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Field Quality Control

Environmental sampling and analysis requires sound quality control practices to minimize systematic and ubiquitous sources of error. An accredited analytical laboratory will have a Quality System in place to fulfill the requirements in regards to the analytical portion however, it is equally important to use procedures in the field to ensure the quality of the analytical data produced.

Field QC samples can indicate sampling variability and determine the presence and/or sources of contamination from the sampling process. There are several documents available in the province of Ontario which provides detailed information into the sampling requirements for field level quality control samples including:

- **Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater**, Ministry of the Environment, January 1999;
- **Guidance in Sampling and Analytical Methods for Use at Contaminated Sites in Ontario**, Ministry of the Environment and Energy Standards Development Branch, December 1996, Version 1.1;
- **Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the *Environmental Protection Act***, Ministry of the Environment, March 9 2004.

Prior to determining your sampling plan for a specific site, the appropriate document should be reviewed however we have provided a basic description of the types and purpose of field samples required for quality control functions.

Field QC Sampling Plan Basics

Prior to sampling, a plan should be devised where potential sources for error and variability are determined and the appropriate type and number of quality control samples should be specified, depending on the requirements of the guidelines being followed and the specifics of the site.

The sampling plan should also include the types of field observations that are to be made during the sampling process, including information such as soil horizon depths, sediment and/or water colour, texture, odours, meteorological conditions; any observations which may aid in the data interpretation and remediation phase.

Throughout all aspects of the sampling process, care must be taken to prevent cross contamination of samples. Sampling equipment should be cleaned carefully between sample points and the appropriate sampling containers and preservatives utilized. Prior to sampling, it is always recommended that you contact the laboratory performing the analysis to determine the hold times, correct sampling containers and volumes of sample required for the analyses being performed, most laboratories will provide the sampling containers and preservatives free of charge. Sampling should proceed from the least contaminated to the most contaminated areas to minimize the potential for cross contamination.

Types of Required Field QC Samples

There are 3 types of field QC samples outlined in the documents referred to above: replicates, traveling blanks and traveling spiked blanks.

Replicate Samples

These are also referred to as ***duplicate*** samples. Replicate samples are two separate samples which are to be taken at the same time in a manner to minimize differences. This can be accomplished in two ways, by sampling simultaneously or sequentially and repeating the sample acquisition technique for each. Replicate samples measure the variability and reproducibility of the matrix and site contaminant levels in the sampling and laboratory analysis processes.

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Traveling Blank

A traveling blank is a sample of uncontaminated reagent water which is free of the analyte of interest. This sample is prepared by the laboratory and is taken to the sampling site, opened while the sampling is performed, preserved as necessary then closed and returned to the laboratory for analysis. This type of QC sample will identify environmental contamination from the field and/or laboratory such as extraneous volatile fractions present in the atmosphere or contamination from the handling of the sampling containers.

Traveling Spiked Blank

A traveling spiked blank is a sample of uncontaminated matrix, free of the analyte of interest, which is prepared by the laboratory. The sample is spiked with a known concentration of the contaminant(s) of interest and preserved as necessary. The sample must be prepared within 24 hours of the sampling event. The traveling spiked blank is taken to the field location and returned unopened to the laboratory for analysis. This type of QC sample will help to identify the stability and recovery of the contaminants of interest for the entire process of transportation, field sampling and laboratory analysis.

Again, to determine the frequency and required QC samples for your particular site, please refer to the appropriate guidance documents.

Additional Field QC Samples

While the following field QC sample types aren't required by the guidance documents, they can also provide additional information to you to aid in the interpretation of your analytical data.

Pre-cleaned Equipment Blanks

This type of sample is collected in the field from equipment which has been brought to the site pre-cleaned and is collected prior to equipment use. This will monitor the on-site sampling environment and sampling equipment decontamination.

Field Cleaned Equipment Blanks

This type of blank will also provide information in regards to the sampling environment and sampling equipment decontamination. The sample is collected between sample points from the rinsate used to clean the equipment.

Trip Blank

This type of blank differs from the traveling blank as it is not opened to the environment during the sampling process. The sample is prepared by the laboratory with reagent water free of the analyte of interest and the blank is shipped with the sampling containers to the field and returned to the laboratory for analysis without being opened. This type of blank will identify any contamination from the sample containers, preservatives, and transportation and storage conditions.

Background Sample

A background sample will help identify areas of background levels of contamination, this type of sample is appropriate for sites with elevated naturally occurring concentrations. The sample is taken from an area located close to the sampling point which is expected to be free of contamination.

The Service Team at Paracel is dedicated to ensuring our Client Service Program meets your needs and expectations. If there is anything additional we can implement to our Program which will improve your interactions with Paracel, please don't hesitate to bring it to our attention. The Service Team at Paracel is also fully committed to continuous improvement and providing complete solutions to our clients in respect to their analytical requirements. If you have any questions in regards to this document or your sampling program, please don't hesitate to contact Paracel's Service Team at 1-800-749-1947 or by email at paracel@paracellabs.com.