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GUIDANCE DOCUMENT

Title: **Sampling of Water and Wastewater – Industrial Effluent Applications**

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**Sampling of Water and Wastewater –
Industrial Effluent Applications
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Important

Information contained in this document is meant to serve as a guideline for conducting water and wastewater sampling at industrial sites. Sampling methods and procedures may vary depending on sampling locations, media and industry requirements. Details specific to individual industries will be clearly outlined in the CofA and CofA's that include water and wastewater monitoring clauses should reference this guidance document.

1.0 Subject

Procedures for sampling of water and wastewater from sites with industrial applications.

2.0 Objective

To outline the steps for the preparation, collection and shipping/delivery of water samples for laboratory analysis.

3.0 Definitions

ALT (acute lethality test) means a test conducted as per Environment Canada's Environmental Protection Service reference method EPS/1/RM-13 Section 5 or 6.

CofA means Certificate of Approval issued under Part XI of the *Environmental Protection Act* SNL2002 Chapter E-14.2.

Composite Sample means a quantity of undiluted effluent collected continually at an equal rate or at a rate proportionate to flow over a designated sampling period.

Department means the Department of Environment and Conservation and its successors.

DOC means dissolved organic carbon.

EEM means Environmental Effects Monitoring.

Environment includes

- i) air, land and water,
- ii) plant and animal life, including human life,
- iii) the social, economic, recreational, cultural and aesthetic conditions and factors that influence the life of humans or a community,
- iv) a building, structure, machine or other device or thing made by humans,
- v) a solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from the activities of humans, or
- vi) a part or a combination of those things referred to in subparagraphs (i) to (v) and the interrelationships between 2 or more of them.

Grab Sample means a quantity of undiluted sample collected at any given time.

Leachate means a liquid that has percolated through solid waste and has extracted dissolved or suspended materials.

MSDS means Material Safety Data Sheet.

QA/QC means Quality Assurance/Quality Control.

Recognized Form of Laboratory Accreditation means accreditation obtained from an accreditation body that is a signatory to the International Laboratory Accreditation Cooperation (ILAC) Agreement and based on ISO 17025.

TDS means total dissolved solids.

TPH means total petroleum hydrocarbons, as measured by the Atlantic PIRI method.

Treat means to apply a method, technique or process, including neutralization, stabilization, filtration and settling that is designed to change the physical, chemical or biological concentration, character or composition of a substance.

Treatment means any physical, thermal, chemical or biological process, including sorting, that changes the characteristics of the waste in order to reduce its volume or hazardous nature, facilitates its handling or enhances its recovery.

TSS means total suspended solids.

WHMIS means Workplace Hazardous Material Information System

4.0 Background

Water monitoring is a typical requirement outlined in an industry's CofA. Water monitoring is conducted to ensure that industries are operating within compliance of legislation and to ensure there are no adverse effects on the environment. The validity and confidence in the monitoring is contingent on the sample. The ultimate goal is to collect a sample that meets the requirements in the CofA in terms of location and frequency, and to prevent the deterioration and contamination of the sample before it is analyzed.

5.0 Quality Assurance/Quality Control

Sample analysis must be conducted at a laboratory with a recognized form of accreditation. The laboratory may have specific sampling instructions and it is the responsibility of the sampler to become familiar with the requirements of the laboratory conducting the analysis. For more information on laboratory accreditation, please see the Department of Environment and Conservation's Policy Directive PD: PP2001-01.2. Note that some analyses are performed at industrial laboratories. These laboratories meet the requirements of the accredited laboratory policy. For the purpose of this guidance document these laboratories are considered to have a recognized form of laboratory accreditation.

Strict measures must be taken to avoid contamination and to maintain the integrity of the sample. Samples must be kept cool during storage at approximately 4°C, but samples must not be allowed to freeze. Samples are to be shipped to the laboratory in a timely fashion and the sampler must be aware of specific holding times that may be associated

with the specific analyses expected to be carried out on the sample.

If sampling protocol requires field measurements such as pH, conductivity, specific ions or other parameters to be obtained, then the field instrumentation utilized for such measurements must be stored and calibrated as per the respective instrument operating manuals. Probes, where applicable, must be stored in electrode storage solution and/or protective cases when not in use. Calibration of field equipment, utilizing certified calibration standards, must be performed just prior to and just after field measurements to ensure validity and accuracy of acquired data. If temperature-sensitive parameters are being determined, calibration standards must be equilibrated to sample/ambient temperature prior to the performance of instrument calibration and field measurements.

5.1 Trip Blanks/Field Blanks

Trip blanks are used to detect any contamination resulting from the sampling containers and/or preservatives during transport and storage. Typically trip blanks are prepared by filling each type of sampling bottle with de-ionized water and preserving them in the same manner as the samples that will be collected. These blanks are transported to the field with the regular sampling bottles, but they remain unopened throughout the duration of the trip. They are then submitted with the field samples for analysis.

Field blanks are used to detect any contamination that may result from the handling techniques and/or exposure to the sampling environment. They are prepared using de-ionized water in each type of sampling bottle that will be used for analysis. If the field blanks are prepared in the laboratory, then the bottle is to be opened while in the field and exposed to the environment for approximately the same amount of time it takes to collect a field sample. If the field blanks are prepared in the field, then de-ionized water is poured into the sampling bottles, capped and labeled. Filtration and/or preservation, if required, must be done in the field as well. This simulates sample collection. It must be documented whether the blank was laboratory prepared or field prepared.

Requirements for trip or field blanks would be directed by the laboratory performing the analysis or as a component to a specific monitoring event such as EEM.

5.2 Duplicates

Field duplicates are two or more samples collected as close as possible in location and time. These samples can be useful in documenting the precision of the entire sampling and analytical (laboratory) process.

Laboratory duplicates are conducted by the laboratory performing the analytical testing. Typically a sample is selected at random and is sub-sampled, with the required analysis being run on both sub-samples. This is useful for testing the level of accuracy of the laboratory instrumentation

Requirements for duplicates would be directed specifically to address QA/QC procedures

of the laboratory conducting the analysis.

6.0 Industrial Wastewater Sampling: Typical Parameters

Wastewater discharges must be sampled at each final discharge point for the purpose of determining compliance. Effluent discharge criteria typically include but is not limited to the parameters listed in Table 1. The sampling schedule, locations, parameters and frequency will be outlined in the industry's CofA.

ammonia	cadmium	lead	zinc	TPH
arsenic	chromium	mercury	TSS	flow rate
barium	copper	nickel	TDS	temperature
boron	iron	nitrate	pH	ALT

General water chemistry analysis is typically required four times per calendar year, and includes but is not limited to the parameters listed in Table 2. Again, the sampling schedule, locations, parameters and frequency will be outlined in the industry's CofA. General water chemistry suites are performed on effluent discharges, receiving water bodies and background water bodies. These analyses help determine changes in the effluent and effects on the environment as a result of the industrial activity being undertaken.

General Parameters				
nitrate + nitrite	color	magnesium	reactive silica	TDS (calculated)
nitrate	sodium	alkalinity	orthophosphate	phenolics
nitrite	potassium	sulphate	phosphorus	carbonate(CaCO ₃)
ammonia	calcium	chloride	DOC	hardness(CaCO ₃)
pH	sulphide	turbidity	conductance	bicarbonate(CaCO ₃)
Metal Scan				
aluminum	boron	iron	nickel	tin
antimony	cadmium	lead	selenium	titanium
arsenic	chromium	manganese	silver	uranium
barium	cobalt	molybdenum	strontium	vanadium
beryllium	copper	mercury	thallium	zinc
bismuth				

7.0 Preparation for Sample Collection

Often sampling is required in remote areas. The following is a list of items that may be necessary to take along when collecting samples in the field:

- All required sample bottles, requisition forms, labels and preservatives that are needed for specific laboratory analyses. The laboratory conducting the analysis typically provides these materials and specific directions.
- Instrumentation for any field measures that are to be collected (eg. pH,

