New England States'

Common

Sample Collection & Preservation Manual

for

Drinking Water

Produced by the Water Supply Programs
of the Six New England States
and the EPA New England Quality Assurance Unit
of the U.S. Environmental Protection Agency

Revision 3
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Table 1. **Regulated Analytes vs. Sampling SOP** 10/1/00	
Sampling SOP	**Analytes**
504.1	1,2-dibromoethane (EDB), 1,2-dibromo-3-chloropropane (DBCP) & 1,2,3-trichloropropane
505	alachlor, atrazine, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorocyclopentadiene, lindane, methoxychlor, PCBs (ID only), simazine, & toxaphene
506	bis(2-ethylhexyl)adipate, bis(2-ethylhexyl)phthalate
507	alachlor, atrazine, simazine
508	chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, PCBs (ID only), toxaphene
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515.3	Dalapon and method 515.2 analytes.
524.2	20 volatile organics, vinyl chloride & 4 trihalomethanes
525.2	benzo(a)pyrene and method 505 analytes
531.1	aldicarb, aldicarb sulfone, aldicarb sulfoxide, carbofuran & oxamyl
547	glyphosate
548.1	endothall
549.2	diquat
550, 550.1	benzo(a)pyrene
551.1	alachlor, atrazine, carbon tetrachloride, 1,2-dibromo-3-chloropropane, 1,2-dibromoethane, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, tetrachloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethylene, 1,2,3-trichloropropane, & total trihalomethanes
552.1, 552.2	dalapon & haloacetic acids
555	2,4-D, 2,4,5-TP (silvex), dinoseb, pentachlorophenol
Inorganics	fluoride, nitrate, nitrite
Metals	antimony, arsenic, barium, beryllium, cadmium, chromium, copper, mercury, lead, nickel, selenium & thallium
Microbiology	All approved drinking water microbiological methods
Radionuclides (except radon)	barium-133, cesium-134 & 137, cobalt-60, gross alpha, gross beta, iodine-131, radium-226 & 228, srontium-89 & 90, tritium, natural uranium & zinc-65

Chapter 1

Introduction
to
Common Sampling Manual

Introduction to Common Sampling Manual

October, 2000

1.0 Introduction

This manual was created by the EPA New England (Region 1) office of the U.S. Environmental Protection Agency, in conjunction with the New England State Drinking Water Programs, to address the need for consistency in public drinking water sampling protocols across these states.

1.1 Purpose of this Manual

This document was created to assist sampling personnel in collecting public drinking water samples using standard procedures that comply with federal guidelines.

1.2 Scope of Manual

This document summarizes national guidelines and procedures for sampling ground water and surface water supplies for monitoring drinking water quality. Federal regulations set the minimum standards and regulations for the collection of samples and the monitoring of drinking water.

State regulations must be at least as stringent as federal regulations and may go beyond the minimum federal criteria. Therefore, to make sure that samples are taken in compliance with specific state requirements in the state where the samples will be taken, please refer to Chapter 3 of this document or contact your state drinking water program.

1.3 Arrangement of Manual

This manual is comprised of three parts. In this, the first chapter, an overview of the many aspects of sample collection is presented, along with some general guidance to make each sampling event safe for the sampler, representative of the sampling site, and in compliance with federal and state regulations.

The second chapter includes detailed sample collection and preservation instructions for each of the biological and chemical substances for which public water supplies must test. (A table listing the drinking water regulated analytes for each sampling SOP is provided following the Table of Contents.) Each standard operating procedure (SOP) is a stand-alone document that can be removed from the manual and taken to the field to provide step-by-step instructions in taking a compliant sample. They are based upon sampling guidance given in the appropriate EPA methods. EPA-approved methods for drinking water analysis are listed in Chapter 40 of the Code of Federal Regulations (CFR), Part 141.

The third chapter provides state-specific information relative to the templates and sampling procedures because each state may have slightly different requirements, especially in terms of laboratory paperwork (i.e., chain of custody forms), equipment (i.e., bottle type and size), etc. It

also includes a list of the laboratory certification officers for each state and their web sites for lists of their certified labs, if any.

2.0 Water System Responsibilities

In general, the water system is responsible for the following tasks in terms of monitoring:

- performing field tests (if applicable),
- properly collecting all necessary samples in compliance with state and federal regulations,
- completing sample paperwork,
- submitting samples to certified or accredited laboratories within allowed hold times,
- collecting samples for confirmation (if necessary) and
- providing payment for analyses.

Although the water system may designate another party (such as the certified operator) to submit samples, it is ultimately the responsibility of the system owner to make sure the samples are taken properly and the results are submitted to the state program.

If samples are incorrectly taken or preserved, analyzed by uncertified (or unaccredited) laboratories, submitted beyond appropriate holding times, submitted with uncompleted or inappropriate paperwork, or taken from inappropriate sampling sites, then the samples will be deemed unacceptable and rejected. Failure to submit valid test results to the state program within the required compliance period (because samples have been rejected by the laboratory and not analyzed) may result in a monitoring violation.

3.0 General Sampling Requirements

3.1 Sampler Requirements

3.1.1 In some states, only water supply program staff are authorized to collect compliance samples. Other states require that the sampler be certified. Check with your state program for its specific requirements or see Chapter 3 of this manual.

3.1.2 Before collecting any samples, all samplers should receive thorough training in proper sampling protocol. This training should include segments on proper procedures for storage and filling of sample containers, handling of preservatives, safety protocols, cleaning of sampling and field equipment, disposal of excess preservatives, and packaging and shipping requirements. Training may be offered by state drinking water programs or other sources. Contact the state laboratories at the numbers given in Chapter 3 for further information.

3.1.3 Measuring devices, such as pH or conductivity meters, used for field monitoring must be maintained and calibrated daily following the EPA-approved analytical methods and the manufacturers' instructions. The calibration standards used must be within their expiration dates and free of suspended matter. Probes must be washed with deionized water after each use and stored according to instructions. Other equipment items used to collect samples also must be rinsed with deionized water and kept clean between sampling events to prevent contamination of the samples.

3.1.4 Appropriate sample containers must be used. Generally, your laboratory will provide sample containers that have been specially prepared, depending on the end use (e.g., bacteria bottles are sterilized, metals containers are acid washed, glass vials used for VOCs are washed and oven-dried, and bottles used for SOCs are washed and triple-rinsed with organic solvents). These containers should not be opened until the actual sampling event. Sampling containers that have been compromised in any way, e.g., by being touched on the threads or the interior surfaces, must not be used.

3.2 Laboratory Requirements

3.2.1 Only laboratories certified (accredited) by their resident state's laboratory certification (accreditation) program or state/federal laboratories certified (accredited) by EPA are allowed to perform compliance testing for microbiology, inorganic, organic, and radiochemistry parameters. Prospective clients should make sure that the laboratory which will analyze their samples is certified (accredited) for the specific parameters involved. Turbidity, chlorine residual, and pH monitoring are some of the exceptions to the laboratory certification (accreditation) requirements for performing analyses. These tests can be performed by any person acceptable to the state.

3.2.2 State principal laboratories or laboratories certified (accredited) by the state should supply containers, preservatives, and any trip blanks for sampling. The containers, blanks, and preservatives used must be free of contaminants at the detection levels of each parameter of interest.

3.3 Number and Frequency of Drinking Water Samples

The number of drinking water samples to be collected is determined by each state water supply program. In general, the state program will notify the water system in advance about the specific analyses required and the sampling time(s) and location(s). As mentioned previously, some states will have their staff take the required samples.

The federal drinking water regulations can be found in Section 40 of *The Code of Federal Regulations (CFR)*, Parts 141 and 143. Local and state regulations can be obtained from the appropriate local and state agencies.

3.4 Sampling Locations

The location for sample collection depends on:

- the water source,
- the analyses to be performed,
- the purpose for the testing and
- regulatory requirements.

Samples may be collected from the source prior to treatment, at the point of entry (before or after treatment), at the point of use (at the tap), or within the distribution system. For example, volatile organic compound (VOC) samples are usually taken at the entry point of the distribution system. (Total trihalomethane samples are taken at points within the system.) Lead and copper

samples are taken at the point of use. The appropriate sampling point is determined by each state agency based on the criteria listed above.

Many states assign sampling sites for each type of test. In the absence of state-approved sampling sites, samples should be taken at an appropriate entry or distribution point to the system.

3.5 Paperwork Submitted with Samples

Appropriate paperwork must accompany all samples to the laboratory. Each state requires specific information to identify the sample, the sampling time and the sampling location. Forms for providing this information can be obtained from your state program. As a reminder, the submittal of any paperwork which is incomplete or inaccurate will result in the rejection of the sample by either the laboratory or the state program.

3.6 Analytical Methods

When samples are submitted to certified laboratories for analysis, the water system must notify the lab that the samples are for drinking water compliance purposes to ensure that appropriate methods are used and that the data are transmitted to the state drinking water program. (Only EPA-approved methods of analysis can be used.)

3.7 Quality Control Measures

3.7.1 *Field duplicates.* It is important for samplers to demonstrate proper sampling techniques by taking field duplicate samples on a regular basis. Field duplicates are two samples taken immediately one after the other from the same source in separate sample containers. Both will be analyzed by the lab, which will calculate the Relative Percent Difference between the results. This is a measure of the overall precision of analysis. Field duplicates should be collected for least 10% of all samples and more often when only small batches of samples are taken per sampling event.

3.7.2 *Extra volumes for lab QC measures.* Laboratories routinely perform quality control procedures, such as the analysis of spiked samples and the analysis of laboratory duplicates, which require extra volumes of samples. For this reason samplers are encouraged to take extra sample volumes for at least 10% of their sampling activities so that the laboratories can perform these vital QC procedures. (These extra volumes should be provided in addition to the field duplicates mentioned in the previous paragraph.)

3.8 Sampling and Safety Tips to Help Meet Requirements

3.8.1 All samples should be taken at faucets that are not threaded. Also, faucet aerators and screens should be removed before taking samples. Anything attached to the end of the faucet, e.g., hoses, should be removed before taking samples.

3.8.2 Ice is not a packing material. Glass sample bottles should be wrapped in bubble wrap or other protective material to prevent breakage during shipping.

3.8.3 Chemical fumes from any source can potentially contaminate samples. Whenever sampling, the sampler should be conscious of his/her surroundings. For example, samples should not be taken in the vicinity of motor exhaust from any pump or vehicle because it will contaminate them. Also, if sampling for volatile organic compounds (VOCs), it is not advisable to refuel vehicles either on the way to the site or while the samples are being transported to the lab.

3.8.4 Sample containers will be contaminated if the inside of the cap is touched or if the septum of a radon or VOC vial is reversed. If this should occur, the container must not be used. All containers must be kept closed until ready for use.

3.8.5 It is highly recommended that safety eye protection and gloves be worn while collecting samples. Such protective devices are readily available. **Many of the chemicals used to preserve samples are highly acidic or caustic. They can cause severe burns to eyes, skin and clothing if they are splashed or spilled.** Sometimes these chemicals are added to the samples in the field. However, they may already be in the empty containers when they are obtained from the container provider. The gloves of choice should be phthalate-free made of nitrile. Nitrile gloves provide the best overall protection from most chemicals while still allowing dexterity. Many other types of gloves contain phthalates, which can contaminate samples for synthetic organic compounds (SOCs). Only phthalate-free gloves should be worn when collecting samples for (SOCs). If such gloves are not available, the sampler must remove all gloves and wash his/her hands before collecting the samples (without gloves).

3.8.6 The sampling point(s) of each water system should be evaluated to determine the actual flushing time needed to remove the stagnant water before samples are taken. This is determined by measuring the temperature with a thermometer. Samples should not be taken until the temperature has stabilized. This is the minimum flushing time; it should be recorded for future use. Placing this information on a tag attached to the sampling faucet is suggested.

3.8.7 A ballpoint pen or waterproof marker should be used when writing on sample tags to reduce bleeding of ink. If icing is required, samples should be placed on ice immediately after collection. Placing filled sample containers in zip lock plastic bags prior to icing helps with sample organization, avoids wet sample tags and results in less confusion when the samples reach the laboratory.

3.8.8 Well pits, ditches, and below-ground pumping stations, pipe raceways and vault systems are extremely dangerous sources from which to collect samples. Before entering confined spaces of any type, samplers must comply with the requirements of 29 CFR 1910.146, Permit Required Confined Space. Specially trained samplers and backup teams are required.

3.8.9 In general, preserved water samples are known environmental samples and are typically exempt from DOT and IATA (aircraft) shipping requirements. However, these regulations must be observed when shipping the preservatives or pre-preserved bottles via ground or air.

3.8.10 Sample containers which have preservatives in them should be labeled accordingly. The specific chemicals should be identified. This applies to empty containers to which preservatives are added before use as well as containers filled with sample.