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FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
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Sampling Plan Guidance

For Distribution Systems at Public Water Systems

This guidance was developed to give public water systems protocols needed to accomplish a reliable, successful plan for sampling in the distribution system. An all-inclusive sampling plan is essential for any water system to ensure safe, reliable drinking water for its customers. The objectives when collecting water samples for analysis are to collect at specific locations and to use proper collection methods. Sampling plans should be developed and utilized to ensure that samples are collected at locations, times, and using methods that meet Safe Drinking Water Act requirements.

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General Guidance

Introduction

Water samples to be tested for various analytes may be collected from multiple locations: at the raw water source (before treatment), at the point of entry to the distribution system (after treatment), at the point of use (the tap of a residence or business), or at other locations in the distribution system. For example, samples to be tested for volatile organic compounds (VOC) and other chemical analytes are usually taken at the entry point to the distribution system (aka EPTDS or plant tap), whereas samples to be tested for total trihalomethanes (TTHM) and other disinfection by-products are taken at points in the distribution system as determined by the Stage 2 Disinfectants and Disinfectant Byproducts Rule. Lead and copper samples are taken at the point of use, i.e., the tap or drinking fountain in a building.

The two types of samples are those for regulatory compliance (also called routine samples), and those evaluated for operational parameters (called special samples). The location for sample collection depends on the:

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

This guidance focuses on the distribution system sampling points required for compliance.

Distribution System

Water quality in the distribution system degenerates the longer the water spends in pipes, especially those more distant from the plant tap. As a distribution system changes over time, it is important to periodically re-evaluate whether water quality sampling is still representative of the entire distribution system. Sampling points and the distribution system map should be reviewed and updated annually. Re-evaluate the sampling plan if there are changes due to:

- Increase in demand
- Decrease in demand
- Significant increase or decrease in the number of meters (for example, new apartment buildings or subdivisions)
- Change in water flow or direction
- Addition or removal of a water source
- Change in water chemistry or chemicals being used
- Addition or removal of a tank or pump station
- Revision to Safe Drinking Water Act (SDWA) rules

Sampling Point Data Sharing

Distribution system sampling points are chosen by water systems and reported to the Kentucky Division of Water (DOW). The sampling point location information and all water analysis results data from each sampling point are then stored in a database called the Safe Drinking Water Information System (SDWIS). Data in SDWIS are shared with the U.S. Environmental Protection Agency (EPA) as needed to demonstrate

that water systems are complying with SDWA regulations. Sampling point locations are saved in SDWIS using a 3-digit code for each sampling point; this code can be a combination of letters and numbers.

It is important for water systems to inform DOW when adding new sampling points or inactivating existing (old) sampling points, because the location codes are used to track water sample results, including disinfection byproducts, total coliform, lead, copper, and other chemicals. If a water system starts using a sampling point that isn't in SDWIS, sample data collected at that point may not be updated in SDWIS correctly and may result in a violation.

Use this DOW Sampling Point Location Template[1] to notify DOW of any changes to water system sampling points.

Other changes to the water system, such as a change in the number of meters, the population size, or operators working at a water system, should also be shared with DOW. Visit the Water System Updates tab on the DOW Compliance webpage[2] for forms to report water system changes.

Drinking Water Watch

Water sample data in SDWIS can be viewed by water systems and the public using Drinking Water Watch[3]. Data are updated to Drinking Water Watch weekly from SDWIS. In addition to active sampling points and their locations, sampling schedules, sample results data, and other information about the facility are also available. Appendix A demonstrates how to use Drinking Water Watch to find a list of water system sampling points currently stored in SDWIS.

General Tips

These tips about sampling points in the distribution system will be explored more thoroughly throughout this guide:

- Review old maps for historical sampling points and their names.
- Be sure all sampling points sufficiently allow analysis of the *entire* service area/distribution system.
- Remove homeowner names from sampling points (privacy rules; ownership changes).
- Consider whether developing a new sampling point naming convention is desirable or necessary.
- Remove sampling points that are no longer used from the distribution sampling plan, and notify DOW of those locations. DOW will inactivate them in SDWIS, which will in turn update Drinking Water Watch.
- Ensure that sampling points that were removed have been replaced by new locations as needed.

[1] https://eec.ky.gov/Environmental-Protection/Water/Drinking/DWProfessionals/ComplianceDocuments/Sampling%20Point%20Location%20with%20Instructions%201.1.pdf

[2] https://eec.ky.gov/Environmental-Protection/Water/Drinking/DWProfessionals/Pages/Compliance.aspx

[3] https://dep.gateway.ky.gov/DWW/

- Have extra sampling points available for each analyte to be tested so that, if a given point becomes inaccessible at sampling time, an available backup can be used.
    - Be sure new and backup sampling points are approved by DOW before use.
- Use different 3-digit Sampling Point Codes (aka, Location Codes) for each sampling point. Any new sampling points must have a new 3-digit code that has never been used in the past.
- Some sampling point codes can be an abbreviation of its function. See the Acronyms and Abbreviations section of this document for a list of common abbreviations.
- Use the DOW Sampling Point Location Template[4] to notify DOW of any changes to water system sampling points; these points will then be updated in SDWIS.
- Do not use a sampling point until DOW confirms that the point has been activated in SDWIS.

Current Sampling Locations

Water systems already have distribution system sampling plans: a list and map of all the sampling points throughout the distribution system, and what each sampling point is used for (e.g., disinfection byproducts, lead and copper, etc.). The rest of this guidance is intended to help water systems improve distribution system sampling plans. Some common issues to look for are:

- A distribution system sampling plan should align with the plan on file at the laboratory
- The plan should be updated at least annually, and reflect the current state of the distribution system (e.g., includes service lines added or inactivated)
- The plan should be updated when new information arises, such as SDWA rule revisions or information about asbestos or lead pipes.

Many water systems are converting hard-copy (paper) distribution sampling plans into digital (electronic) records using geographic information systems (GIS). The most commonly used software systems for this purpose are ArcGIS and ArcGIS Online. Using a GIS is highly encouraged because GIS programs allow for easy updates, more meaningful analyses of the distribution system, and many other benefits.

Complying with Safe Drinking Water Act rules

Revised Total Coliform Rule (RTCR)

General Introduction

- Revised Total Coliform Rule: A Quick Reference Guide (PDF)(3 pp, 450 K, About PDF) EPA 815-B-13-001, September 2013[5]
- Total Coliform Rule: A Quick Reference Guide (PDF)(2 pp, 114 K, About PDF) EPA 816-F-01-035, September 2001

The RTCR establishes a maximum contaminant level (MCL) for *E. coli* and uses *E. coli* and total coliform bacteria sample results to initiate a "find and fix" approach to address potential fecal contamination that

[4] https://eec.ky.gov/Environmental-Protection/Water/Drinking/DWProfessionals/ComplianceDocuments/Sampling%20Point%20Location%20with%20Instructions%201.1.pdf

[5] Web addresses for all EPA reference guides can also be found in the References section.

could enter the distribution system. It requires public water systems (PWS) to perform assessments for sanitary defects and take subsequent actions to correct them.

- The RTCR includes distribution system monitoring and requires identification of monitoring locations and a sampling schedule for both routine and repeat samples (40 CFR 141.853). The RTCR allows significant flexibility in choosing monitoring locations.
- For routine samples, the RTCR requires that PWS use monitoring locations that are representative of water quality in the distribution system. These points may include residences, businesses, government buildings, dedicated sampling taps, and other designated compliance sampling locations.
- Water systems can revise their sample site plan with routine sampling locations as they deem necessary. These plans are subject to DOW review and revision (40 CFR 141.853(a)(1)). In Kentucky, PWS work with DOW to ensure that routine sampling locations are active in SDWIS prior to submission of sample results.
- The RTCR requires repeat sampling when total coliform is present; the RTCR provides flexibility for monitoring locations at the original tap, within five service connections upstream and downstream of the original tap, or at locations that the PWS believes better represent pathways of distribution system contamination. A PWS can immediately use alternate locations more than five connections from the original tap for repeat sampling if it submits updated sample site plans to the DOW. The DOW may modify the alternate locations as needed (40 CFR 141.853(a)(5)(i)).

How to Determine Sampling Locations

The purpose of the RTCR is to protect drinking water in the distribution system by monitoring for microbial contamination. The RTCR is the only microbial drinking water regulation that applies to all PWS, which must collect water samples for bacteriological sampling according to their written, DOW-approved, sample site plan. The plan identifies the schedule for sampling and the location of routine sampling sites that are representative of the entire distribution system. It identifies the minimum number of samples to be collected monthly, based on the RTCR (Table 1). All surface water systems must have a sample site plan for total coliform sample collection. Ground water systems with prior bacteriological results that triggered source water monitoring must also include sampling points on a sample site plan. The sample site plan should be reviewed annually.

When identifying sample sites for the plan, the entire distribution system must be considered. Representative sites should be selected to cover the entire service area. It is suggested to divide the service area into sections based on population, service connections, pressure zones, water age, water sources, tanks, and main sizes. Include sample locations from residential areas. Take into consideration the requirement to select repeat sample locations within 5 service connections upstream and downstream of the original location. Sample hydrants installed at representative locations have easy accessibility but can be weather dependent and may need to be pumped out in the winter months to avoid a frozen tap.

Another consideration when collecting samples for the RTCR is scheduling. Sample collection should represent the entire distribution system both spatially and temporally. This means that the sample site plan should include more sites than the minimum number of samples needed each month, and PWS should vary which sites are sampled each month. This way, samples are collected from a larger area of the distribution system and sample collection can better represent the entire area served.

The offices or clubhouses of apartment complexes are usually residential sites with easier access. Select locations that are accessible and open on a regular basis, such as businesses, police and fire stations, quick marts, or hospitals. Make sure to obtain permission from the location to come in and sample on a regular basis.

All sample sites on the plan must be submitted to DOW before compliance (routine) samples are taken. The use of non-submitted sample sites for routine samples could result in a violation and a required public notification. Special samples (marked as SP on the DOW report form) collected for boil water advisories, investigative, or other purposes can be collected from any location within the distribution system and do not have to be collected from a submitted sample site.

The distribution system sampling sites will need reevaluation and revision as new construction, new businesses, and population changes occur in the distribution system.

Table 1. Number of samples required for all systems in good standing under the RTCR.

Population served:	Minimum # of samples required per month*
1 to 1,000 (surface water)	1
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 12,900	10
12,901 to 17,200	15
17,201 to 21,500	20
21,501 to 25,000	25
25,001 to 33,000	30
33,001 to 41,000	40
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150
320,001 to 450,000	180
450,001 to 600,000	210
600,001 to 780,000	240

Table 1. Number of samples required for all systems in good standing under the RTCR.

Population served:	Minimum # of samples required per month*
780,001 to 970,000	270
970,001 to 1,230,000	300
1,230,001 to 1,520,000	330
1,520,001 to 1,850,000	360
1,850,001 to 2,270,000	390
2,270,001 to 3,020,000	420

*Non-community systems serving <1,000 only need to sample annually. Community systems using groundwater and serving < 1,000 only need to sample quarterly. This assumes both systems have been in compliance with RTCR and qualify for reduced monitoring.

Naming Convention

Sampling points used for RTCR can be coded with the standard, 3-digit sampling point naming convention used by the water system (e.g., 001, 002, 003, etc.). Chain of custody documentation for repeat sampling points must list the original 3-digit sampling point code (i.e., the 3-digit code of the sampling point that had a TC-positive result), as well as these sampling point codes:

- RPU: Upstream from the TC-positive routine sampling point
- RPD: Downstream from the TC-positive routine sampling point

Tips for staying in compliance

- Only collect samples at approved sampling sites. Keep a list of approved sites available when samples are collected. If a current list is not available, go to Drinking Water Watch[6] or contact the DOW Drinking Water Branch RTCR rule manager.
- Label the samples correctly. Samples are sometimes mislabeled as specials (SP) instead of routine (RT).
- Verify that pre-printed chain of custody documents contain correct information before submitting each set of sample results. Also confirm that blank spaces on chain of custody document are completed appropriately.
- Level I and II Assessments
  - Know the assessment triggers. Use the DOW Assessment Triggers Quick Reference Guide[7] for guidance.
  - Notify the DOW promptly when a Level II Assessment is triggered.
  - Be sure to complete and submit assessments to DOW.

[6] https://dep.gateway.ky.gov/DWW/

[7] https://eec.ky.gov/Environmental-Protection/Water/Drinking/DWProfessionals/ComplianceDocuments/RTCR%20Assessment%20Triggers%20Quick%20Reference1.0.pdf

- Laboratory submissions
  - Avoid errors in reporting analysis codes, sample results missing, etc.
  - Keep sampling agreements between laboratories and water systems updated
  - Follow good laboratory and system communications practices (see Appendix B)
  - Verify that the laboratory processed and/or submitted all required compliance samples to DOW

Distribution Disinfection Rules

General Introduction

Drinking water systems are required to maintain a minimum level of disinfectant in water leaving the plant tap – the "disinfectant residual". This ensures that no harmful biological growth (i.e., microbes such as bacteria, viruses, or protozoa) occurs in the water between leaving the treatment plant and arriving at the user, throughout the distribution system.

Operational use of chlorine, chloramine, and chlorine dioxide (chlorite):

Daily monitoring of residual disinfectant in the distribution system is a state and federal requirement. The intent of the rules is to ensure that PWS maintain residual disinfectant throughout their distribution systems, to reduce the chance of microbial contamination after treatment. The SDWA requires monitoring disinfectant residuals in the Surface Water Treatment Rules (SWTR), e.g., 40 CFR 141.72(b) and 40 CFR 141.74(c). The corresponding Kentucky administrative regulation is:

401 KAR 8:150: Disinfection, filtration, and recycling.

Section 1. Disinfection. A public and semipublic water system shall provide disinfection, except as provided in this section. A semipublic water system shall comply with the requirements of this section for public water systems or meet the requirements of Section 2(2) of this administrative regulation.

(1) A public water system using groundwater or surface water as a source.

(a) A public water system that uses chlorine shall:

1. Use continuous automatic disinfection by chlorination;
2. Provide a minimum free chlorine residual of two-tenths (0.2) milligrams per liter, or ppm, throughout the distribution system measured as described in subsection (2) of this section;
3. Check free chlorine residuals daily at representative points throughout the system; and
4. Report the free chlorine residuals monthly pursuant to 401 KAR 8:020, Section 3(7)(a)

(b)

1. Disinfecting agents other than chlorine may be used pursuant to 40 C.F.R. 141.172(c).
2. If chloramination is used, a minimum combined residual of five-tenths (0.5) milligrams per liter, or ppm, shall be provided throughout the distribution system.

Free and Total Chlorine

Free chlorine monitoring is required for all PWS using chlorination (chlorine) as a secondary disinfectant in the distribution system.

Total chlorine monitoring is required for all PWS using chloramination (chloramine) as a secondary disinfectant in distribution system.

Separate columns for each are listed in the monthly operating report (MOR) form.

Tips for staying in compliance

At a minimum, one daily measurement of the disinfectant residual must be collected in the distribution system and reported on the MOR.

- Chlorine systems: sample and report the free chlorine residual on the MOR.

  Free chlorine residual for chlorine systems must be at a minimum of 0.2 mg/L.

- Chloramine systems: sample and report the total chlorine residual on the MOR. It is acceptable to report the free chlorine residual on the MOR, as long as the total chlorine residual is also reported.

  Total chlorine residual for chloramine systems must be at a minimum of 0.5 mg/L.

Designate multiple sample spots in each quadrant of the system to help determine if certain areas are struggling to maintain a sufficient residual disinfectant. Only sampling at the same four designated sample sites for the entire month – one in each quadrant of the distribution system (north, south, east, west) - is technically compliant, but is not representative of other areas of the water system.

- Make sure to run a verification check with secondary standards
- Make certain that sampling locations are being properly flushed (neither too much nor too little)
- Do not record the chlorine meter reading on the MOR when the meter is flashing. Flashing often indicates that the chlorine residual has exceeded the instrument's range and the sample must be diluted with chlorine free water and re-analyzed or analyzed in the Hi mode on the meter.

How to Determine Sampling Locations

Any sample site in the distribution system can be used for daily residual monitoring. PWS should perform representative monitoring throughout the distribution system by identifying multiple sample sites in different quadrants (N,S,E,W). Sampling points used for RTCR compliance can also be used for residual disinfectant sampling.

Naming Convention

Because the DOW does not require daily disinfectant residual monitoring to be collected at state-approved sites, sample site identifiers are not required. Instead, the daily logs kept by the PWS should record sites for internal operational purposes; maintaining these logs can help determine what corrective actions are necessary when needed.

Residual disinfectant concentrations that are collected at the same time as bacteriological samples (e.g., total coliform samples) can be reported using the same sample point number as the bacteriological sample.

Disinfection Byproducts Rules (DBPR)

General Introduction

- Stage 1 Disinfection and Disinfection Byproducts Rule: Laboratory Quick Reference Guide (PDF) (2 pp, 543 K, About PDF) EPA 816-F-02-021

- Stage 2 DBPR: A Quick Reference Guide For Schedule 1 Systems (PDF)(2 pp, 123 K, About PDF) EPA816-F-06-001
- Stage 2 DBPR: A Quick Reference Guide For Schedule 2 Systems (PDF)(2 pp, 123 K, About PDF) EPA 816-F-06-002
- Stage 2 DBPR: A Quick Reference Guide For Schedule 3 Systems (PDF)(2 pp, 123 K, About PDF) EPA 816-F-06-003
- Stage 2 DBPR: A Quick Reference Guide For Schedule 4 Systems(PDF)(2 pp, 123 K, About PDF) EPA 816-F-06-004
- Comprehensive Disinfectants and Disinfection Byproducts Rules (Stage 1 and Stage 2) Quick Reference Guide (PDF)(2 pp, 622 K, About PDF) EPA 816-F-10-080

The DBPR require PWS to collect samples for total trihalomethanes (TTHM) and haloacetic acids (HAA5) from their distribution systems (Table 2). Water systems develop and implement a monitoring plan, which includes monitoring locations representing high TTHM or high HAA5 levels in the distribution system, and a monitoring schedule based on the peak historical month for TTHM or HAA5 levels. Disinfection byproduct (DBP) samples can be collected from an outside spigot or tap. After consultation with DOW, a utility can make revisions to monitoring locations if the locations reflect areas with expected high TTHM or HAA5 levels (40 CFR 141.622(c)).

Table 2. Number of DBP samples required from the distribution system. Samples must be collected during month of highest DBP concentrations.

Source water type	Population served	Monitoring Frequency	Samples per monitoring period
Surface Water, Ground Water under the direct influence of Surface Water (GUDI)	<500	per year	2*
	500-3,300	per quarter	2*
	3,301-9,999	per quarter	2
	10,000-49,999	per quarter	4
	50,000-249,999	per quarter	8
	250,000-999,999	per quarter	12
	1,000,000-4,999,999	per quarter	16
	≥5,000,000	per quarter	20
Ground Water	<500	per year	2*
	500-9,999	per year	2
	10,000-99,999	per quarter	4
	100,000-499,999	per quarter	6
	≥500,000	per quarter	8

*Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for surface water or GUDI systems serving 500-3,300. Ground water systems serving 500-9,999 on annual monitoring must take dual sample sets at each monitoring location. All other systems on annual monitoring, and surface water or GUDI systems serving 500-3,300, are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. For systems serving fewer than 500 people, only one location with a dual sample set per monitoring period is needed if the highest TTHM and HAA5 concentrations occur at the same location and in the same month.

Tips for staying in compliance

- The 2006 Stage 2 DBPR requires calculating a *locational* running annual average (LRAA) as follows:
  - LRAA is calculated quarterly and is based on the 12 months that ended with the compliance period. This calculation is the average of the DBP sample results from a single monitoring site.
  - MCL for TTHM = LRAA is 0.080 mg/L or higher.
  - MCL for HAA5 = LRAA is 0.060 mg/L or higher.
  - Note: The MCL values are the same as listed in the 2001 Stage 1 DBPR; only the calculation method changed from a *total* running annual average (RAA) across all locations collectively, to the LRAA at each location individually.
- Be sure to monitor the required number of locations each monitoring period (Table 2).
- Identify when TTHM or HAA5 levels exceed the operational evaluation level (OEL) and, when this happens, look at source water, operational practices, and treatment to find ways to reduce TTHM and HAA5 concentrations in the distribution system. Use the DOW OEL Report[8] for more information about how to determine whether an OEL exceedance has occurred.
- Take water age into account when choosing sampling locations. Water that sits stagnant in a pipe for a longer period of time may have higher levels of DBP. Distribution system models should show both large and small diameter pipes because water age can be higher in larger diameter pipes due to the slower water velocity, which can impact DBP. Similarly, in rural areas the combination of small diameter water mains and longer distances between service lines can contribute to water age.

The Stage 2 DBPR is an extension of the Stage 1 DBPR. Systems must continue to comply with the requirements of the Stage 1 DBPR in addition to meeting the requirements of the Stage 2 DBPR. This includes compliance with the MCLs for bromate (for systems using ozone) and chlorite (for systems using chlorine dioxide), the maximum residual disinfectant levels (MRDL) for chlorine or chloramine (depending on the residual disinfectant used; Table 3), as well as total organic carbon (TOC) removal requirements.

Table 3. Maximum contaminant levels (MCL) and maximum residual disinfectant levels (MRDL) for disinfectant byproducts.

MCL				MRDL		
TTHM	HAA5	Bromate	Chlorite	Chlorine	Chloramine	Chlorine dioxide
0.080 mg/L	0.060 mg/L	0.010 mg/L	1.0 mg/L	4.0 mg/L	4.0 mg/L	0.8 mg/L

As the distribution system changes, the DBP sampling points should be re-evaluated to ensure the distribution system is represented correctly and in its entirety. New subdivisions or building closures can change the general "shape" of the distribution system, and should be cause for re-evaluating DBP

[8] https://eec.ky.gov/Environmental-Protection/Water/Drinking/DWProfessionals/ComplianceDocuments/OEL%20Report%201.2.pdf

sampling. Visit DOW Drinking Water Compliance website[9], *'Stage 1 and Stage 2 Disinfectants and Disinfection ByProducts Rule'* tab, for more information.

Total Organic Carbon (TOC)

- Routine Monitoring: Water systems using surface water and ground water under the direct influence of surface water (GUDI) must take two monthly TOC samples and one monthly alkalinity sample at the same time. The paired TOC samples include one measurement from the source water prior to any treatment, and one measurement no later than the point of combined filter effluent turbidity monitoring. The alkalinity must be taken at the same location as the source water TOC sample.
- Reduced Monitoring: Water systems that qualify for reduced monitoring may collect the paired TOC samples and one alkalinity sample at the same time per quarter, rather than monthly. Contact the DBP rule manager at DOW to determine whether a water system is eligible for reduced monitoring (find contact information on the DOW Drinking Water Compliance website[9]).

Chlorite

Water systems using chlorine dioxide must collect one 3-sample set for chlorite per month at these points:

1. Entry point to the distribution system;
2. At a location representative of maximum residence time; and
3. At a location representative of average residence time.
   Reduced monitoring for chlorite may be available for some systems; contact the DBP rule manager at DOW for more information.

Bromate

- Water systems that disinfect with ozone must collect one bromate sample per treatment plant at the entry point to the distribution system while the ozonation system is under normal operating conditions.
- Reduced monitoring: Water systems that qualify and have state approval may collect one bromate sample per quarter per treatment plant.

How to Determine Sampling Locations

The Initial Distribution System Evaluation (IDSE) was a required one-time study of a water system's distribution system. PWS conducted the study to determine locations with the highest concentrations of TTHM and HAA5 and followed a specified schedule to conduct the IDSE between 2006 –2010. This was an important part of the Stage 2 DBPR to select compliance monitoring locations.

It has been over a decade since PWS completed the IDSE, which means changes to distribution systems have likely been made; this presents a good opportunity to reevaluate whether the sampling points for DBPs are still representative of the distribution system. At a minimum, water systems should add new sampling points whenever they lose access to sampling sites (for example, when a homeowner moves away or a building closes down). When adding new replacement sites, make every attempt to keep the

[9] https://eec.ky.gov/Environmental-Protection/Water/Drinking/DWProfessionals/Pages/Compliance.aspx

new sampling point on the same line as the one being replaced. In addition, water systems must add new sampling points as the population served grows, and whenever there are major additions or reductions in the number of meters (for example, when a new subdivision is constructed).

Naming Convention

Sampling points used for DBPR can be coded with the standard 3-digit sampling point naming convention used by the water system (e.g., 001, 002, 003, etc.). Any combination of letters or numbers can be used.

Samples to monitor TOC are collected from raw water and finished water (collected at the plant tap). The sample point code for these should be R01 (raw water; adjust the 2 numbers as needed) and CF1 (finished water from the combined filter effluent; adjust the number as needed).

Lead and Copper Rule (LCR) - Current

General Introduction

- Public Water Systems: Lead and Copper Rule Quick Reference Guide (PDF)
- Learn about the Basics: Understanding the Lead and Copper Rule (PDF)
- Lead and Copper Rule: A Revised Quick Reference Guide (PDF)(2 pp, 125 K, About PDF) EPA 816-F-08-018, June 2008
- Lead and Copper Rule: A Quick Reference Guide for Schools and Child Care Facilities that Are Regulated Under the Safe Drinking Water Act (PDF)(5 pp, 546 K, About PDF) EPA 816-F-05-030, October 2005

The LCR requires PWS to collect samples from an interior tap from which water is typically drawn for consumption. PWS personnel do not have to collect the samples; customers may collect tap samples in their homes if they are provided with sampling instructions. If, for any reason, a PWS cannot gain access to a sampling site to collect a follow-up tap sample, the PWS may collect the follow-up tap sample from another site *in its sampling pool* if it documents that the new site meets the same targeting criteria and is within reasonable proximity of the original site (40 CFR 141.86(b)(4)). For these reasons, PWS should identify more than the required minimum number of sampling locations within the distribution system. If PWS run out of available sampling sites, they should work with DOW to develop alternate strategies. DOW has discretion to approve a different period for conducting LCR tap sampling for systems collecting a reduced number of samples (40 CFR 141.86(d)(4)(i)(A)).

Tips for staying in compliance

- Water treatment changes reset the lead and copper sampling schedule back to routine monitoring (collect samples every 6 months for two consecutive 6-month sampling periods).
- All sampling points should be selected from the highest tier possible (Tier 1 or 2).
- Sampling points should represent the whole distribution system. For example, they should not be clustered in one section of the service area, but instead be spread throughout the service area in any location that has a high tier level.

How to Determine Sampling Locations

Sampling sites are chosen based on a tier system. Residences and buildings in the distribution system are categorized by whether they are served by a lead service line or by service lines with lead solder.

- **Tier 1**: single family structures served by lead service lines or copper pipes with lead solder
- **Tier 2**: buildings (multifamily or business structures) served by lead service lines or copper pipes with lead solder
- **Tier 3**: single family structures served by copper service lines with lead solder, installed before 1983

Naming Convention

Sampling points used for LCR can be coded with the standard sampling point naming convention used by the water system (e.g., 001, 002, 003, etc.). Any 3-digit combination of letters or numbers can be used.

Lead and Copper Rule (LCRR) – Revisions
(Compliance date: October 16, 2024)

General Introduction

The LCRR requirements provide greater and more effective protection of public health by reducing exposure to lead and copper in drinking water. The rule will better identify lead levels, improve the reliability of lead tap sampling results, strengthen corrosion control treatment requirements, expand consumer awareness, and improve risk communication. This rule revision requires, for the first time, community water systems to conduct drinking water lead testing and public education in schools and childcare facilities. In addition, the rule will accelerate lead service line replacements by closing existing regulatory loopholes, compelling early action, and strengthening replacement requirements [EPA–HQ–OW–2017–0300; FRL–10019–23–OW].

Lead and Copper Rule Comparison[10]: Side by side comparison of the 1991/2007 LCR and the 2021 LCRR.

Explore EPA's Revised Lead and Copper Rule[11] webpage for more information.

New Requirements of the LCRR

To help choose new sampling locations and develop new tap sampling plans, the LCRR requires that all PWS complete a service line (SL) inventory by October 16, 2024. Through the process of developing this inventory, water systems may locate lead service lines (LSLs) that were previously unknown. The LCRR has a new tier prioritization system and requires standard monitoring – monitoring at twice as many sampling sites during two 6-month monitoring periods in 2025. This means PWS should plan to choose many new lead and copper sampling points prior to the compliance date of October 16, 2024.

[10] https://www.epa.gov/sites/default/files/2020-12/documents/reference_guide_for_pwss_12.21.20.pdf
[11] https://www.epa.gov/node/261043

How to Determine Sampling Locations

The number of lead and copper sampling points required by the LCRR is listed in Table 4. All water systems will begin the new Standard Monitoring schedule in January 2025. Water systems will collect samples for two 6-month 'Standard Monitoring' periods during 2025, and then will sample annually for at least the following 2 years.

Table 4. Number of sampling points required by the Lead and Copper Rule Revisions.

System size (number of people served)	Number of sites (standard monitoring)	Number of sites (reduced monitoring)
>100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
≤100	5	5

The new tier prioritization system under the LCRR requires that *all* tap sampling points must be from the highest tier possible (e.g., Tier 1, if a water system has sufficient LSLs to meet the number of sampling sites required):

- **Tier 1**: single family structures serviced by a known LSL, OR multiple-family residences *only if* they comprise at least 20% of the structures served by the water system *and* have a LSL
- **Tier 2**: non-residential buildings and multifamily residences served by known LSLs
- **Tier 3**: single-family structures with galvanized service lines downstream from LSLs currently or in the past, or downstream of lead goosenecks, pigtails, or connectors
- **Tier 4**: single-family structures with copper pipes with lead solder
- **Tier 5**: everything else, including non-residential buildings and multifamily residences. Must prioritize 1) single-family structures, followed by 2) multifamily structures.

Naming Convention

Sampling points can be named using the same format as LCR and new points are not necessary if the old ones meet requirements. However, if a new sampling point is chosen to replace an old one, a new 3-character sampling point code must be assigned to it.

Asbestos

General Introduction

Asbestos is a natural, fibrous mineral that was used extensively in many products in the past, including drinking water pipes. Some people who drink water containing asbestos well in excess of the asbestos MCL over many years have an increased risk of health problems, so the SDWA requires that drinking water systems monitor water in the distribution system when there are known asbestos pipes.

Tips for staying in compliance

Asbestos enters drinking water through asbestos cement pipes in the distribution system. All systems that have asbestos pipes must sample once in the first three-year period of each nine-year compliance cycle (the current 9-year cycle started in 2020). Systems that have no asbestos cement pipes in the distribution system can request a waiver from distribution system sampling, but still must sample for asbestos at the plant tap. If a purchasing system does not have asbestos pipes, a waiver can be requested and, if granted, does not need to sample for asbestos at all.

If there are no asbestos / cement pipes in the distribution system, both producing (treatment) systems and purchasing (distributing) systems can apply to DOW for a waiver to avoid sampling in the distribution system.

- If a waiver is approved:
  - purchasing/distributing systems do not need to collect asbestos samples in the distribution system.
  - producing/treatment systems still need to collect asbestos samples at the entry point to the distribution system (plant tap) every nine years.
- The waiver can be found on the DOW website here[12].

How to Determine Sampling Locations

Sampling locations should be at any service line known to be made of asbestos. Water systems should have already completed an inventory of distribution system lines and identified the location of any asbestos service lines. If there are still service lines of unknown materials in the distribution system, the best opportunity to locate any remaining asbestos lines is during the process of completing the service line inventory required by the 2021 LCRR.

Naming Convention

Sampling points used for asbestos sampling can be coded with the standard sampling point naming convention used by the water system (e.g., 001, 002, 003, etc.).

Fluoride

General Introduction

Fluoride is found naturally in the environment and is added to drinking water at optimal levels to improve dental health. All water systems that serve over 3,000 people are required by the Kentucky Cabinet for Health and Family Services to add fluoride to drinking water and to maintain a fluoride 'operating tolerance range' between 0.6 ppm and 1.2 ppm (902 KAR 115:010). Water systems monitor fluoride at the plant tap daily, and at the point of maximum retention in the distribution system during the third week of the month. Samples collected from the distribution system are required to be submitted to a certified lab.

The EPA also requires fluoride monitoring at the plant tap. Rather than monitoring for a minimum amount, the EPA regulates whether fluoride levels in treated water exceed the MCL of 4.0 mg/L or the

[12] https://eec.ky.gov/Environmental-Protection/Water/Drinking/DWProfessionals/ComplianceDocuments/ASBESTOS%20Waiver%202.0.pdf

secondary MCL of 2.0 mg/L. Usually the EPA monitoring requirements are met when the PWS collects a water sample to be tested for inorganic chemicals (IOCs) or secondary contaminants (SEC); fluoride is one of the IOCs and SECs the laboratory will test for at the same time as the other contaminants.

More information about water fluoridation can be found at the CDC's Community Water Fluoridation[13] page, the Fluoride FAQ sheet[14] from the EPA, or the DPH Oral Health Program[15] page.

Tips for staying in compliance

To avoid the three most common mistakes related to fluoride, water systems should confirm the:

1. Fluoride value is correctly reported on the MOR;
2. Correct fluoride sample is reported on the consumer confidence report (CCR); and
3. Amount of fluoride added to finished water is calculated correctly.

Fluoride can be added to finished water by using one of three different chemicals: sodium fluoride, sodium fluorosilicate, or most commonly, hydrofluorosilicic acid (HFS). On the MOR, water systems must report the pounds of chemical added daily, and the MOR will calculate the resulting parts per million (ppm) of fluoride. To calculate the ppm, the different purity and available fluoride ion (AFI) of each chemical must be accounted for (Table 5).

Table 5. Parameters needed to calculate fluoride in drinking water.

Fluoride chemical used	Fluoride purity	Available fluoride ion (AFI)
Sodium fluoride	0.980	0.452
Sodium fluorosilicate	0.985	0.607
Hydrofluorosilicic acid (HFS)	0.230	0.792

The most recent samples collected as part of the IOC analyte monitoring and, when applicable, SEC analyte monitoring, should be reported on the CCR by July 1 of each year. Laboratories automatically report these fluoride results to DOW, and they are the only fluoride results that are uploaded into the SDWIS database. Water systems that need to see fluoride results can look on Drinking Water Watch[16] at the 'Chem/Rad Samples/Results by Analyte' menu on the left side. The analyte code for fluoride is **1025**. Both IOC and SEC fluoride samples are reported in Drinking Water Watch. To distinguish between the two, take note of the IOC sample collection dates since they are often different from the SEC sample collection dates.

Monthly distribution system fluoride sample results must be reported to the Department for Public Health (DPH) using the DPH Lab 505 form[17]. All applicable sections of the Lab 505 Form should be completed by the facility operator prior to sending the sample to their certified lab.

[13] https://www.cdc.gov/fluoridation/index.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Ffluoridation%2Findex.htm
[14] https://www.epa.gov/sites/default/files/2015-10/documents/2011_fluoride_questionsanswers.pdf
[15] https://chfs.ky.gov/agencies/dph/dpqi/hcab/Pages/oralhealth.aspx
[16] https://dep.gateway.ky.gov/DWW/
[17] https://chfs.ky.gov/agencies/dph/dls/Documents/LabForm505CDentalFluoride.pdf

How to Determine Sampling Locations

Most fluoride samples are collected from raw (untreated) water and from finished (treated) water at the plant tap. A fluoride sample should also be collected monthly during the third week of the month at the Point of Maximum Retention in the distribution system, agreed upon between the DPH and the PWS. These monthly samples are reported to the Oral Health Branch of DPH, rather than to the DOW like most other chemical sample results.

Naming Convention

Fluoride samples can be collected at a Point of Maximum Retention already selected for other analytes with similar requirements. The sampling point number can be any 3-character combination of letters and numbers.

Fluoride as an Indicator of Water Age and Leak Detection

Because of its stability in water, fluoride is often used as an indicator of water age. Water age in different areas of the distribution system can be determined by measuring fluoride levels in those areas and comparing them to the date or time that fluoride was last added at the treatment plant. High fluoride levels even after long periods of time since being added to drinking water could indicate low water turnover rates in that area of the distribution system, which could also have negative implications for DBP and bacteriological development in the drinking water. When implementing a water age study utilizing fluoride as the tracer, PWS should coordinate with the Oral Health Branch of DPH and also provide notice prior to shutting down the fluoride system.

Fluoride can also be utilized as an indicator of distribution system leaks. Analyzing a sample for fluoride is a quick and easy way to determine whether a suspected leak originates from groundwater or the distribution system because since fluoride is stable and is not likely to be found in the groundwater. Note: chlorine residual can also be used as an indicator of leaks in the distribution system.

Distribution Mapping

General Discussion

Public and semipublic water systems are required to create a map of their distribution systems and update the maps annually. Best practice is to record the location of sampling points at the same time that the distribution system map is developed. Most water systems still have paper copies of maps on file, which are useful to see the history of the distribution system. These important historical documents should be converted to electronic format to better document the history of changes in the distribution system.

There is an increased demand for, and benefit to, mapping the location of water system assets, including sampling points and other distribution system components, with global positioning system (GPS) and GIS tools. Standard file formats include ESRI Feature Data Services, shape (.shp) files, and geodatabases.

Tips for staying in compliance

Pursuant to 401 KAR 8:020, Section 3(11), "[A] public or semipublic water system shall have on the premises, or readily accessible to cabinet staff inspecting the system, an up-to-date map of the distribution system. The map shall, at a minimum, show:

1. Line size;
2. Cutoff valves;
3. Fire hydrants;
4. Flush hydrants;
5. Tanks;
6. Booster pumps;
7. Chlorination stations;
8. Connection to emergency or alternative sources;
9. Wholesale customer master meters; and
10. Type of piping material in the distribution system and its location."

GIS Coordinates and Mapping

Mapping many assets is as easy as using a GPS unit, cell phone, or other mobile device to record the x, y coordinates of the asset (for a point location). The accuracy of these devices ranges from sub-foot to over 30ft. The DOW requests that each time a water system updates a sampling point, that the x, y coordinates of its location are included. This enables the water system to become more aware of the exact location of each sampling point, plot the locations on a map, and easily see features such as:

- Planned use of each point (lead and copper, DBPs, bacterial sampling, etc.)
- Active vs. inactive points
- Arrangement of all sampling points in relation to the distribution system as a whole and identifying in which quadrant the sampling location is located.

View Appendix C to learn about using a GPS or mobile device to record x, y coordinates of distribution system assets and sampling points.

Water Age Map

Water systems may choose to make a water age map with color-coded sections of the distribution system based on water age (Figure 1). This type of map is useful to demonstrate water turnover times and points of maximum water retention, which are important for identifying areas of potential buildup of DBPs and low levels of residual disinfectants. To develop a color-coded map, operators collect samples from different points at the distal locations of the distribution system and measure fluoride levels in those samples.

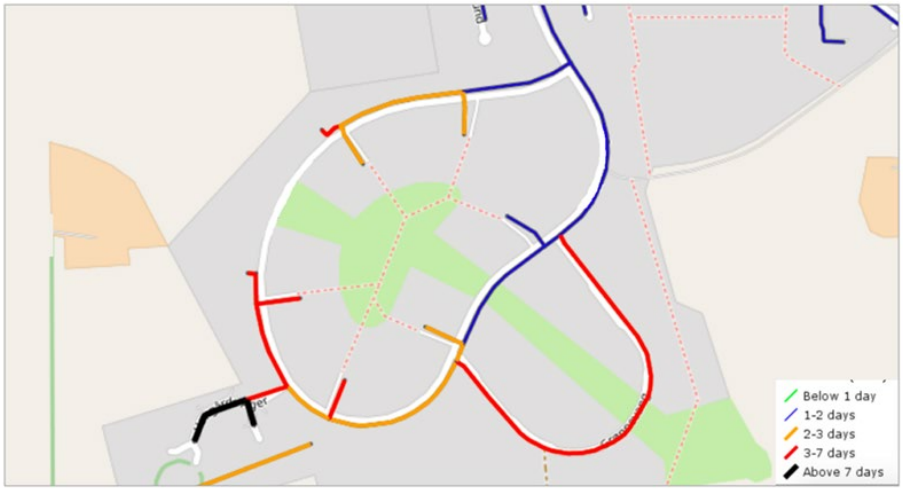


Figure 1. Example of a color-coded water age map.
Image Credit: DHI Group Blog. (2017) How to understand water age within your water distribution network.

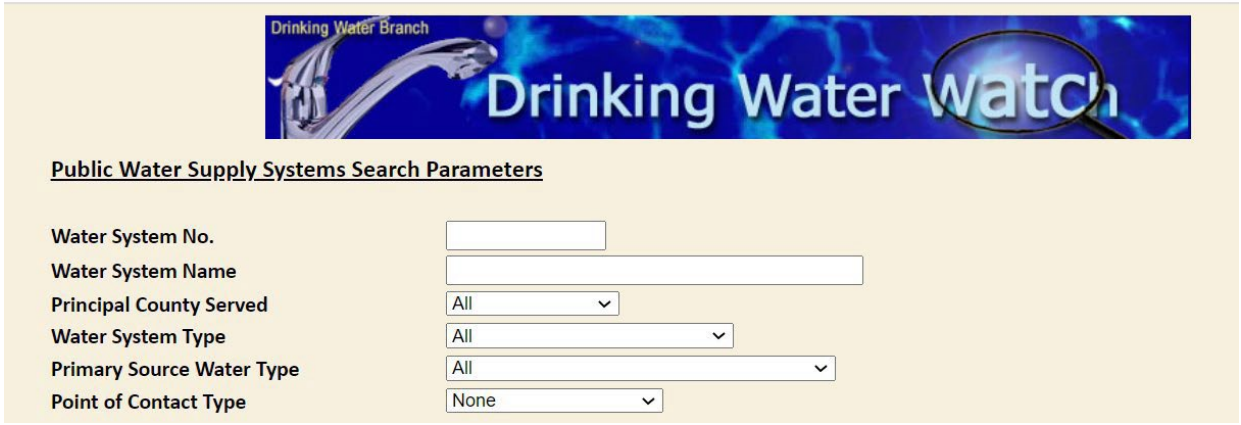
Appendices

Appendix A: Using Drinking Water Watch to find list of sampling points and sample data.

Finding Water System Information in Drinking Water Watch

Drinking Water Watch is an online application that water systems and the public can use to find information about drinking water and drinking water systems. Here are some useful tips for using the application:

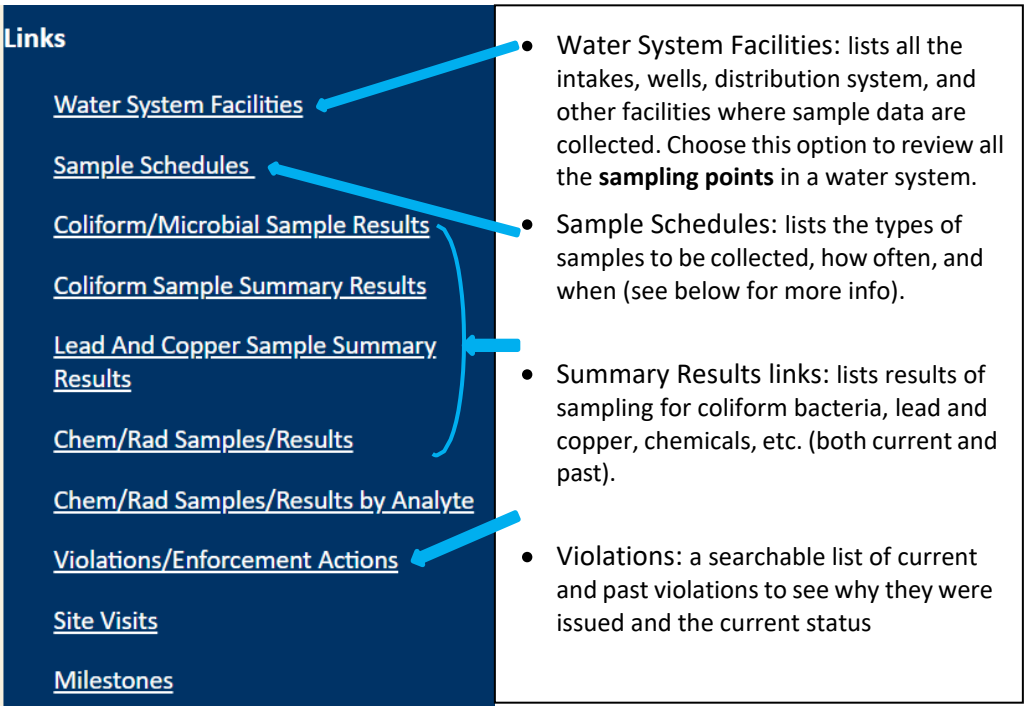
- Search by water system name, public water system identification number (PWSID), or county:



- After selecting a water system, the Water System Details page will display:
  - contact information
  - population served (size)
  - number of service connections
  - water purchase and sale data

  This information, which comes directly from the Safe Drinking Water Information System (SDWIS) database, is the most current information on file with the Kentucky Division of Water (DOW). If any changes need to be made, use these templates for:
  - Contact Updates
    - Operators (401 KAR 8:030 requires that water systems notify DOW whenever operators are added or leave a water system)
    - Owner contact
    - Administrative contact
    - Emergency contact
  - Population Updates

On the Water System Details page, a blue menu on the left enables searches for different sets of information:



Water System Facilities Submenu

The **Water System Facilities** submenu lists all the intakes and sampling points used by a water system.

- State Asgn ID No. - a number that SDWIS uses to track each facility and usually contains the water system's Public Water System Identification (PWSID)
- Facility Name - indicates whether the facility is an intake, a water system purchasing from or selling to another water system, or a water treatment plant (WTP)
- Type - types of facilities may be IN - intake; DS - distribution system; TP - treatment plant; WH - wellhead; WL - well; CC - cross connection
- Activity Status - indicates whether the facility is actively in use (A - active) or no longer in use (I - inactive)

Choose the facility labeled 'DISTRIBUTION' to see the sampling points for the water system.

State Asgn ID No.	Facility Name	Type	Activity Status
XXXXX0DS001	DISTRIBUTION - WESTERN MASON CO WATER DI	DS	A
IDSE9054	IDSE - WESTERN MASON CO WATER DIST	DS	A
XXXXX0TPB	WESTERN MASON CO WTP	TP	A
XXXXXWH001	WELLHEAD - WELL #1	WH	A

A list of all the sampling points and identifying information will appear. Each sampling point is identified with a 3-digit code, which can be a combination of letters or numbers.

Sampling Points

Sampling Point	Location	Type
001	MCNUTT DR	DS
002	XXX POWERSVILLE RD	DS
003	XXX AUGUSTA RD	DS
004	XXX BROOKSVILLE GTOWN RD	DS

Sample Schedules Submenu

- There are several sections in the **Sample Schedules** submenu:

  '**TCR Schedules**' section displays how many bacteriological (BacT) samples to collect each month, and whether a water system is subject to seasonal or additional sampling.

  - 'Sample Count' - the number of samples to collect
  - 'Sample Type' - whether samples are Routine (RT) or Repeat (RP).
  - 'Sample Frequency' - how often samples are collected (DL = daily; MN = monthly).

TCR Schedules

Sample Count	Sample Type	Sample Frequency	Effective Begin Date	Effective End Date	Seasonal Start MM/DD	Seasonal End MM/DD	Analyte Code
3	RP	DL	09-16-2021	09-30-2021	9/16	9/30	3100
3	RP	DL	09-09-2021	09-23-2021	9/9	9/23	3100
3	RP	DL	06-17-2021	07-01-2021	6/17	7/1	3100
3	RP	DL	06-16-2021	06-30-2021	6/16	6/30	3100
3	RP	DL	06-10-2021	06-24-2021	6/10	6/24	3100
3	RP	DL	08-20-2021	09-03-2021	8/20	9/3	3100
150	RT	MN	01-01-2016		1/1	12/31	3100

'**Non-TCR Group Schedules**' section lists when to sample for chemicals, including inorganic chemicals (IOC), volatile organic compounds (VOC), or synthetic organic chemicals (SOC)), lead and copper, disinfection by-products (DBP, such as TTHM or HAA5), and radionuclides.

- 'Analyte Group Name' - the chemicals or other substances that the sample will be tested for. For example, RADA = radium (gross alpha, 226, and 228) and uranium; REG IOC = regulated inorganic compounds; and REG SOC = regulated synthetic organic compounds.

- 'Sample Count' - the number of samples that need to be collected.
- 'Sample Frequency' - how often (3Y = every 3 years, YR = annually, QT = quarterly, and MN = monthly) samples must be collected. These same abbreviations are used on all the schedules.

Non-TCR Group Schedules

Analyte Group Code	Analyte Group Name	Sample Count	Sample Type	Sample Frequency	Current Monitoring Period Date Range	Next Monitoring Period Date Range
PBCU	LEAD & COPPER TAP	20	RT	3Y	06-01-2020 to 09-30-2022	----
RADA	RADA	1	RT	YR	No Monitoring in Current Period	01-01-2026 to 12-31-2026
IOCS	REG IOC	1	RT	3Y	Monitoring Completed	01-01-2023 to 12-31-2025
SOCS	REG SOC W/O DIOXIN	2	RT	3Y	Monitoring Completed	01-01-2023 to 12-31-2025
VOCS	REG VOC	1	RT	3Y	Monitoring Completed	01-01-2023 to 12-31-2025
SCND	SECONDARY	1	RT	YR	Monitoring Partially Completed	01-01-2022 to 12-31-2022
DBPS	TTHM THAA	2	RT	QT	10-01-2021 to 12-31-2021	-----
DBPS	TTHM THAA	2	RT	YR	08-01-2021 to 08-31-2021	No Monitoring After 09-30-2021

Appendix B: Water System – Laboratory Communications

Water systems and laboratories have an important relationship, and working well together is key to avoiding data errors or misplacing sample results that could lead to violations. Ensure that all expectations and agreements between the water system and the laboratory are clearly communicated and documented. Both parties equally benefit from a clear understanding of expectations, and this will lead to a better relationship.

To help ensure that water sample results from a laboratory are correctly communicated to the DOW:

- Make sure water system sampling chain-of-custody (COC) documents are filled out completely.
- Clearly document whether a sample is routine (RT) or special (SP) on the COC document.
- Work with the lab to designate one person to communicate results to DOW (either a PWS or lab staff) – this reduces confusion caused by duplicate reporting to DOW.
- Discuss the laboratory backup or contingency plan should an instrument become inoperable or unavailable to analyze the sample within the hold time.
- Tell the laboratory what minimum reporting levels (MRL)[18] it needs to analyze down to. This can be important for inorganic chemical (IOC) detect entries on the annual consumer confidence report (CCR).
- Know the water system sampling schedule and inform the laboratory when it wants to sample. Do not rely on the laboratory for information about when to sample. If unsure, contact the DOW compliance officers listed on the Drinking Water Compliance[19] web page.
- Communicate to the laboratory what results need confirmation samples collected and analyzed within a certain amount of time, such as positive bacteriological (BACT) samples or an IOC sample result above the maximum contaminant level (MCL). Communicate the need for time-sensitive results notification to the lab.
- Take samples early in the compliance period – don't wait until the last week! Some results may be delayed by the need for a re-sample, or a sample being sent by the primary laboratory to a sub-contracted laboratory.
- Laboratory results must be maintained by the water system – however, the contractual agreement should include provisions for the laboratory to maintain duplicate documentation necessary to reconstruct results for a period of 10 years for most chemicals; 12 years for lead and copper (Pb/Cu).

REMEMBER - if a water system requests that a laboratory submit completed drinking water data to DOW, any associated errors are still the responsibility of the water system, and could result in violations to the water system.

[18] https://eec.ky.gov/Environmental-Protection/Water/PermitCert/LabCert/Documents/KY%20DW%20Minimum%20Reporting%20Limits.pdf

[19] https://eec.ky.gov/Environmental-Protection/Water/Drinking/DWProfessionals/Pages/Compliance.aspx

Appendix C: Recording Longitude and Latitude Locations of Sampling Points

"Location coordinates" refers to a location on a map using latitude and longitude, or "lat and long," coordinates. The location of water meters, service line/water main connections, and other assets managed by a water system can be recorded by using the location coordinates of each asset. Location coordinates can be recorded in multiple formats, but the most useful for reporting asset locations to the Division of Water (DOW), such as sample point locations or lead service lines, is decimal degrees (DD). For example, the DOW main office in Frankfort has a latitude of 38.187522 and a longitude of -84.843453:

When listing coordinates, the latitude is always first, the longitude is second, and they are usually separated by a comma: 38.187522, -84.843453. Also note that for Kentucky locations, the longitude is always represented by a negative number (all locations in the western hemisphere have a negative longitude, whereas those in the eastern hemisphere are represented by a positive longitude).

Recording location coordinates is useful for many aspects of asset management:

- Maintaining a detailed inventory of the location of distribution system parts and sampling points
- Completing the service line inventory required by the Lead and Copper Rule Revision
- Scheduling meter readings and replacements, and fire hydrant testing

All smart phones have global positioning service (GPS) capabilities with different methods of finding lat and long coordinates. Applications designed specifically for recording lat and long are easiest to use, and can be found by searching the App Store (iPhones) or Play Store (Android phones) for "GPS location" or "GPS logging" apps. Choose one that displays coordinates in DD.

Some apps only record the location where the phone is currently positioned which are useful for field visits to the service line site. Other apps record a location by using a map – these may be less accurate for locating a specific point (such as the exact location of the water meter), but are useful for narrowing down the lat and long of an address when using the app from a different location.

Some GPS apps can also record additional data. Search for apps that can record coordinates, photos, and notes about that location. These apps can help operators record information about a site at which they are working, such as service line material or repairs made.

Tips for recording location coordinates:

- A cell phone, GPS device, or tablet can all be acceptable tools for recording location coordinates.
- Use the most accurate tool available to the water system.
- GPS units that can communicate with a cell phone via Bluetooth are available.
- Use the Sampling Point Location template[20] to add lat and long coordinates to sampling points on file with the DOW, or to notify DOW of new sampling points.
- Location coordinates reported to DOW should be in DD format.
- When using a GPS app along with a Geographic Information System (GIS), choose a GPS app compatible with that GIS or one that can store the location coordinates in a table that can be saved into the GIS database later.

Appendix D: Other Samples Required

Water systems must collect samples to test for these chemical contaminants at the entry point to the distribution system (EPTDS or plant tap) using the sampling protocol required for that contaminant.

- VOC – volatile organic chemicals
- RADs – radionuclides
- IOC – inorganic chemicals
- SOC – synthetic organic chemicals
- Secondary contaminants, or Secondaries – chemicals not required by SDWA to be sampled, but potentially required by 401 KAR 8:250
- Nitrates
- Nitrites
- Sodium

Appendix E: Related Guidance Documents

- DOW Consumer and Boil Water Advisory Guidance
- Centers for Disease Control and Prevention / EPA Drinking Water Advisory Communication Toolbox[21]
- Kentucky Rural Water Association Boil Water Advisory Template[22]
- Kentucky Rural Water Association Sample Collection Manual: Distribution System[23]

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[20] https://eec.ky.gov/Environmental-Protection/Water/Drinking/DWProfessionals/ComplianceDocuments/Sampling%20Point%20Location%20with%20Instructions%201.1.pdf

[21] https://www.cdc.gov/healthywater/emergency/dwa-comm-toolbox/index.html

[22] https://form.jotform.com/210896149465062

[23] https://urldefense.com/v3/__https:/assets.noviams.com/novi-file-uploads/krwa/PDFs_and_Documents/KRWA_Sample_Collection_Manual-2012_Distribution.pdf__;!!Db6frn15oIvDD3UI!h-Wb7w9O3eAYUlo2Z4PiunV1lFCoNhmCWDcdXNtIgc3uR5hTQgDffbRXlF5eu2Kc_k0nHByRRPo3YWij0iGW_AQ$

Acronyms and Abbreviations

AFI – available fluoride ion; the amount of fluoride available to interact with other compounds

CCR – Consumer Confidence Report

CF1 – sample point code used for TOC sample collected from combined filter effluent water

CDC – U.S. Centers for Disease Control and Prevention

COC – chain of custody

Cu – copper

DBP – disinfection by-product

DBPR – Disinfection By-Products Rule of the SDWA

DOW – Kentucky Division of Water

DPH – Kentucky Department of Public Health

EPA – U. S. Environmental Protection Agency

EPTDS – Entry point to the distribution system (also called 'plant tap')

GIS – geographic information system

GPS – Global positioning system, a system used to measure and identify locations or features on a map

HAA5 – haloacetic acids (there are 5 of these that are measured as required by the DBPR)

HFS – hydrofluorosilicic acid, a chemical commonly used to add fluoride to drinking water

IDSE – initial distribution system evaluation, required by the DBPR

IOC – inorganic chemical

KRWA – Kentucky Rural Water Association

LCR – Lead and Copper Rule of the SDWA, initiated in 1991 and most recently revised in 2007

LCRR – Lead and Copper Rule Revisions of the SDWA, 2021

LSL – lead service line

MCL – maximum contaminant level

MOR – monthly operating report

MRDL – maximum residual disinfectant level

MRL – minimum reporting level

Pb – lead

Ppb – parts per billion (equal to µg/L)

Ppm – parts per million (equal to mg/L)

PWS – public water system

R01 – sample code used for TOC sample collected from raw water

RP – repeat sample (abbreviation used for RTCR)

RPD – repeat sample downstream from original sample (RTCR)

RPU – repeat sample upstream from original sample (RTCR)

RT – routine sample (abbreviation used for RTCR)

RTCR – Revised Total Coliform Rule of the SDWA

SDWA – Safe Drinking Water Act

SDWIS – Safe Drinking Water Information System, the database used by DOW and EPA to maintain records of drinking water data

SL – service line

SOC – synthetic organic chemical

SP – special sample (abbreviation used for RTCR)

SWTR – Surface Water Treatment Rules of the SDWA

TC – total coliform (bacteria)

TOC – total organic carbon

TTHM – total trihalomethanes, disinfection byproducts

VOC – volatile organic compound

References

Kentucky Division of Water (2021). Drinking Water Sampling Point Locations Template. Access at https://eec.ky.gov/Environmental-Protection/Water/Drinking/DWProfessionals/Pages/Compliance.aspx

Kentucky Division of Water (2021). Asbestos Waiver. Access at https://eec.ky.gov/Environmental-Protection/Water/Drinking/DWProfessionals/ComplianceDocuments/ASBESTOS%20Waiver%202.0.pdf

U.S. Environmental Protection Agency (2018). Revised Total Coliform Rule (RTCR) Sample Siting Plan with Template Manual: Public Water Systems serving 1,000 or fewer persons, Direct Implementation Program and Tribal Water Systems. EPA 815-B-18-005. Access at https://www.epa.gov/sites/default/files/2018-12/documents/usepa_sampling_siting_plan_final_published-2018_508.pdf

U.S. EPA Fact Sheets:

Disinfection Byproducts Rules (DBPR)

Stage 1 Disinfection and Disinfection Byproducts Rule: Laboratory Quick Reference Guide (PDF) (2 pp, 543 K, About PDF) EPA 816-F-02-021: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=3000663Y.txt

Stage 2 DBPR: A Quick Reference Guide For Schedule 1 Systems (PDF)(2 pp, 123 K, About PDF) EPA816-F-06-001: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100A2D4.txt

Stage 2 DBPR: A Quick Reference Guide For Schedule 2 Systems (PDF)(2 pp, 123 K, About PDF) EPA 816-F-06-002: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100A2D6.txt

Stage 2 DBPR: A Quick Reference Guide For Schedule 3 Systems (PDF)(2 pp, 123 K, About PDF) EPA 816-F-06-003: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100H94A.txt

Stage 2 DBPR: A Quick Reference Guide For Schedule 4 Systems(PDF)(2 pp, 123 K, About PDF) EPA 816-F-06-004: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100A2D8.txt

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