EnviroAqua CONSULTANTS INC.

Water Talk

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COLLECTION AND PRESERVATION OF LIQUID ENVIRONMENTAL SAMPLES FOR LABORATORY ANALYSIS

The proper collection of liquid environmental samples for laboratory analysis is quite important and can greatly affect the accuracy and precision of the results. The integrity and accuracy of the laboratory analysis can be heavily compromised if proper care and storage of samples are not followed. The timing in which certain tests are performed is also dependent on the microbiological and chemical nature of the sample.

With this in mind, we will discuss how some suggested guidelines to follow to obtain quality samples for analytical testing. Details for proper shipping procedures as well as sample storage options will also be covered.

Generally, the shorter the lapse of time between sample collection and analysis, the more reliable the analytical reporting. It is also very important to allow samples to completely flush out of the sample location to prevent any old, non-recirculating water in the system from causing contamination.

CONTAINERS

Clean polyethylene or glass bottles should be used for liquid sample collection. They should also be rinsed several times with the sample before the final filling for analysis.

SAMPLING

Samples should be taken as close as possible to the supply source to minimize the effects of the distribution system (or from other contamination sources). Liquids should be allowed to run sufficiently to flush the entire sample line. The sample container should also be filled slowly, with a gentle stream. This will avoid turbulence, air bubbles, and prevent unwanted liquid reactions with air. A full bottle will also help to preserve the sample by excluding air from the container. It is also recommended that any hot samples be cooled to at least 120°F.

Well water should be taken only after the supply pump has run long enough to purge and deliver water representative of the well supply. Care should be taken to prevent the capture of old, stagnant water that may have been sitting in the piping for any extended period of time.

PRESERVATION

Preservation should be used as needed to retard potential sample changes that continue after sampling, during transit, and prior to delayed analysis. Preservation methods are utilized to slow bacterial changes, chemical reactions, as well as possible absorption or evaporation. Other useful techniques include pH adjustment with acid and alkalinity buffers, as well as adding bacterial inhibitors.

Microbiological testing should be done immediately, or at least within one hour of the sample being taken. Should a sample need to be shipped, it should be kept as cool as possible (< 40°F) without freezing. The sample should preferably be packed in ice before shipment to minimize biodegradation potential between sampling and laboratory analysis.

Microbiological growth will flourish rapidly over time at room temperatures, and even worse over the course of one to two days. Keeping samples in cool conditions as well as using sterilized bottle containers will effectively slow the potential for growth and is always strongly recommended.

POOR SAMPLING

Examples of a few well-known changes with delayed analytical testing include the presence of microorganisms and bacteria. These directly affect the nitrate – nitrite - ammonia content, biological oxygen demand (BOD), chemical oxygen demand (COD), as well as the reduction of sulfate to sulfide. Chlorine residuals are quickly reduced to chlorides, and chemicals such as sulfite, sulfide, and ferrous iron can actually be lost completely through oxidation over time.

The majority of oxygen scavengers inhibit corrosion by reducing dissolved oxygen content. Unfortunately they also react quickly with atmospheric oxygen. The presence of oxygen is a catalyst for the oxidation of sulfite to sulfate. Therefore, excessive exposure to air should be avoided. To help ensure accuracy and reduce potential errors, oxygen scavenger samples should not be collected for later analysis. These tests should be done immediately on site when possible.

CONCLUSION

One single method of collection and preservation cannot assure zero changes in sample chemistry and biological presence. However taking the necessary preventative steps will help ensure high quality samples are utilized for proper laboratory analysis.