-<25%	CAS No.: 7647-01-0	Skin Corr. 1B - H314 STOT SE 3 - H335

SECTION 4: First aid measures

4.1 General information

IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician. If unconscious place in recovery position and seek medical advice. Never give anything by mouth to an unconscious person or a person with cramps. Change contaminated, saturated clothing. Do not leave affected person unattended.

In case of inhalation

Call a POISON CENTER/doctor. Remove casualty to fresh air and keep warm and at rest. If breathing is irregular or stopped, administer artificial respiration.

In case of skin contact

After contact with skin, wash immediately with plenty of water and soap. Remove contaminated, saturated clothing immediately. In case of skin reactions, consult a physician.

After eye contact

In case of contact with eyes flush immediately with plenty of flowing water for 10 to 15 minutes holding eyelids apart and consult an ophthalmologist. Protect uninjured eye. Remove contact lenses, if present and easy to do. Continue rinsing.

In case of ingestion

If accidentally swallowed rinse the mouth with plenty of water (only if the person is conscious) and obtain immediate medical attention. Do NOT induce vomiting. Give nothing to eat or drink.

4.2 Most important symptoms/effects, acute and delayed

no data available

4.3 Indication of any immediate medical attention and special treatment needed

no data available

4.4 Self-protection of the first aider

First aider: Pay attention to self-protection!

4.5 Information to physician

no data available

SECTION 5: Fire fighting measures

5.1 Extinguishing media

Suitable extinguishing media

The product itself does not burn.
Co-ordinate fire-fighting measures to the fire surroundings.

Extinguishing media which must not be used for safety reasons

no restriction

5.2 Specific hazards arising from the chemical

In case of fire may be liberated:
Hydrogen chloride (HCl)

5.3 Advice for firefighters

DO NOT fight fire when fire reaches explosives.

Protective equipment and precautions for firefighters

Wear a self-contained breathing apparatus and chemical protective clothing.

Additional information

Do not allow run-off from fire-fighting to enter drains or water courses.

Do not inhale explosion and combustion gases.

Use water spray/stream to protect personnel and to cool endangered containers.

In case of fire: Evacuate area.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

In case of major fire and large quantities: Remove persons to safety. Wear a self-contained breathing apparatus and chemical protective clothing.

6.2 Environmental precautions

Do not allow to enter into soil/subsoil. Do not allow to enter into surface water or drains.

6.3 Methods and material for containment and cleaning up

Spilled product must never be returned to the original container for recycling. Clean contaminated articles and floor according to the environmental legislation. Soak up inert absorbent and dispose as waste requiring special attention.

6.4 Additional information

Clear spills immediately.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Avoid:
Inhalation
Avoid contact with eyes and skin.
Use extractor hood (laboratory).
If handled uncovered, arrangements with local exhaust ventilation have to be used.
If local exhaust ventilation is not possible or not sufficient, the entire working area must be ventilated by technical means.
Protect from moisture.

7.2 Conditions for safe storage, including any incompatibilities

Recommended storage temperature: 15-25 °C
Keep container tightly closed and in a well-ventilated place.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Does not contain substances above concentration limits fixing an occupational exposure limit.

8.2 Engineering controls

Appropriate engineering controls
Technical measures and the application of suitable work processes have priority over personal protection equipment. If handled uncovered, arrangements with local exhaust ventilation have to be used.

Personal protection equipment (PPE)
Wear suitable protective clothing. When handling with chemical substances, protective clothing must be worn.

Eye/face protection
Eye glasses with side protection

Skin protection
Wear suitable gloves. When handling with chemical substances, protective gloves must be worn. In the case of wanting to use the gloves again, clean them before taking off and air them well. Check leak tightness/impermeability prior to use.

By short-term hand contact

Suitable material:	CR (polychloroprene, chloroprene rubber)
Thickness of the glove material:	0,13 mm
Breakthrough time (maximum wearing time):	101 min

By long-term hand contact

Suitable material:	CR (polychloroprene, chloroprene rubber)
Thickness of the glove material:	-
Breakthrough time (maximum wearing time):	> 480 min

Respiratory protection

Respiratory protection necessary at: aerosol or mist formation If exposure limits are exceeded or irritation is experienced, NIOSH approved respiratory protection should be worn.

Additional information

Wash hands before breaks and after work. Avoid contact with eyes and skin. When using do not eat, drink or smoke. Provide eye shower and label its location conspicuously.

Environmental exposure controls

no data available

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

(a) Appearance	
Physical state:	liquid
Color:	colorless
(b) Odour:	no data available
(c) Odour threshold:	no data available

Safety relevant basic data

(d) pH:	no data available
(e) Melting point/freezing point:	no data available
(f) Initial boiling point and boiling range:	no data available
(g) Flash point:	no data available
(h) Evaporation rate:	no data available
(i) Flammability (solid, gas):	not applicable
(j) Flammability or explosive limits	
Lower explosion limit:	no data available
Upper explosion limit:	no data available
(k) Vapour pressure:	no data available
(l) Vapour density:	no data available
(m) Relative density:	no data available
(n) Solubility(ies)	
Water solubility (g/L):	no data available
Soluble (g/L) in Ethanol:	no data available
(o) Partition coefficient: n-octanol/water:	no data available
(p) Auto-ignition temperature:	no data available
(q) Decomposition temperature:	no data available
(r) Viscosity	
Kinematic viscosity:	no data available
Dynamic viscosity:	no data available
(s) Explosive properties:	not applicable
(t) Oxidising properties:	not applicable

9.2 Other information

Bulk density:	no data available
Refraction index:	no data available
Dissociation constant:	no data available
Surface tension:	no data available
Henry's Law Constant:	no data available

SECTION 10: Stability and reactivity

10.1 Reactivity

Corrosive to metals

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions

Explosive reaction with:
Alkali metals
Alkaline earth metal
Alkali (lye)
Violent reaction with:
light metals
Powdered metals
Exothermic reaction with:
Water
Substance, organic

10.4 Conditions to avoid

Humidity

10.5 Incompatible materials

Metal

10.6 Hazardous decomposition products

no data available

10.7 Additional information

no data available

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute effects

Acute oral toxicity:
no data available

Acute dermal toxicity:
Hydrochloric acid - LD50: > 5010 mg/kg - Rabbit - (Japan GHS Basis for Classification Data)

Acute inhalation toxicity:
Hydrochloric acid - LC50: 1.68 mg/l - Rat - (Japan GHS Basis for Classification Data)

Irritant and corrosive effects

Primary irritation to the skin:

Causes skin irritation.

Irritation to eyes:

Causes serious eye irritation.

Irritation to respiratory tract:

May cause respiratory irritation.

Respiratory or skin sensitization

In case of skin contact: not sensitising

In case of inhalation: not sensitising

STOT-single exposure

May cause respiratory irritation.

STOT-repeated exposure

not applicable

CMR effects (carcinogenicity, mutagenicity and toxicity for reproduction)

Carcinogenicity

The table below indicates whether each agency has listed any ingredient as a carcinogen.

no data available	ACGIH	IARC	NTP	OSHA

Germ cell mutagenicity

No indications of human germ cell mutagenicity exist.

Reproductive toxicity

No indications of human reproductive toxicity exist.

Aspiration hazard

not applicable

Other adverse effects

no data available

Additional information

no data available

SECTION 12: Ecological information

12.1 Ecotoxicity

Fish toxicity:

no data available

Daphnia toxicity:

Hydrochloric acid - LC50: 250 mg/l (48 h) - Portmann, J.E., and K.W. Wilson 1971. The Toxicity of 140 Substances to the Brown Shrimp and Other Marine Animals. Shellfish Information Leaflet No.22 (2nd Ed.):12 p.

Algae toxicity:

no data available

Bacteria toxicity:

no data available

12.2 Persistence and degradability

no data available

12.3 Bioaccumulative potential

Partition coefficient: n-octanol/water: no data available

12.4 Mobility in soil:

no data available

12.5 Results of PBT/vPvB assessment

The substances in the mixture do not meet the PBT/vPvB criteria according to REACH, annex XIII.

12.6 Other adverse effects

no data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Appropriate disposal / Product

Dispose according to legislation. Consult the appropriate local waste disposal expert about waste disposal.

Waste code product: no data available

Appropriate disposal / Package

Dispose according to legislation. Handle contaminated packages in the same way as the substance itself.

Additional information

no data available

SECTION 14: Transport information

Land transport (TDG)

UN-No.:	1789
Proper Shipping Name:	HYDROCHLORIC ACID
Class(es):	8
Packing group:	III
Environmental hazards:	No
Marine pollutant:	No
Special precautions for user:	

Sea transport (IMDG)

UN-No.:	1789
Proper Shipping Name:	HYDROCHLORIC ACID
Class(es):	8
Classification code:	
Hazard label(s):	8
Packing group:	III
Environmental hazards:	No
Marine pollutant:	No
Special precautions for user:	
Segregation group:	1
EmS-No.	F-A S-B

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
not relevant

Air transport (ICAO-TI / IATA-DGR)

UN-No.:	1789
Proper Shipping Name:	HYDROCHLORIC ACID
Class(es):	8
Classification code:	
Hazard label(s):	8
Packing group:	III
Special precautions for user:	

SECTION 15: Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture

Domestic Substance List:

SECTION 16: Other information

Abbreviations and acronyms

ACGIH - American Conference of Governmental Industrial Hygiensts
DOT - Department of Transportation
IARC - International Agency for Research on Cancer
IATA-DGR - International Air Transport Association-Dangerous Goods Regulations
ICAO-TI - International Civil Aviation Organization-Technical Instructions
IMDG - International Maritime Code for Dangerous Goods
LTV - Long Term Value
NIOSH - National Institute for Occupational Safety and Health
NTP - National Toxicology Program
OSHA - Occupational Safety & Health Administration
PBT - Persistent, Bioaccumulative and Toxic
PEL - Permissible Exposure Limit
STV - Short Term Value
SVHC - Substances of Very High Concern
TDG - Transport of Dangerous Goods
TLV - Threshold Limit Value
vPvB - very Persistent, very Bioaccumulative

Additional information

Indication of changes: general update

The above information is believed to be correct but does not purport to be all-inclusive and shall be used only as a guidance. The information in this document is based on the present state knowledge and is applicable to the product with regard to appropriate safty precautions. It does not represent any guarantee of the properties of the product. VWR International and his Affiliates shall not be held liable for any damage resulting from handling.

SAFETY DATA SHEET

Creation Date 12-Mar-2009 **Revision Date** 25-Apr-2019 **Revision Number** 9

1. Identification

Product Name	**Nitric acid, Trace Metal Grade**
Cat No. :	**A509-212; A509-500; A509P212; A509P500; A509SK212**
CAS-No	7697-37-2
Synonyms	Azotic acid; Engraver's acid; Aqua fortis
Recommended Use	Laboratory chemicals.
Uses advised against	Food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Oxidizing liquids	Category 3
Corrosive to metals	Category 1
Acute Inhalation Toxicity - Dusts and Mists	Category 3
Skin Corrosion/irritation	Category 1 A
Serious Eye Damage/Eye Irritation	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
May intensify fire; oxidizer
May be corrosive to metals
Causes severe skin burns and eye damage
Toxic if inhaled

Precautionary Statements
Prevention
Do not breathe dust/fume/gas/mist/vapors/spray
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Use only outdoors or in a well-ventilated area
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep/Store away from clothing/ other combustible materials
Take any precaution to avoid mixing with combustibles
Keep only in original container
Wear respiratory protection
Response
Immediately call a POISON CENTER or doctor/physician
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Immediately call a POISON CENTER or doctor/physician
Skin
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Ingestion
IF SWALLOWED: Rinse mouth. DO NOT induce vomiting
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Spills
Absorb spillage to prevent material damage
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Store in corrosive resistant polypropylene container with a resistant inliner
Store in a dry place
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Corrosive to the respiratory tract

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Nitric acid	7697-37-2	65 - 70
Water	7732-18-5	30 - 35

4. First-aid measures

General Advice	Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.
Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

	Immediate medical attention is required.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Remove and wash contaminated clothing before re-use. Call a physician immediately.
Inhalation	If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Remove from exposure, lie down. Call a physician immediately.
Ingestion	Do not induce vomiting. Never give anything by mouth to an unconscious person. Clean mouth with water. Call a physician immediately.
Most important symptoms and effects	Causes burns by all exposure routes. Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation: Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	CO_2, dry chemical, dry sand, alcohol-resistant foam.
Unsuitable Extinguishing Media	No information available
Flash Point	Not applicable
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Oxidizing Properties	Oxidizer
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Thermal decomposition can lead to release of irritating gases and vapors. The product causes burns of eyes, skin and mucous membranes. Oxidizer: Contact with combustible/organic material may cause fire. May ignite combustibles (wood paper, oil, clothing, etc.).

Hazardous Combustion Products

Nitrogen oxides (NOx) Thermal decomposition can lead to release of irritating gases and vapors

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
4	0	0	OX

6. Accidental release measures

Personal Precautions	Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions	Should not be released into the environment. Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information.
Methods for Containment and Clean Up	Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Sweep up and shovel into suitable containers for disposal. Wear self-contained breathing apparatus and protective suit.

7. Handling and storage

Handling	Use only under a chemical fume hood. Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Do not ingest. Do not breathe vapors or spray mist. Keep away from clothing and other combustible materials.
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place. Do not store near combustible materials.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Nitric acid	TWA: 2 ppm STEL: 4 ppm	(Vacated) TWA: 2 ppm (Vacated) TWA: 5 mg/m^3 (Vacated) STEL: 4 ppm (Vacated) STEL: 10 mg/m^3 TWA: 2 ppm TWA: 5 mg/m^3	IDLH: 25 ppm TWA: 2 ppm TWA: 5 mg/m^3 STEL: 4 ppm STEL: 10 mg/m^3	TWA: 2 ppm STEL: 4 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures	Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166. Tightly fitting safety goggles. Face-shield.
Skin and body protection	Long sleeved clothing.
Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Hygiene Measures	Keep away from food, drink and animal feeding stuffs. When using, do not eat, drink or smoke. Contaminated work clothing should not be allowed out of the workplace. Provide regular cleaning of equipment, work area and clothing. Avoid contact with skin, eyes and clothing. For environmental protection remove and wash all contaminated protective equipment before re-use. Wear suitable gloves and eye/face protection.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Clear Colorless, Light yellow
Odor	Strong Acrid
Odor Threshold	No information available
pH	< 1.0 (0.1M)
Melting Point/Range	-41 °C / -41.8 °F
Boiling Point/Range	Not applicable
Flash Point	Not applicable
Evaporation Rate	No information available

Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	0.94 kPa (20°C)
Vapor Density	No information available
Specific Gravity	1.40
Solubility	miscible
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	HNO3
Molecular Weight	63.01

10. Stability and reactivity

Reactive Hazard	Yes
Stability	Oxidizer: Contact with combustible/organic material may cause fire.
Conditions to Avoid	Incompatible products. Combustible material. Excess heat. Exposure to air or moisture over prolonged periods.
Incompatible Materials	Combustible material, Strong bases, Reducing agents, Metals, Powdered metals, Organic materials, Aldehydes, Alcohols, Cyanides, Ammonia, Strong reducing agents
Hazardous Decomposition Products	Nitrogen oxides (NOx), Thermal decomposition can lead to release of irritating gases and vapors
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information	
Oral LD50	Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.
Dermal LD50	Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.
Mist LC50	Category 3. ATE = 1 - 5 mg/l. Category 4.
Vapor LC50	Based on ATE data, the classification criteria are not met. ATE > 20 mg/l.

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Nitric acid	Not listed	Not listed	LC50 = 2500 ppm. (Rat) 1h
Water	-	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation	Causes severe burns by all exposure routes
Sensitization	No information available
Carcinogenicity	The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Nitric acid	7697-37-2	Not listed	Not listed	Not listed	Not listed	Not listed
Water	7732-18-5	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects	No information available.
Developmental Effects	No information available.
Teratogenicity	No information available.
STOT - single exposure	None known
STOT - repeated exposure	None known
Aspiration hazard	No information available
Symptoms / effects,both acute and delayed	Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation: Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated
Endocrine Disruptor Information	No information available
Other Adverse Effects	The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains. Large amounts will affect pH and harm aquatic organisms.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Nitric acid	Not listed	LC50: = 72 mg/L, 96h (Gambusia affinis)	Not listed	Not listed

Persistence and Degradability	Miscible with water Persistence is unlikely based on information available.
Bioaccumulation/ Accumulation	No information available.
Mobility	Will likely be mobile in the environment due to its water solubility.

Component	log Pow
Nitric acid	-2.3

13. Disposal considerations

Waste Disposal Methods	Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN2031
Proper Shipping Name	NITRIC ACID
Hazard Class	8
Subsidiary Hazard Class	5.1
Packing Group	II

TDG

UN-No	UN2031
Proper Shipping Name	NITRIC ACID
Hazard Class	8
Subsidiary Hazard Class	5.1
Packing Group	II

IATA

UN-No	UN2031
Proper Shipping Name	NITRIC ACID
Hazard Class	8

Subsidiary Hazard Class	5.1
Packing Group	II

IMDG/IMO

UN-No	UN2031
Proper Shipping Name	NITRIC ACID
Hazard Class	8
Subsidiary Hazard Class	5.1
Packing Group	II

15. Regulatory information

United States of America Inventory

Component	CAS-No	TSCA	TSCA Inventory notification - Active/Inactive	TSCA - EPA Regulatory Flags
Nitric acid	7697-37-2	X	ACTIVE	-
Water	7732-18-5	X	ACTIVE	-

Legend:
TSCA - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Australia (AICS), China (IECSC), Korea (ECL).

Component	CAS-No	DSL	NDSL	EINECS	PICCS	ENCS	AICS	IECSC	KECL
Nitric acid	7697-37-2	X	-	231-714-2	X	X	X	X	KE-25911
Water	7732-18-5	X	-	231-791-2	X	-	X	X	KE-35400

U.S. Federal Regulations

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Nitric acid	7697-37-2	65 - 70	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Nitric acid	X	1000 lb	-	-

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Nitric acid	-	TQ: 500 lb

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Nitric acid	1000 lb	1000 lb

California Proposition 65 This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Nitric acid	X	X	X	X	X
Water	-	-	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ):	Y
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security This product contains the following DHS chemicals:
Legend - STQs = Screening Threshold Quantities, APA = A placarded amount

Component	DHS Chemical Facility Anti-Terrorism Standard
Nitric acid	Release STQs - 15000lb Theft STQs - 400lb

Other International Regulations

Mexico - Grade No information available

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date	12-Mar-2009
Revision Date	25-Apr-2019
Print Date	25-Apr-2019
Revision Summary	SDS sections updated. 2. 11.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Creation Date 06-Aug-2009 **Revision Date** 18-Jan-2018 **Revision Number** 5

1. Identification

Product Name	**Sodium thiosulfate pentahydrate**
Cat No. :	**S445-3; S445-10; S445-50; S445-500; S474-3; S474-12; S474-500; S475-12; S475-50KG; S475-212;**
CAS-No	10102-17-7
Synonyms	Sodium hyposulfite pentahydrate; Disodium thiosulfate pentahydrate (Crystalline/USP/FCC/EP/BP/Certified ACS)
Recommended Use	Laboratory chemicals.
Uses advised against	Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Combustible dust	Yes

Label Elements

Signal Word
Warning

Hazard Statements
May form combustible dust concentrations in air

Precautionary Statements
Storage
Store in a well-ventilated place. Keep container tightly closed
Hazards not otherwise classified (HNOC)
None identified

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Sodium thiosulfate pentahydrate	10102-17-7	>95
Sodium thiosulfate	7772-98-7	-

4. First-aid measures

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Get medical attention immediately if symptoms occur.
Inhalation	Move to fresh air. If breathing is difficult, give oxygen. Get medical attention immediately if symptoms occur.
Ingestion	Do not induce vomiting. Obtain medical attention.
Most important symptoms and effects	No information available.
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media	No information available
Flash Point	No information available
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Dust can form an explosive mixture in air. Containers may explode when heated. Thermal decomposition can lead to release of irritating gases and vapors. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Sodium oxides Sulfur oxides

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
1	1	1	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment. Avoid dust formation.
Environmental Precautions	Should not be released into the environment. See Section 12 for additional ecological information.
Methods for Containment and Clean Up	Sweep up or vacuum up spillage and collect in suitable container for disposal. Avoid dust formation.

7. Handling and storage

Handling	Wear personal protective equipment. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing. Avoid ingestion and inhalation. Avoid dust formation.
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines	This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.
Engineering Measures	Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure.
Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	White
Odor	Odorless
Odor Threshold	No information available
pH	6.0-8.4 10% aq. sol
Melting Point/Range	48.5 °C / 119.3 °F
Boiling Point/Range	No information available
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	Not applicable
Specific Gravity	No information available
Solubility	Soluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	> 45°C
Viscosity	Not applicable
Molecular Formula	Na2 O3 S2 . 5 H2 O
Molecular Weight	248.18

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Hygroscopic. Air sensitive. Light sensitive.
Conditions to Avoid	Avoid dust formation. Incompatible products. Excess heat. Exposure to moist air or water. Exposure to light. Exposure to air.
Incompatible Materials	Strong oxidizing agents
Hazardous Decomposition Products	Sodium oxides, Sulfur oxides
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Oral LD50	Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.
Dermal LD50	Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.
Mist LC50	Based on ATE data, the classification criteria are not met. ATE > 5 mg/l.

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium thiosulfate	LD50 > 5000 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products	No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation	No information available
Sensitization	No information available
Carcinogenicity	The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Sodium thiosulfate pentahydrate	10102-17-7	Not listed	Not listed	Not listed	Not listed	Not listed
Sodium thiosulfate	7772-98-7	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects	No information available
Reproductive Effects	No information available.
Developmental Effects	No information available.
Teratogenicity	No information available.
STOT - single exposure	None known
STOT - repeated exposure	None known
Aspiration hazard	No information available
Symptoms / effects,both acute and delayed	No information available
Endocrine Disruptor Information	No information available
Other Adverse Effects	The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Do not empty into drains. Do not flush into surface water or sanitary sewer system.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Sodium thiosulfate pentahydrate	Not listed	Pimephales promelas: LC50>10000mg/L/96h	Not listed	Not listed
Sodium thiosulfate	Not listed	LC50: = 24000 mg/L, 96h static (Gambusia affinis)	Not listed	Not listed

Persistence and Degradability Soluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Will likely be mobile in the environment due to its water solubility.

Component	log Pow
Sodium thiosulfate	-4.35

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT	Not regulated
TDG	Not regulated
IATA	Not regulated
IMDG/IMO	Not regulated

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Sodium thiosulfate pentahydrate	-	X	-	-	-		X	X	X	X	-
Sodium thiosulfate	X	X	-	231-867-5	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazard Categories	See section 2 for more information
CWA (Clean Water Act)	Not applicable
Clean Air Act	Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA	Not applicable
California Proposition 65	This product does not contain any Proposition 65 chemicals
U.S. State Right-to-Know Regulations	Not applicable

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade	No information available

16. Other information

Prepared By	Regulatory Affairs Thermo Fisher Scientific Email: EMSDS.RA@thermofisher.com
Creation Date	06-Aug-2009
Revision Date	18-Jan-2018
Print Date	18-Jan-2018
Revision Summary	This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Creation Date 15-October-2009 **Revision Date** 17-January-2018 **Revision Number** 3

1. Identification

Product Name	**Sodium thiosulfate**
Cat No. :	**S446-3, S446-500**
CAS-No	7772-98-7
Synonyms	Thiosulfuric Acid Disodium Salt; Sodium Oxide Sulfide; Sodium Hyposulfite
Recommended Use	Laboratory chemicals.
Uses advised against	Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Importer/Distributor
Fisher Scientific
112 Colonnade Road,
Ottawa, ON K2E 7L6,
Canada
Tel: 1-800-234-7437

Manufacturer
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification

WHMIS 2015 Classification Not classified under the Hazardous Products Regulations (SOR/2015-17)

Based on available data, the classification criteria are not met

Label Elements
None required

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Sodium thiosulfate	7772-98-7	>95

4. First-aid measures

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Get medical attention immediately if symptoms occur.
Inhalation	Move to fresh air. Get medical attention immediately if symptoms occur. If not breathing, give artificial respiration.
Ingestion	Do not induce vomiting. Obtain medical attention.
Most important symptoms/effects	No information available.
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media	No information available
Flash Point	No information available
Method -	No information available
Autoignition Temperature	
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Sodium oxides Sulfur oxides
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
1	0	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment. Avoid dust formation.
Environmental Precautions	Should not be released into the environment. See Section 12 for additional ecological information.
Methods for Containment and Clean Up	Sweep up or vacuum up spillage and collect in suitable container for disposal. Avoid dust formation.

7. Handling and storage

Handling	Wear personal protective equipment. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing. Avoid ingestion and inhalation. Avoid dust formation.
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines	This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.

Engineering Measures

None under normal use conditions.

Personal protective equipment

Eye Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Hand Protection	Wear appropriate protective gloves and clothing to prevent skin exposure.

Glove material	Breakthrough time	Glove thickness	Glove comments
Natural rubber Nitrile rubber Neoprene PVC	See manufacturers recommendations	-	Splash protection only

Inspect gloves before use. observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. (Refer to manufacturer/supplier for information) gloves are suitable for the task: Chemical compatability, Dexterity, Operational conditions, User susceptibility, e.g. sensitisation effects, also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion. gloves with care avoiding skin contamination.

Respiratory Protection
No protective equipment is needed under normal use conditions.

Recommended Filter type: Particle filter

Environmental exposure controls

No information available.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice. Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing before re-use. Wash hands before breaks and at the end of workday.

9. Physical and chemical properties

Physical State	Solid
Appearance	White
Odor	Odorless
Odor Threshold	No information available
pH	6.0-8.5 5% aq. sol. 20°C
Melting Point/Range	48 °C / 118.4 °F
Boiling Point/Range	No information available
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	negligible
Vapor Density	Not applicable
Specific Gravity	No information available
Solubility	Soluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	
Decomposition Temperature	No information available
Viscosity	Not applicable

Molecular Formula	Na2 O3 S2
Molecular Weight	158.1

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Hygroscopic.
Conditions to Avoid	Exposure to moist air or water.
Incompatible Materials	Strong oxidizing agents
Hazardous Decomposition Products	Sodium oxides, Sulfur oxides
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium thiosulfate	LD50 > 5000 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation	No information available
Sensitization	No information available
Carcinogenicity	The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Sodium thiosulfate	7772-98-7	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects	No information available
Reproductive Effects	No information available.
Developmental Effects	No information available.
Teratogenicity	No information available.
STOT - single exposure	None known
STOT - repeated exposure	None known
Aspiration hazard	No information available
Symptoms / effects,both acute and delayed	No information available
Endocrine Disruptor Information	No information available
Other Adverse Effects	The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains. .

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Sodium thiosulfate	Not listed	LC50: = 24000 mg/L, 96h static (Gambusia affinis)	Not listed	Not listed

Persistence and Degradability	Soluble in water Persistence is unlikely based on information available.
Bioaccumulation/ Accumulation	No information available.
Mobility	. Will likely be mobile in the environment due to its water solubility.

Component	log Pow
Sodium thiosulfate	-4.35

13. Disposal considerations

Waste Disposal Methods	Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT	Not regulated
TDG	Not regulated
IATA	Not regulated
IMDG/IMO	Not regulated

15. Regulatory information

International Inventories

Component	DSL	NDSL	TSCA	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Sodium thiosulfate	X	-	X	231-867-5	-		X	X	X	X	X

Canada

SDS in compliance with provisions of information as set out in Canadian Standard - Part 4, Schedule 1 and 2 of the Hazardous Products Regulations (HPR) and meets the requirements of the HPR (Paragraph 13(1)(a) of the Hazardous Products Act (HPA)).

16. Other information

Prepared By	Regulatory Affairs Thermo Fisher Scientific Email: EMSDS.RA@thermofisher.com
Creation Date	15-October-2009
Revision Date	17-January-2018
Print Date	17-January-2018
Revision Summary	This document has been updated to comply with the requirements of WHMIS 2015 to align with the Globally Harmonised System (GHS) for the Classification and Labelling of Chemicals.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other

materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Creation Date 03-Nov-2010 **Revision Date** 18-Jan-2018 **Revision Number** 3

1. Identification

Product Name	**Sodium Bisulfate Monohydrate (Certified)**
Cat No. :	**S240-3, S240-500**
CAS-No	10034-88-5
Synonyms	Sodium hydrogen sulfate
Recommended Use	Laboratory chemicals.
Uses advised against	Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Serious Eye Damage/Eye Irritation	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
Causes serious eye damage

Precautionary Statements
Prevention
Wear protective gloves/protective clothing/eye protection/face protection

Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Immediately call a POISON CENTER or doctor/physician
Storage
Store in a well-ventilated place. Keep container tightly closed
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
None identified

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Sodium hydrogen sulfate, monohydrate	10034-88-5	>95
Sodium bisulfate	7681-38-1	-

4. First-aid measures

General Advice	If symptoms persist, call a physician.
Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.
Inhalation	Move to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.
Ingestion	Clean mouth with water and drink afterwards plenty of water. Get medical attention if symptoms occur.
Most important symptoms and effects	None reasonably foreseeable. Causes severe eye damage.
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Unsuitable Extinguishing Media	No information available
Flash Point	No information available
Method -	No information available
Autoignition Temperature	
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.

Hazardous Combustion Products
Sulfur oxides

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	0	1	N/A

6. Accidental release measures

Personal Precautions	Use personal protective equipment. Ensure adequate ventilation. Avoid dust formation.
Environmental Precautions	Should not be released into the environment.
Methods for Containment and Clean Up	Sweep up or vacuum up spillage and collect in suitable container for disposal. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling	Wear personal protective equipment. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Avoid dust formation.
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines	This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.
Engineering Measures	Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection	Tightly fitting safety goggles.
Skin and body protection	Long sleeved clothing.
Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	White
Odor	No information available
Odor Threshold	No information available
pH	~ 1 (@ 20) 5% aq. sol
Melting Point/Range	58 °C / 136.4 °F
Boiling Point/Range	No information available
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available

Lower	No data available
Vapor Pressure	No information available
Vapor Density	Not applicable
Specific Gravity	2.12
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	H Na O4 S . H2 O
Molecular Weight	138.08

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Moisture sensitive.
Conditions to Avoid	Avoid dust formation. Incompatible products. Excess heat. Exposure to moist air or water.
Incompatible Materials	Strong oxidizing agents, Strong bases
Hazardous Decomposition Products	Sulfur oxides
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information
Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium bisulfate	LD50 = 2490 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products	No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation	Risk of serious damage to eyes
Sensitization	No information available
Carcinogenicity	The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Sodium hydrogen sulfate, monohydrate	10034-88-5	Not listed	Not listed	Not listed	Not listed	Not listed
Sodium bisulfate	7681-38-1	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects	No information available
Reproductive Effects	No information available.
Developmental Effects	No information available.
Teratogenicity	No information available.
STOT - single exposure	None known
STOT - repeated exposure	None known

Aspiration hazard	No information available
Symptoms / effects,both acute and delayed	No information available
Endocrine Disruptor Information	No information available
Other Adverse Effects	The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Sodium bisulfate	Not listed	Not listed	Not listed	EC50: = 190 mg/L, 48h (Daphnia magna)

Persistence and Degradability	Soluble in water Persistence is unlikely based on information available.
Bioaccumulation/ Accumulation	No information available.
Mobility	Will likely be mobile in the environment due to its water solubility.

13. Disposal considerations

Waste Disposal Methods	Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT	Not regulated
TDG	Not regulated
IATA	Not regulated
IMDG/IMO	Not regulated

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Sodium hydrogen sulfate, monohydrate	-	-	-	-	-		X	-	X	X	-
Sodium bisulfate	X	X	-	231-665-7	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b)	Not applicable
SARA 313	Not applicable
SARA 311/312 Hazard Categories	See section 2 for more information
CWA (Clean Water Act)	Not applicable
Clean Air Act	Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA	Not applicable
California Proposition 65	This product does not contain any Proposition 65 chemicals
U.S. State Right-to-Know Regulations	Not applicable

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade	No information available

16. Other information

Prepared By	Regulatory Affairs Thermo Fisher Scientific Email: EMSDS.RA@thermofisher.com
Creation Date	03-Nov-2010
Revision Date	18-Jan-2018
Print Date	18-Jan-2018
Revision Summary	This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
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End of SDS

Sulfuric acid solution

84733-100ML

SECTION 1. IDENTIFICATION

Product name	:	Sulfuric acid solution
Number	:	000000021010
Product Use Description	:	Laboratory chemicals
Manufacturer or supplier's details	:	Honeywell International Inc. 1953 South Harvey Street Muskegon, MI 49442
For more information call	:	1-800-368-0050 +1-231-726-3171 (Monday-Friday, 9:00am-5:00pm)
In case of emergency call	:	**Medical: 1-800-498-5701 or +1-303-389-1414**
	:	**Transportation (CHEMTREC): 1-800-424-9300 or +1-703-527-3887**
	:	
	:	(24 hours/day, 7 days/week)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Form	:	liquid
Color	:	colourless
Odor	:	odourless

Classification of the substance or mixture

Classification of the substance or mixture : Corrosive to metals, Category 1
Skin corrosion, Category 1A
Serious eye damage, Category 1

GHS Label elements, including precautionary statements

Symbol(s) :

Signal word : Danger

Hazard statements : May be corrosive to metals.
Causes severe skin burns and eye damage.

Precautionary statements : **Prevention:**
Keep only in original container.
Wash skin thoroughly after handling.
Wear protective gloves/protective clothing/eye protection/face protection.

Response:
IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Immediately call a POISON CENTER/doctor.
Wash contaminated clothing before reuse.
Absorb spillage to prevent material damage.

Storage:

Store locked up.
Store in corrosive resistant container with a resistant inner liner.

Disposal:
Dispose of contents/ container to an approved waste disposal plant.

Carcinogenicity

NTP:	Sulfuric Acid Known carcinogen	7664-93-9
IARC:	Sulfuric Acid Group 1: Carcinogenic to humans	7664-93-9
ACGIH:	Sulfuric Acid A2: Suspected human carcinogen	7664-93-9

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : H2SO4

Chemical nature : Mixture

Chemical name	CAS-No.	Concentration
Sulfuric Acid	7664-93-9	>=40.00 - <60.00 %
Water	7732-18-5	>=40.00 - <60.00 %

SECTION 4. FIRST AID MEASURES

General advice	: First aider needs to protect himself. Move out of dangerous area. Immediately take off contaminated clothing and rinse body with plenty of water.
Inhalation	: Remove to fresh air. If breathing is difficult, give oxygen. Use oxygen as required, provided a qualified operator is present. Call a physician immediately.
Skin contact	: Wash off immediately with plenty of water for at least 15 minutes. Take off contaminated clothing and shoes immediately. Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty. Call a physician immediately.
Eye contact	: Protect unharmed eye. Irrigate eyes for at least 15 minutes with copious quantities of water, keeping eyelids apart and away from eyeballs during irrigation. Small amounts splashed into eyes can cause irreversible tissue damage and blindness. Call a physician immediately.
Ingestion	: Clean mouth with water and drink afterwards plenty of water. Magnesium hydroxide (milk of Magnesia) as an antacid may be given. Do NOT induce vomiting. Call a physician immediately.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	: Foam Carbon dioxide (CO2) Dry powder
Unsuitable extinguishing media	: Water Do NOT use water jet. Contact with a relatively small quantity of water creates violent reaction generating much heat and spattering of hot acid
Specific hazards during firefighting	: Reacts violently with water. Contact with combustible material may cause fire. In case of a spillage, the resulting acid solution may attack many metals with liberation of hydrogen which is flammable

	and forms explosive mixture with air In case of fire hazardous decomposition products may be produced such as: Sulphur oxides
Special protective equipment for firefighters	Wear self-contained breathing apparatus and protective suit. No unprotected exposed skin areas.
Further information	The product itself does not burn. Collect contaminated fire extinguishing water separately. This must not be discharged into drains.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	Evacuate personnel to safe areas. Wear personal protective equipment. Unprotected persons must be kept away. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Do not breathe vapours or spray mist. Do not get in eyes, on skin, or on clothing.
Environmental precautions	Do not flush into surface water or sanitary sewer system. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities. Should not be released into the environment.
Methods and materials for containment and cleaning up	Ventilate the area. Dilute with water. Neutralise with the following product(s): lime Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national regulations (see section 13). Never neutralise with the following products: soda ash

SECTION 7. HANDLING AND STORAGE

Handling

Precautions for safe handling	:	Handle with extreme care. Wear personal protective equipment. Use only in well-ventilated areas. Use only acid resistant equipment. When diluting, always add the product to water. Never add water to the product. Do not breathe vapours or spray mist. Do not get in eyes, on skin, or on clothing.
Advice on protection against fire and explosion	:	Normal measures for preventive fire protection. In case of a spillage, the resulting acid solution may attack many metals with liberation of hydrogen which is flammable and forms explosive mixture with air

Storage

Conditions for safe storage, including any incompatibilities	:	Store in original container. Keep containers tightly closed in a dry, cool and well-ventilated place. Storage rooms must be properly ventilated. Keep in an area equipped with acid resistant flooring. Store in upright position only.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Protective measures	:	Ensure that eyewash stations and safety showers are close to the workstation location. Legal requirements are to be considered in regard of the selection, use and care of personal protective equipment. Do not breathe vapours or spray mist. Do not get in eyes, on skin, or on clothing.

Engineering measures	:	Use with local exhaust ventilation.
Eye protection	:	Face-shield Safety goggles
Hand protection	:	Impervious gloves Gloves must be inspected prior to use. Replace when worn.
Skin and body protection	:	Wear suitable protective equipment. Wear as appropriate: acid-resistant protective clothing
Respiratory protection	:	In case of insufficient ventilation, wear suitable respiratory equipment.
Hygiene measures	:	Separate rooms are required for washing, showering and changing clothes. Contaminated work clothing should not be allowed out of the workplace. Keep working clothes separately. Take off all contaminated clothing immediately. Remove and wash contaminated clothing before re-use. Wash hands before breaks and at the end of workday. Avoid contact with the skin and the eyes.

Exposure Guidelines

Components	CAS-No.	Value	Control parameters	Update	Basis
Sulfuric Acid	7664-93-9	TWA : Time weighted average	0.2 mg/m3	2008	ACGIH:US. ACGIH Threshold Limit Values
Further information :	Form of exposure : Thoracic fraction.				

Sulfuric Acid	7664-93-9	REL : Recommended exposure limit (REL):	1 mg/m3	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards

Sulfuric Acid	7664-93-9	PEL : Permissible exposure limit	1 mg/m3	02 2006	OSHA_TRANS:US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Sulfuric Acid	7664-93-9	TWA : Time weighted average	1 mg/m3	1989	Z1A:US. OSHA Table Z-1-A (29 CFR 1910.1000)

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	:	liquid
Color	:	colourless
Odor	:	odourless
pH	:	Note: acidic
Melting point/range	:	Note: no data available
Boiling point/boiling range	:	ca. 110 °C at 1,013 hPa
Flash point	:	Note: Not applicable
Flammability	:	Not applicable

Lower explosion limit	: Note: Not applicable
Upper explosion limit	: Note: Not applicable
Density	: ca. 1.290 g/cm3 at 20 °C
Water solubility	: Note: completely soluble
Partition coefficient: n-octanol/water	: Note: no data available
Decomposition temperature	: Note: No decomposition if used as directed.
Oxidizing properties	: The substance or mixture is not classified as oxidizing.
Molecular weight	: 98.08 g/mol
Corrosivity	: Note: Corrosive to metals

SECTION 10. STABILITY AND REACTIVITY

Chemical stability	: Stable under recommended storage conditions.
Possibility of hazardous reactions	: Hazardous polymerisation does not occur. Gives off hydrogen by reaction with metals.

Conditions to avoid	Protect from heat/overheating.
Incompatible materials	Bases Reducing agents Organic materials Copper Amines Alcohols Aldehydes Cyanides Sulphides Nitriles Gives off hydrogen by reaction with metals.
Hazardous decomposition products	Sulphur oxides

SECTION 11. TOXICOLOGICAL INFORMATION

Acute oral toxicity	Note: Toxicity is determined by the corrosivity of the product.
Acute inhalation toxicity	Note: Toxicity is determined by the corrosivity of the product.
Acute dermal toxicity	Note: Toxicity is determined by the corrosivity of the product.
Skin irritation	Note: Extremely corrosive and destructive to tissue.
Eye irritation	Note: Extremely corrosive and destructive to tissue.
Sensitisation	Note: no data available
Genotoxicity in vitro	Note: Not classified due to data which are conclusive although

insufficient for classification.

Carcinogenicity
Sulfuric Acid : Note: An increased risk of cancer in humans has been shown in work-place based studies. This hazard is related to exposure to the mist/vapor of the acid and not the acid solution. Please review IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Occupational Exposures to Mists and Vapours from Strong Inorganic Acids; and Other Industrial Chemicals, Vol. 54, 1992 and IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, A review of human carcinogens: Chemical Agents and Related Occupations, Vol. 100F, 2012.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Toxicity to fish : static test
LC50: 16 - 28 mg/l
Exposure time: 96 h
Species: Lepomis macrochirus (Bluegill sunfish)

Toxicity to daphnia and other aquatic invertebrates : Immobilization
EC50: > 100 mg/l
Exposure time: 48 h
Species: Daphnia magna (Water flea)
Method: OECD Test Guideline 202

Toxicity to algae : Growth rate
EC50: > 100 mg/l
Exposure time: 72 h
Species: Desmodesmus subspicatus (green algae)
Method: OECD Test Guideline 201

Elimination information (persistence and degradability)

Biodegradability	:	Note: The methods for determining biodegradability are not applicable to inorganic substances.

Further information on ecology

Additional ecological information	:	Neutralisation will reduce ecotoxic effects.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods	:	Observe all Federal, State, and Local Environmental regulations.

SECTION 14. TRANSPORT INFORMATION

DOT	UN/ID No.	:	UN 2796
	Proper shipping name	:	Sulphuric acid
	Class		8
	Packing group		II
	Hazard Labels		8

IATA	UN/ID No.	:	UN 2796
	Description of the goods	:	Sulphuric acid
	Class	:	8
	Packaging group	:	II
	Hazard Labels	:	8
	Packing instruction (cargo aircraft)	:	855
	Packing instruction (passenger aircraft)	:	851
	Packing instruction (passenger aircraft)	:	Y840

IMDG

UN/ID No.	:	UN 2796
Description of the goods	:	Sulphuric acid
Class	:	8
Packaging group	:	II
Hazard Labels	:	8
EmS Number	:	F-A, S-B
Marine pollutant	:	no

IMDG Code segregation group 1 – ACIDS,

SECTION 15. REGULATORY INFORMATION

Inventories

US. Toxic Substances Control Act	:	On TSCA Inventory
Australia. Industrial Chemical (Notification and Assessment) Act	:	On the inventory, or in compliance with the inventory
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL)	:	All components of this product are on the Canadian DSL
Japan. Kashin-Hou Law List	:	On the inventory, or in compliance with the inventory
Korea. Existing Chemicals Inventory (KECI)	:	On the inventory, or in compliance with the inventory
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	:	On the inventory, or in compliance with the inventory
China. Inventory of Existing Chemical Substances	:	On the inventory, or in compliance with the inventory
New Zealand. Inventory of Chemicals (NZIoC), as	:	On the inventory, or in compliance with the inventory

published by ERMA New Zealand

National regulatory information

US. EPA CERCLA Hazardous Substances (40 CFR 302) : The following component(s) of this product is/are subject to release reporting under 40 CFR 302 when release exceeds the Reportable Quantity (RQ):

Reportable quantity: 1000 lbs
: Sulfuric Acid 7664-93-9

SARA 302 Components : The following components are subject to reporting levels established by SARA Title III, Section 302:
: Sulfuric Acid 7664-93-9

SARA 313 Components : The following components are subject to reporting levels established by SARA Title III, Section 313:
: Sulfuric Acid 7664-93-9

SARA 311/312 Hazards : Acute Health Hazard
Chronic Health Hazard

CERCLA Reportable Quantity : 2000 lbs

California Prop. 65 :

⚠**WARNING:**This product can expose you to chemicals, listed below, known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Sulfuric Acid 7664-93-9

Massachusetts RTK : Sulfuric Acid 7664-93-9

New Jersey RTK : Sulfuric Acid 7664-93-9

Pennsylvania RTK	: Sulfuric Acid	7664-93-9

SECTION 16. OTHER INFORMATION

		HMIS III	**NFPA**
Health hazard	:	3*	3
Flammability	:	0	0
Physical Hazard	:	2	
Instability	:		2
Special hazard.	:		W

* - Chronic health hazard
Hazard rating and rating systems (e.g. HMIS® III, NFPA): This information is intended solely for the use of individuals trained in the particular system.

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. Final determination of suitability of any material is the sole responsibility of the user. This information should not constitute a guarantee for any specific product properties.

Changes since the last version are highlighted in the margin. This version replaces all previous versions.
Previous Issue Date: 12/07/2016
Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group

Appendix O

Sampling Protocol for Municipalities

Instructions for Sampling Community Water - Tap, THM & HAA

GLOVES HAVE BEEN INCLUDED FOR EACH SAMPLE.
PLEASE PUT ON THE GLOVES WHEN YOU ENTER THE HOUSE BEFORE YOU TOUCH ANYTHING AND REMOVE WHEN YOU LEAVE.
See instructions included.

Remember: Freeze the freezer packs prior to shipping the samples back!!

You will be using:
- 7 bottles for tap water inorganic samples,
- 2 vials for THMs, and
- 2 vials for HAAs.

Most of these bottles have a small amount of chemical preservative in them and **must not be rinsed of overfilled**. Do not spill preservative. Rinse thoroughly with water if preservative comes in contact with skin.

A video on how to collect the samples can be found here:
https://www.youtube.com/watch?v=7N8QmkoACoU

1. Fill the 7 bottles from the tap location located approximately 2/3 of the way through the distribution system:
    a. Let the tap water **flush** for about **5 minutes** before filling the bottles/vials.
    b. **Do not rinse** or overfill the bottles – this may be tricky so turn your tap pressure down to slowly fill up the bottles.

    THM (2 vials) & HAA (2 vials)s:
    c. **Do not rinse** the vials.
    Fill all vials completely without over-spilling – this can be tricky, so **fill slowly**. Try to avoid trapping air in the vial but lightly pushing down on the flexible cap centre while twisting the cap on.

2. On the bag containing the bottles, fill out the **Tap Sample** section including:
    a. Location (e.g. Gas station)
    b. Water temperature & pH (if you can)
    c. Time
    d. Free chlorine and Total chlorine (if you have a chlorine test kit)

3. Store the samples in a refrigerator at around 4°C until they can be shipped. Do not freeze the samples.

4. Freeze the freezer packs in a freezer prior to shipping the samples back.

5. Samples should be shipped back **within 1 day** after being collected.

6. Return the field sheets in the zip lock bag, the samples, and the freezer packs in the cooler provided. Make sure the samples are packaged to prevent breakage.

7. Attach the return address and Xpresspost label provided to the cooler and drop it off at your local post office for shipping.

Feel free to call Carla Hayes at 709-637-2542 if you have any questions.

Appendix P

Protocol for THM & HAA Collection and Reporting

Newfoundland Labrador

Government of Newfoundland and Labrador
Department of Environment and Conservation
Water Resources Management Division

March 11, 2010

Protocol for THM and HAA Collection and Reporting

Rationale

Trihalomethanes (THMs) and Haloacetic Acids (HAAs) are disinfection by-products (DBPs) that are formed when precursor material, such as natural organic matter reacts with a disinfectant, such as chlorine, in a distribution system. DBP formation is dependent on the functioning of the chlorination equipment.

Current Protocol

Collection

A THM and/or HAA sample does not have to be taken if the Town/operator verifies that the chlorination system is not in operation. If the operation of the system is not verified by the Town/operator the THM and/or HAA sample must be taken.

Reporting

A THM and/or HAA level of 0.0µg/L does not mean that the system is not chlorinating.

Because of the above statement noted above, a THM and/or HAA results of 0.0µg/L cannot be rejected.

A free or total chlorine residual reading of 0.0mg/L does not mean that the system is not chlorinating.

Because of the above noted statement, a THM and/or HAA sample should not be excluded because of a 0.0mg/L free or total chlorine residual reading.

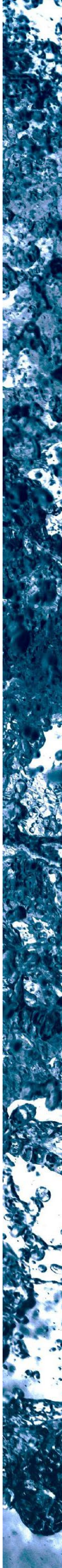
Calculation of THM and HAA averages

The THM and HAA averages are based on the last four season values. These averages are classified as locational running annual averages and are comparable to the *Guidelines for Canadian Drinking Water Quality*.

If a value for either season is missing the remaining values are averaged over the number of season sampled and are classified as a simple average which is not comparable to the *Guidelines for Canadian Drinking Water Quality*.

Appendix Q

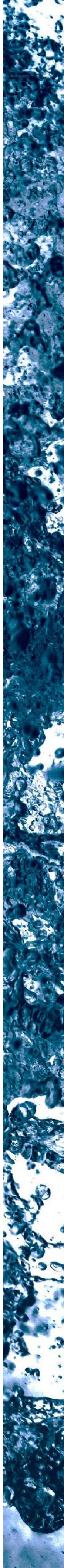
Sample Hold Times



ITEM #	PACKAGE / TEST	MATRIX	HOLD TIME	COMMENTS
1	**Trihalomethane**	Water	14	
2	**Inorganic Package**			
	Alkalinity	Water	14	
	Metals Water Total MS	Water	180	
	Nitrogen Ammonia - water	Water	28	
	Anions (Bromide, Chloride, Sulphate)	Water	28	
	Colour	Water	2	exempt - will not be flagged on final report
	Conductance - water	Water	28	
	Organic carbon - Dissolved	Water	28	
	Fluoride	Water	28	
	Hardness (calculated as CaCO3)	Water	180	
	Mercury - Total (CVAA,LL)	Water	28	
	Nitrogen - Nitrite	Water	2	exempt - will not be flagged on final report
	Nitrogen - Nitrate (as N)	Water	3	calculated using nitrite result (nitrite exempt)
	pH	Water	0	exempt - will not be flagged on final report
	Calculated TDS (DW Pkg)	Drinking Water	n/a	
	Total Kjeldahl Nitrogen	Water	28	
	Organic carbon - Total	Water	28	
	Total Phosphorus (Colourimetric)	Water	28	
	Turbidity	Water	2	exempt - will not be flagged on final report
	Haloacetic Acids in Water	Water	14	
3	**Total Suspended Solids**	Water	7	It will be important to ship samples asap after collection to ensure the samples can ship from NL and arrive at the lab in Bedford with time to be logged in and processed.
4	**Bromate**	Water	28	
5	**PCBs in water by GC/ECD**	Water	365	
6	**PAH in Water by GC/MS (SIM)**	Water	7	Hexane preservation upon receipt at the lab will extend the hold time from 7 to 14 days if needed
7	**RBCA Hydrocarbons in Water**	Water	14	
8	**Gross Alpha and Gross Beta**	Water	n/a	
9	**Radiological Parameters**	Water		
10	Lead 210	Water	n/a	
	Polonium-210 by Alpha Spectrometry	Water	n/a	
	Radium Isotopes by Alpha Spectrometry	Water	n/a	
	Radon-222 in Drinking Water	Water	3	half-life constraints - will most likely need to ship directly to Ontario to expedite receipt at the lab
11 & 12	**Geosmin/Methylisoborneol -H2O**	Water	10	
13	**NDMA in Drinking Water**	Water	10	

Appendix R

Protocol for Exceedance Reporting for Source Samples



Newfoundland
Labrador

Government of Newfoundland and Labrador
Department of Environment and Climate Change
Water Resources Management Division

Protocol for Exceedance Reporting for Source Samples

Rationale

Water analysis results for all public water supplies in Newfoundland and Labrador are compared to the Guidelines for Drinking Water Quality in Newfoundland and Labrador. An exceedance is defined as a value that is above the maximum acceptable concentration (MAC) established by the Guidelines. If an exceedance is detected, the laboratory sends a report to the Department of Environment and Climate Change via fax and e-mail. Due to the possible implications of contaminant exceedances, the Department of Environment and Climate Change may have to resample the drinking water system to determine if there is a potential problem in the system.

Protocol

When an exceedance report is received from the chemical analysis laboratory for a source water sample, both the community and relevant government agencies will be notified of both the source and corresponding seasonal tap water quality results. Whether or not resampling of the source water is necessary within the same season will depend on the corresponding seasonal tap water quality (i.e. if the corresponding tap water quality sample is below the MAC for the parameter of concern, resampling of the source water will not be required). However, if there are also tap water sample exceedances, the protocol outlined in Appendix S or T will be followed. All sample results will be recorded in the main drinking water quality database.

Appendix S

Protocol for Exceedance Reporting for Tap Samples
(Lead Only)

Newfoundland Labrador

Government of Newfoundland and Labrador
Department of Environment and Climate Change
Water Resources Management Division

Protocol for Lead Exceedance Reporting for Tap Samples

Rationale

Water analysis results for all public water supplies in Newfoundland and Labrador are compared to the Guidelines for Drinking Water Quality in Newfoundland and Labrador. An exceedance is defined as a value that is above the maximum acceptable concentration (MAC) established by the Guidelines. If an exceedance is detected, the laboratory sends a report to the Department of Environment and Climate Change via fax and e-mail. Due to the possible implications of contaminant exceedances, the Department of Environment and Climate Change may have to resample the drinking water system to determine if there is a potential problem in the system.

Note: As of March 2019, the GCDWQ maximum acceptable concentration (MAC) for total lead in drinking water is 0.005 mg/L (5 µg/L), based on a sample of water taken at the tap.

Protocol

When an exceedance report is received from the chemical analysis laboratory (for a parameter other than lead), one of two reporting scenarios will be triggered.

Scenario 1:
Water supplies for which historical water quality data show lead concentrations above the MAC.

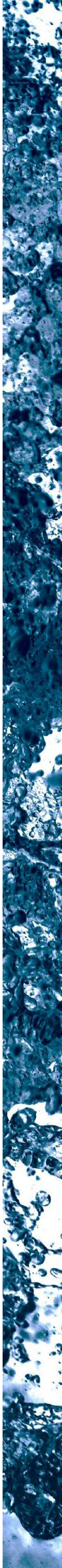
Action: when a lead exceedance report is received from the chemical analysis laboratory, the lead exceedance will be reported to the community and various government agencies but a resample sample will not be taken. Sample results will be stored in the drinking water quality database.

Scenario 2:
Water supplies for which historical water quality data show lead concentrations below the MAC.

Action: when a lead exceedance report is received from the chemical analysis laboratory, the exceedance will be reported to the community and various government agencies and three resamples will be collected from the following locations: the original sampling location, a location upstream of the original sampling location, and a location downstream of the original sampling location. These resamples will be sent to the laboratory for urgent/rush analysis of all parameters. The community will be informed immediately of the results of resampling and the information will be copied to various government agencies for appropriate action. All sample results (e.g. the original sample and the resamples) will be stored in the drinking water database.

Appendix T

Protocol for Exceedance Reporting for Tap Samples
(Parameters Other Than Lead)



Government of Newfoundland and Labrador
Department of Environment and Climate Change
Water Resources Management Division

Protocol for Exceedance Reporting of Tap Samples (with the exception of Lead)

Rationale

Water analysis results for all public water supplies in Newfoundland and Labrador are compared to the Guidelines for Drinking Water Quality in Newfoundland and Labrador. An exceedance is defined as a value that is above the maximum acceptable concentration (MAC) established by the Guidelines. If an exceedance is detected, the laboratory sends a report to the Department of Environment and Climate Change via fax and e-mail. Due to the possible implications of contaminant exceedances, the Department of Environment and Climate Change may have to resample the drinking water system to determine if there is a potential problem in the system.

Protocol

When an exceedance report is received from the chemical analysis laboratory (for a parameter other than lead), one of two reporting scenarios will be triggered.

Scenario 1
Water supplies for which historical water quality data show concentrations above the MAC.

Action: when an exceedance report is received from the chemical analysis laboratory, the exceedance will be reported to the community and various government agencies but a resample will not be taken. Sample results will be stored in the main drinking water quality database.

Scenario 2
Water supplies for which the historical water quality data shows concentrations below the MAC.

Action: when an exceedance report is received from the chemical analysis laboratory, the exceedance will be reported to the community and various government agencies. A resample will be collected and sent to the laboratory for urgent/rush analysis of all parameters. The community will be informed immediately of the results of resampling and the information will be copied to various government agencies for appropriate action. All sample results (e.g. the original sample and the resample) will be stored in the drinking water database.