New Jersey Department of Environmental Protection
Division of Water Supply and Geoscience

Water Quality Parameter Sampling Plan Guidance

March 2017

The Lead and Copper Rule (LCR) under the Federal Safe Drinking Water Act is applicable to public community (CWS) and non-transient non-community water systems (NTNC). The LCR requires Water Quality Parameters (WQP) be monitored to help public water systems and the New Jersey Department of Environmental Protection (NJDEP) determine whether a water supply is corrosive, identify appropriate corrosion control treatment (CCT) options if needed, and determine whether CCT is being properly operated and maintained following installation (40 CFR 141.87). For most water systems that require treatment, corrosion control is the primary mechanism for reducing lead and copper levels in the distribution system.

The NJDEP is requiring all small and medium water systems (systems serving less than or equal to 50,000) that use CCT to conduct ongoing WQP monitoring after the installation of CCT. All large water systems (serving greater than 50,000) must conduct ongoing WQP monitoring once they are determined to be optimized per the LCR.

Appropriately characterizing a system and understanding the sources of water, including treatment, are necessary to determine the appropriate WQPs to be sampled at a water system's entry point to the distribution system (EPTDS) and throughout the distribution system. This document provides guidance on how to prepare an acceptable WQP Sampling Plan (WQPSP). A template for NTNC and CWS serving <500 residents, along with additional guidance, is available on our webpage (http://www.nj.gov/dep/watersupply/dwc-lead-public.html). Please note that the template is provided for guidance only and systems may use other formats as applicable.

Acknowledgements: This document was prepared using various resources including EPA's Lead and Copper Rule Monitoring and Reporting Guidance for Public Water Systems (March 2010)

Table of Contents

1. General Water System Information

Information that is required includes:

- Date plan was prepared (and revision date, if applicable);
- Name and contact information of the person who prepared/revised the WQPSP;
- *Signature of applicable Licensed Operator indicating review and approval of the plan;*
- System name;
- PWSID number;
- Total number of service connections;
- Population served (excluding transient populations);
- System type (GW, SW, GUDISW, SWP, GWP).

1.a Contact Information

For the system owner and operator including:

- Name and title;
- Phone number;
- Email; and
- License classification and number as applicable.

1.b List of Sources and Treatment Facilities

Must include a complete listing of all facilities, including:

- List of sources with source ID (i.e. WL001002, IN001002, CC001002);
    - Identify if the source is regular/emergency/seasonal use. If seasonal, identify the seasonal operating period.
    - If the source is an interconnection, identify percentage of water received.
- Treatment plants with all installed treatment highlighting corrosion control used for lead and/or copper and the appropriate facility ID (i.e. TP001001 - Soda Ash, TP002008 Orthophosphate);
- Location of any additional treatment that does not have a facility ID such as booster stations;
- If a corrosion inhibitor for lead and/or copper is installed and/or received from only a select number of entry points, identify if the inhibitor is isolated to a specific distribution system zone (i.e. pressure gradient) or if it extends throughout the entire distribution system; and
- Identify if the corrosion inhibitor for lead and/or copper has a secondary purpose (i.e. reduce levels of iron/manganese).

1.c Contact information for bulk purchasers and wholesalers

As sample results and treatment or source changes may impact bulk purchasers and/or wholesalers, it is important to include up to date contact information. Additionally:

- Indicate if system has no bulk purchasers or wholesalers; and/or
- Indicate if connection is year round or seasonal.

2. Distribution System Map

The following information is required:

- Distribution system map that clearly identifies the following water system components:
  - Water source(s);
  - Interconnections;
  - Treatment plants (including booster stations);
  - Storage tanks;
  - Delineation of pressure zones;
  - Delineation of areas receiving corrosion control inhibitor;
  - Blow offs/flushing points;
  - Maximum residence time sites and/or areas of high water age;
  - Standard WQP sampling sites;
  - Reduced WQP sampling sites; and
  - Alternate WQP sampling sites;
- A brief summary of the water main materials that exist within the distribution system.

Please note the following:

- Please do not indicate layout of distribution mains, or include any other potentially sensitive information.
- The distribution map may be stored as an electronic GIS map as long as it can be accessed and provided upon request. (Note: the map must be submitted to NJDEP with any WQPSP submittal.)
- NTNC systems may submit a detailed sketch in lieu of a map.

3. Sample Site Selection

3.a Distribution System

The number of sample sites utilized to sample throughout the distribution system is based upon the system's residential and non-transient population served (refer to Table 1 below). Sample sites in the distribution system must be representative of the water quality throughout the system.

Table 1: Number of Required WQP Distribution Sample Sites

System size (Population Served)	No. of Standard Distribution Sites for WQPs	No. of Reduced Distribution Sites for WQPs
> 100,000	25	10
10,001-100,000	10	7
3,301 to 10,000	3	3
501 to 3,300	2	2
≤ 500	1	1

NJDEP recommends that systems identify alternate distribution sites. A suitable pool of alternate sites should be equal in number to the reduced distribution sites. Changes to sample sites are allowed when a water system can no longer gain access to the site or if the original site location no longer meets the selection criteria. The change in location must be submitted to the NJDEP using the *Water Quality Parameter Sample Site Change Form (BWSE-19)*, which can be found at http://www.nj.gov/dep/watersupply/dws-sampreg.html. The Water Quality Parameter sampling plan must be updated whenever there is an addition or deletion of a site

NJDEP may require additional distribution system sites to represent water quality more evenly throughout the distribution system (e.g. a system required to collect from 3 distribution system sites has 7 distinct pressure zones; in this case, 7 distribution system samples may be required).

Sites identified in a water system's Revised Total Coliform Rule (RTCR) sampling plan may provide an adequate pool of WQP tap sample sites. Utilizing the same sites for both WQP and RTCR helps ensure that access is available, personnel are already in place to perform monitoring at these sites, and the locations are representative of the distribution system conditions.

The following items should be taken into consideration when selecting sample sites:

- Size of the population served and where the population is located;
- All of the different sources of water currently in use;
- All of the different treatments installed and operating;
- The effects of seasonal variability on treatment and water quality;
- The proximity of WQP sites to supplemental chlorination feed points;
- The proximity of WQP sites to ground or elevated storage locations;
- That sampling sites are representative of typical retention times of water in the distribution system;
- That sampling sites are representative of distinct pressure zones located throughout the distribution system;
- That sampling sites are representative of distribution system materials;
- The sampling sites' proximity to seasonal sources of supply; and
- The proximity of WQP sites to lead and copper tap water sampling sites.

Systems should avoid the following when selecting sample sites:

- Areas where maintenance or flushing is conducted to reduce the chance of water quality upsets;
- Fire hydrants and storage tank taps; and
- Sampling sites where routine access is an issue as repeat sampling may be necessary following an excursion (e.g. schools, businesses with limited hours, residences).

Be sure to include the site specific justification for each tap sample site.

The WQPSP should outline procedures for when samples may need to be taken from alternate and/or additional distribution sites, including if an emergency source is used for an extended period of time.

3.b Entry Point to the Distribution System

Samples must be collected from each EPTDS, including all permanent active interconnections. Samples collected at the EPTDS shall be from locations representative of each source after treatment. If the system draws water from more than one source and the sources are combined before distribution, the system must sample at an EPTDS during periods of normal operating conditions (i.e., when water is representative of all sources being used).

The WQPSP should outline procedures for when samples may need to be taken from an emergency EPTDS, if used for an extended period of time (more than 30 consecutive days).

It should be noted that there may be situations when additional WQP sampling is required based on the dynamics of the water system (e.g. if, after leaving the EPTDS, the treated water is blended with another source prior to entering the distribution system). This also includes booster stations where a corrosion control inhibitor is added.

NTNC systems that do not have a tap immediately after the EPTDS may sample from the tap that is closest to the EPTDS. However, this tap cannot also be used as the distribution system tap site. This should be clearly indicated in the WQPSP.

4. Monitoring Schedules and Required Analytes

WQP sampling may vary depending on whether initial, follow-up, or optimized monitoring is required. Additionally, alternate sources of water (e.g. emergency interconnections or wells) should be identified so the appropriate WQPs may be sampled if the source is needed for a prolonged period. Incorporate the appropriate WQPs to be analyzed based on which schedule type is applicable for your water system.

Monitoring requirements are as follow, except as noted in the following initial WQP monitoring section:

- **Distribution system:** Samples are to be collected from each representative site, at two different times in the monitoring period, to ensure water quality data is representative of seasonal changes that can take place during a monitoring period. (NJDEP recommends that the sampling events be quarterly and at least 2 weeks apart.)
- **EPTDS:** Samples to be collected once every 14 days (bi-weekly) throughout the monitoring period, beginning January 1st or July 1st, whichever is sooner.

NJDEP may require monitoring of additional water quality parameters (i.e. iron, manganese, chloride, sulfate, etc.) if determined necessary for complete evaluation of CCT processes.

4.a Initial WQP Monitoring

Under the LCR, water systems that do not have CCT installed for lead and/or copper are required to conduct initial WQP monitoring within six months from the beginning of the monitoring period in which the system exceeded the lead and/or copper action level. Initial WQP monitoring is used to determine water corrosivity and identify appropriate CCT options. *Only those systems that do not have CCT installed for lead and/or copper, or have not been*

placed on follow-up or optimal WQP monitoring by NJDEP, should include initial WQP monitoring requirements in the WQPSP.

During initial monitoring, the analysis of the following parameters is required:

- pH;
- Alkalinity;
- Calcium;
- Conductivity;
- Temperature;
- Orthophosphate, when a phosphate-based corrosion inhibitor is used; and/or
- Silica, when a silicate-based corrosion inhibitor is used.

It is strongly recommended that chloride, sulfate, iron, and manganese also be analyzed at each EPTDS, permanent interconnection points, and distribution location(s). This will provide the system with additional water quality characteristics to assist in determining appropriate CCT options.

During Initial WQP monitoring, both distribution tap locations and EPTDS locations are to be sampled twice within the monitoring period.

4.b Follow-up WQP Monitoring

Water systems under the LCR are required to conduct follow-up WQP monitoring during 2 consecutive 6-month monitoring periods immediately following the installation of CCT, beginning January 1st or July 1st, whichever is sooner.

During follow-up monitoring, analysis of the following parameters is required:

- pH;
- Alkalinity (Always in the distribution system and only at the EPTDS if alkalinity adjustment is used);
- Calcium, when calcium carbonate stabilization is used;
- Orthophosphate, when a phosphate-based corrosion inhibitor is used; and/or
- Silica, when a silicate-based corrosion inhibitor is used.

During Follow-up WQP monitoring, distribution tap locations are to be sampled twice within the six-month monitoring period. EPTDS locations are to be sampled bi-weekly (at least once every 14 days) during the monitoring period.

4.c Optimal WQP Monitoring

NJDEP sets optimum WQP values following the completion of follow-up WQP monitoring. Within 30 days of completing follow-up WQP monitoring, a water system is required to submit an Optimal WQP Recommendation to NJDEP using form BWSE-LC03 (available on NJDEP's webpage at http://www.nj.gov/dep/watersupply/pdf/bwselc03.pdf). After NJDEP sets optimum WQP values, the water system is then required to conduct optimal WQP monitoring beginning January 1st or July 1st, whichever is sooner.

During optimal monitoring, the following parameters are required:

- pH;
- Alkalinity, when alkalinity adjustment is used;
- Calcium, when calcium carbonate stabilization is used;
- Orthophosphate, when a phosphate-based corrosion inhibitor is used; and/or
- Silica, when a silicate-based corrosion inhibitor is used.

During optimal WQP monitoring, distribution tap locations are to be sampled twice within every six-month monitoring period. EPTDS locations are to be sampled bi-weekly (at least once every 14 days) continuously.

4.d Reduced Distribution Monitoring

Systems on optimal monitoring may request reduced monitoring if the following criteria are met:

- If a system maintains the optimal WQPs during two consecutive 6-month monitoring periods and serves more than 10,000 persons, the system may reduce the number of distribution sampling sites (refer to Table 1 in section 3.a above), with approval from NJDEP.
- If a system maintains the optimal WQPs during three consecutive years of monitoring, the system may reduce sampling from every six months to annually, with approval from NJDEP. This sampling begins during the calendar year immediately following the end of the third consecutive year of six-month monitoring.
- If a system maintains the optimal WQPs during three consecutive years of annual monitoring, the system may reduce the sampling from annually to every three years. This sampling begins no later than the third calendar year following the end of the third consecutive year of annual monitoring.

Reduced monitoring only applies to distribution system sampling. EPTDS monitoring will remain biweekly.

5. Sample Collection, Analysis, and Reporting

WQP samples may be collected and analyzed by a NJ certified laboratory or by an approved party[1].. If the sample collection and analysis is being conducted by a certified laboratory, the WQPSP may only include the name and contact information of the contracted laboratory. If the sample collection and/or analysis is being conducted by an approved party, the following items should be detailed in the WQPSP, as applicable:

- Identification of primary and alternate sample collectors;
- Established sample container preparation and transport procedures;
- Established sample collection procedures; and

[1] An approved party is a person "acceptable to the State" who is either the Licensed Operator or someone trained by a Licensed Operator. If an approved party conducts the monitoring and analyses, proper calibrations, and recordkeeping of all QAQC tasks must be kept on site and made available upon request.

- Established sampling analysis procedures. (Refer to the Office of Quality Assurance for standard procedures at http://www.nj.gov/dep/enforcement/oqa.html).

WQP samples should be collected as follows:

- Remove an aerator if present;
- Fully flush the tap (for a minimum of 30 seconds);
- Collect and analyze sample for temperature and pH in the field; and
- Collect the samples for the other WQPs.

Observations about color, suspended solids, and the flushing time required prior to achieving acceptable sampling conditions should be noted during sample collection. Care should be taken to avoid the introduction of air bubbles into the sample which can affect the pH, conductivity, and dissolved oxygen content of the water sample.

When collecting WQP samples for alkalinity, calcium, conductivity, orthophosphate, and silica, two, 500 mL sample bottles should be filled at each sampling location. Two bottles are needed as the calcium analysis is conducted using a separate sample to allow for acidification of the sample prior to analyses. The two 500 mL bottles count as one sample; thus, you must repeat this for each entry point during initial monitoring, as well as at each distribution site that is required during each WQP monitoring period.

Plastic or glass containers can be used when collecting WQP samples unless silica analysis is required, in which case, plastic must be used. All samples should be stored in a cool environment until analyzed. During transportation, care should be taken to avoid breakage of the sample.

The results from a continuous analyzer, that meets the EPA Methods under 40 CFR 141.23(k)(1), may be used for WQP compliance. The results reported would be the average of the results for the 24-hour period.

Results from samples collected and analyzed by an approved party are to be submitted on the *WQP Monitoring Report Form for Approved Party.* This form, along with instructions, can be found on our webpage at http://www.nj.gov/dep/watersupply/dws-sampreg.html. Results from samples analyzed by a NJ certified laboratory should be submitted via The New Jersey Electronic Environmental (E2) Reporting System.

6. Action Plans

Action plans for Monitoring & Reporting violations (M&R), single excursions[2], and treatment technique (TT) violations, are required (as applicable) in the WQPSP. Action plans for single excursions and TT violations are only required for systems on optimal WQP monitoring.

[2] "Excursion" refers to any daily value for a parameter that is below the minimum value set by NJDEP.

In addition, systems incorporating initial WQP monitoring requirements should include a plan for submitting a CCT recommendation following completion of initial WQP monitoring. Systems incorporating follow-up WQP monitoring requirements should include a plan for submitting recommended optimal WQP values to NJDEP following completion of follow-up WQP monitoring. Systems may refer to EPA's "*Optimal Corrosion Control Treatment Evaluation Technical Recommendations for Primacy Agencies and Public Water Systems*" for further guidance on these actions. *The WQPSP may refer/direct the user to the system's Lead and Copper Sampling Plan for these items.*

A system should note that failure to complete specific action items may also result in additional violations, such as failure to submit a Corrosion Control/Source Water Treatment Recommendation, failure to install the approved Corrosion Control/Source Water Treatment within the designated timeframe, and failure to implement public education requirements. These violations are also required to be reported to NJDEP and require issuance of public notification to consumers.

The WQPSP must clearly identify the water system personnel and their roles and responsibilities for each action plan.

6.a Monitoring & Reporting Violations

If a M&R violation is incurred, the following is required:

- Report the violation to NJDEP within 48 hours of determining the noncompliance;
- Deliver a Tier 3 public notification to your customers;
- Submission of a copy of the Tier 3 Public Notice and a Public Notice Certification Form to the NJDEP within ten days of completing the public notice; and
- Include a discussion of the violation in your CCR (if applicable).

Additional steps that a system may want to incorporate into their M&R action plan include:

- Notification to management and supervisors; and
- A review of sampling protocols to ensure future sampling is not missed.

6.b Single Excursion

NOTE: Only required if system is on Optimal Monitoring

If a single excursion is incurred, the system should outline steps to confirm, inspect, and adjust treatment units as necessary. The WQPSP should also outline steps to collect WQPs immediately following an excursion. As the values are counted daily until another sample is collected, a single excursion could result in multiple daily excursions if not addressed promptly.

Examples of actions to take after a single excursion include:

- Management and supervisors will be made aware of the issue immediately.
- A follow up sample will be collected immediately to confirm the issue.
- A review of treatment operations, distribution operations, and equipment calibration will be performed.
- Changes to distribution operations (i.e. flushing) or changes to treatment operations will be made if the sample excursion is verified.

6.c Treatment Technique

NOTE: Only required if system is on Optimal Monitoring

A TT violation is incurred when excursions occur on more than nine days within a 6-month monitoring period during optimal WQP monitoring. An excursion occurs when any daily value for a parameter is below the minimum value set by NJDEP. An excursion remains unresolved until the system collects a sample at the same location for the same WQP that meets the minimum value. Nine excursions are allowed as it will ensure that the WQPs are above the minimum at least 95% of the time during a 6-month compliance period.

If a TT violation is incurred, the following is required:

- Report the violation to NJDEP within 48 hours of determining the noncompliance;
- Deliver a Tier 2 public notification to your customers within 30 days;
- Submit copy of the Tier 2 Public Notice and a Public Notice Certification Form to the NJDEP within ten days of completing the public notice;
- Include a discussion of the violation in your CCR (if applicable);
- Provide NJDEP with a report outlining the source of the TT and steps taken toward remediation; and
- Return to semi-annual WQP tap monitoring and lead and copper tap monitoring at the standard number of sites if you are on reduced monitoring.

Additional steps that a system may want to incorporate into their TT violation action plan include:

- Management and supervisors will be made aware of the issue immediately;
- Additional WQP samples will be taken within 30 days;
- A review of treatment operations, distribution operations, and equipment calibration will be performed;
- A review of system optimization will be performed to investigate possible causes of the excursions; and
- Update WQP and Lead and Copper Sampling Plans as necessary.