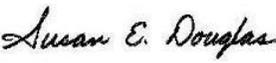


**COMMONWEALTH OF VIRGINIA
DEPARTMENT OF HEALTH
OFFICE OF DRINKING WATER**

Date: June 15, 2016

To: Office of Drinking Water Staff

Through: Drew Hammond, PE, Deputy Director 
Office of Drinking Water

From: Susan E. Douglas, PE, Director 
Division of Technical Services

Subject: **Working Memo 898, Amendment #2**
Compliance Sampling and Reporting Guidance Manual

Summary:

This memo replaces Working Memo 898, dated April 19, 2011. An updated Compliance Sampling and Reporting Guidance Manual, Version 4.1 (*Sampling Manual*) is released with this memo, and the following Working Memos are revoked:

- WM 892 – Long Term 2 Enhanced Surface Water Treatment Rule – Source Water Monitoring and Monitoring Plans; and
- WM 904 – Long Term 2 Rule – Results of Source Water Monitoring.

Updates to the *Sampling Manual* include:

- Revisions required for consistency with the Revised Total Coliform Rule;
- Revisions to Chapter 10 – Monitoring Waivers, to streamline the waiver process and include Source Water assessment information;
- Creation of a new Chapter 13 – Monitoring of Surface Water Sources, to incorporate relevant portions of WM 892, WM 904, and EPA Water Supply Guidance (WSG) 198, dated April 8, 2016. Existing Chapters 13 and 14 have been renumbered to Chapters 14 and 15, respectively.

The *Sampling Manual* provides instructions and clarifications to ODW staff regarding the compliance sampling and reporting requirements of the *Waterworks Regulations*. It identifies, describes, and provides information related to: sample groups; sampling locations; monitoring plans; sample scheduling; monitoring waivers; chemical/physical/radionuclide compliance determinations; approved laboratories; DCLS sample request procedures; and reporting of results.

The *Sampling Manual* is not intended to replace the requirements of the *Waterworks Regulations*. It has been and will remain the responsibility of the waterworks owner to ensure that the proper number of samples (bacteriological, physical, chemical, and radiological) are collected, submitted for analysis, analyzed and results reported to the appropriate Field Office.

The *Sampling Manual* references a number of templates (forms and letters) which are intended to: standardize office procedures, improve office efficiency, and address regulatory requirements. The templates should only be modified to address specific circumstances or individual Field Office situations, or where noted as optional.

Electronic Copy:

An electronic copy of this working memo in PDF format is available for staff internally at the following location: [odwsrv1\odwshare\03-Memos\301-Active Working Memos\301.01-pdf Active Memos](#).

An electronic copy of the *Sampling Manual* and attachments is available for staff internally at the following location: [odwsrv1\odwshare\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals\WM898- Sampling Manual](#).

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Disclaimer:

This document is provided as guidance and, as such, sets forth standard operating procedures for the Office of Drinking Water. However, it does not mandate or prohibit a particular action not otherwise required or prohibited by law. If alternative proposals are made, such proposals will be reviewed and accepted or denied based upon their technical adequacy and compliance with appropriate laws and regulations.

END OF MEMO



Compliance Sampling and Reporting Guidance Manual for ODW Staff

Version 4.1
June 15, 2016

VDH VIRGINIA
DEPARTMENT
OF HEALTH
Protecting You and Your Environment

Office of
Drinking
Water
*Safe Drinking Water for
a Healthy Virginia*

COMPLIANCE SAMPLING AND REPORTING GUIDANCE MANUAL

Version 4.1

FOREWARD

The *Waterworks Regulations* require routine monitoring of all public water supplies. It is the responsibility of the waterworks owner to ensure that the proper number of samples (bacteriological, chemical, physical, and radiological) are collected, submitted for analysis, analyzed and results reported to the appropriate Field Office. However, the Health Department will assist the owner, on a regular frequency in obtaining the necessary services from State approved laboratories for the collection of bacteriological, chemical, physical, and radiological samples.

This manual provides guidance for ODW staff on the procedures required for compliance sampling and reporting. It identifies: sampling locations, monitoring plans, sample schedules, groundwater source sampling requirements and surface water influence determination, monitoring waiver procedures, chemical and radionuclides compliance decision flow charts, special procedures for ordering invoices from the Division of Consolidated Laboratories (DCLS); and reporting of results. The manual also includes copies of various standard monitoring plans, review/evaluation forms, and letters.

EXCLUSIONS

This manual does NOT cover well development sampling.

REVISIONS SUMMARY

DATE	DESCRIPTION OF CHANGES
February 6, 2007	Original issuance
Sept. 21, 2009 (Version 2.0)	<ol style="list-style-type: none">1. Revised DCLS Table 2.1 with Sample Groups and Methods;2. Revised Section 4 Bacteriological Sample Site Report to include TNC (section 4.1.5) and Triggered Source Water sample criteria (Section 4.2.);3. Revised Section 6 Lead and Copper Monitoring Plan, to include LCR-STR changes;4. Revised Section 7, Groundwater Sources Raw Water Sampling and GUDI Determination;5. Included Section 8, Radiological Samples;6. Revised Section 9, Monitoring Waivers;7. Deleted Section V.III. New Sources;8. Deleted Section V.IV. Groundwater Sources and Surface Influence Determination9. Included note regarding TTHM / HAA5 Running Annual Average, Section 11.5;10. Revised Section 12, Laboratories;11. Revised Section 13 DCLS Sample Kit Request Procedures to include new Ad Hoc ordering procedures and Triggered Source Water Monitoring kit dispatch;12. Revision to Section 14, Evaluation and Distribution of Sample Results;13. Included Section 15, with revised Samples / Letters / Forms for Bacteriological Sample Site Report (to include Triggered Source Water Samples) and14. Lead and Copper Monitoring Review Forms and Approval Letters updates to include LCR-STR changes.
April 19, 2011 (Version 3.0)	<ol style="list-style-type: none">1. Revised section 2.1, DCLS Sample Groups.2. Updated Section 5 – Disinfection and Disinfection Byproducts Regulatory Requirements and Monitoring Plans, for provisions of ST2 Rule, as incorporated into the revised <i>Waterworks Regulations</i>.3. Updated Section 6 – Lead and Copper Monitoring Plan, to include LCR Short Term Revisions and Clarifications. This section incorporates WM 907, which

	<p>has been deleted. Includes new flowchart for Corrosion Control Treatment and Examples section.</p> <ol style="list-style-type: none"> 4. Revised Section 7- Groundwater Sources Raw Water Sampling and GUDI Determination. Revised GUDI Determination Review Sheet, and Raw Water Monitoring Decision Flow Chart, and notification letter. This section incorporates WM 905, which has been deleted, and deletes the original GUDI Determination Flow Chart. 5. Added new Section 9 – Contaminants of Concern. It includes emerging non-regulated contaminants such as MTBE, Chromium-6 and Perchlorate. The MTBE section replaces WM 807 and WM831, which have been deleted. 6. Section 12 “Laboratories” has been deleted, and Section 16 “Sample Letters and Forms” has been deleted.
August 22, 2011 (Version 3.1)	<ol style="list-style-type: none"> 1. Revised Chapter 5, Disinfectants and Disinfection Byproducts: changes to sections 5.1, 5.4.1 and 5.4.2. Added DBP & OEL results letter and new OEL Report Review Sheet. 2. Revised Chapter 13, section 13.3 – Bacterial Repeat and triggered source water monitoring kit dispatch with staff procedure for ordering additional repeat bottle containers and labels. 3. Deleted section 14.3, Calculation form for Running Annual Average.
December 29, 2011 (Version 3.2)	<ol style="list-style-type: none"> 1. Revise Chapter 11, section 11.8- Standard Monitoring Schedule to correct 1st, 2nd and 3rd period delimiters, clarify & correct radionuclides monitoring.
March 12, 2012 (Version 3.3)	<ol style="list-style-type: none"> 1. Revise Chapter 5, section 5.4.2 – DBP Compliance & Operational Evaluation Level (OEL) Calculations, to include OEL forms, 2. Revise Chapter 5, section 5.4.3 - Stage 2 Reduced Monitoring, to clarify source running annual average TOC criteria. 3. Added sentence to first paragraph of section 11. Sample Scheduling noting when a thorough review of sampling requirements is needed.
October 10, 2012 (Version 3.4)	<ol style="list-style-type: none"> 1. Chapter 2, Table 2.1 – DCLS Sample Groups, has been eliminated. Reference now made to ODW Website for information. 2. Chapter 5, Section 5.4.1. – DBP monitoring changes from ST1 to ST2 Rules have been clarified. 3. Chapter 9 – Section 9.3 Perchlorate has been updated. 4. Chapter 11, Table 11.6 – Location for TOC & Alkalinity sampling points has been corrected, footnote on alkalinity monitoring has been added, and the significant digits of the TOC removal ratio corrected. 5. Chapter 13 – Monitoring schedules posted to ODW Website and those submitted to DCLS have been clarified.

DATE	DESCRIPTION OF CHANGES
February 4, 2015 (Version 3.5)	<ol style="list-style-type: none"> 1. Chapter 5 (5.4.2 DBP Compliance & Operational Evaluation Level (OEL) Calculations) - A compliance equation for situations where a quarterly sample is missed has been added. A reference to the OEL approval letter template has been added. 2. Chapter 5 (5.5.5. ST2: Groundwater Systems Serving <10,000) – The decision flowchart has been corrected. 3. Chapter 7 (Groundwater Source Water Monitoring and GUDI Determinations) is revised completely, including associated attachments (form letters and GUDI Determination Worksheet). 4. Chapter 9 – A section on harmful algal blooms has been added.
December 9, 2015 (Version 4.0)	<ol style="list-style-type: none"> 1. Chapter 1 - Changed "BSSR" to "BSSP" in the List of Abbreviations. 2. Chapter 4 - Replaced entire text to include requirements of both RTCR and GWR. Triggered source water monitoring is combined with BSSP for groundwater systems. 3. Chapter 6 – Corrected <i>Regulations</i> reference in section 6.15. 4. Chapter 13 - Updated to include requirements of RTCR for repeat samples. 5. Minor corrections made to flowcharts 5.5.5, 6.22, 12.1.6, 12.2.1, and 12.2.2.
June 15, 2016 (Version 4.1)	<ol style="list-style-type: none"> 1. Created new Chapter 13 to incorporate WMs 892 and 904, and established staff guidance on monitoring of surface water sources, incorporating EPA’s WSG 198 dated April 8, 2016. 2. Renumbered existing Chapters 13 and 14 to Chapters 14 and 15, respectively. 3. Updated Chapter 10 to include Source Water Assessment information in the evaluation of SOC waiver applications, and updated all attachments. Created a single waiver application form.

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1. List of Abbreviations

BSSP – Bacteriological Sample Siting Plan

CCR – Consumer Confidence Report

CCT – Corrosion Control Treatment

CP – Copper Pipe

CR – Combined Radium Ra226 + Ra228

Cu - Copper

DBCP - Dibromochloropropane

DBP – Disinfection Byproducts

DBPR – Disinfection Byproducts Rule

DCLS – Division of Consolidated Laboratory Services

EDB – Ethylene dibromide

EP – Entry Point

GA – Gross Alpha Activity

GUDI – Groundwater Under the Direct Influence of Surface Water

GW - Groundwater

HAA5 – Haloacetic Acids (five)

IOC – Inorganic Chemicals

LSLR – Lead Service Line Replacement

LSR – Lead Service Lines

LUA – Land Use Activity

MCL – Maximum Contaminant Level

MCLG – Maximum Contaminant Level Goal

MFR – Multi-Family Residence

MPN – Most Probable Number bacteriological analysis method

MRDL – Maximum Residual Disinfection Level

NTNC – Nontransient Noncommunity water system

ODW – Office of Drinking Water

OWQP – Optimum Water Quality Parameters

Pb – Lead

PWS – Public Water System

RAA – Running Annual Average

SDWA – Safe Drinking Water Act

SFR – Single Family Residence

SOC – Synthetic Organic Chemicals

SOP – Standard Operating Procedure

SUVA – Specific Ultraviolet Absorption at 254 nanometers

SW – Surface Water

TNC – Transient Noncommunity waterworks

TOC – Total Organic Carbon

TTHM – Total Trihalomethanes

U - Uranium

VOC – Volatile Organic Chemicals

WQP – Water Quality Parameters

2. Sample Groups

The *Waterworks Regulations* include a list of the required bacteriological, chemical, physical, and radiological samples.

Required bacteriological analyses are based on whether the water sample is collected from the distribution system or directly from the water source.

Required Bacteriological Sampling Locations and Analysis Methods

Sample Location	Analysis Type
Source/Raw Water	Quantitative Analysis Methods
Approved Distribution System Sites	Presence / Absence Analysis Methods for total coliform and E. coli bacteria

Required chemical, physical, and radiological analyses are listed in Tables 2.2 through 2.13 of the *Waterworks Regulations*. A current list of the various contaminants by analysis group is included in the monitoring schedules (MS Excel workbook) posted on the ODW Website under “Information for Laboratories” tab.

3. Sample Locations / Monitoring Plans

3.1. Compliance Sample Location Types

Water samples to be analyzed for compliance purposes must be collected from sample locations within a waterworks listed below:

Source Water (Raw Water) – Source water samples are water samples collected from the source prior to any treatment.

Combined Filter Effluent – Combined Filter Effluent samples are water samples collected where the effluent from multiple filters combine to represent the treated water at a conventional surface water treatment plant.

Entry Point – Entry Point samples are water samples collected after application of any treatment as the water is entering the distribution system before the first customer.

Distribution System – Distribution System samples are water samples collected from approved locations within the distribution system of a waterworks.

Treatment Process Control - Treatment Process Control samples are water samples collected at various locations within a treatment plant and include but are not limited to source water samples, treated water samples, settled water samples, individual filter effluent water samples, combined filter effluent water samples, and entry point samples. Treatment Process Control samples are not only used for compliance purposes but also for the purpose of identifying needed process changes at a treatment plant.

3.2. Monitoring Plans

The *Waterworks Regulations* require certain monitoring plans to be submitted for review and approval. Listed below are the various monitoring plans needed by waterworks. The procedures for developing, reviewing, and approving these monitoring plans are found in the sections listed below.

- Bacteriological Sample Site Plan (Section 4)
- Disinfectants/Disinfection Byproducts Rule (Stage 1 and 2 DBPR) Regulatory Requirements and Monitoring Plans (Section 5)
- Lead and Copper Rule Materials Survey/Sampling Plan (Section 6)

4. Bacteriological Monitoring

Bacteriological monitoring is required under two EPA Rules: the Revised Total Coliform Rule (RTCR) and the Groundwater Rule (GWR). For waterworks with groundwater sources, both rules apply. For waterworks with only surface water sources or those that have been declared to be groundwater under the direct influence (GUDI) of surface water, only the RTCR applies. All consecutive waterworks must comply with the RTCR, regardless of the source water. If the consecutive waterworks' source water is groundwater, the raw water sampling requirements of the GWR will apply to the wholesaler waterworks.

4.1. RTCR and GWR Requirements

The RTCR and the GWR require bacteriological monitoring of the distribution system and untreated groundwater source supplies, respectively. Each rule requires a monitoring plan establishing sampling sites specifically selected to ensure representative sampling. Where appropriate, ODW has elected to have these two monitoring plans combined into a single plan, referred to as a Bacteriological Sample Siting Plan (BSSP), with all of the sample site information specified. All monitoring plans shall be reviewed and approved by ODW in accordance with this guidance.

4.1.1. Bacteriological Sample Siting Plan (BSSP)

Under the RTCR, all waterworks must monitor their distribution systems according to a specific frequency established in a written, approved BSSP, as described in the *Waterworks Regulations*. The BSSP establishes the collection of routine and repeat water samples for microbial analysis, specifically total coliform and *Escherichia coli* (*E. coli*). Whenever a routine sample is tested and the result indicates the presence of total coliform, **three repeat samples**¹ must be collected for each total coliform-positive routine sample.

The number of routine samples to be collected by any waterworks is based on the population served, in accordance with the *Waterworks Regulations*. However, in cases where the population may vary during the monitoring period, particularly seasonal waterworks, the number of samples must be adjusted accordingly. The BSSP will establish all of the routine and repeat sample sites representative of water quality in the distribution system.

Under the GWR, source water monitoring for *E. coli* is required for all groundwater source waterworks that do not provide 4-log virus inactivation, whenever there is a total coliform-positive result from routine RTCR distribution system monitoring. Groundwater waterworks are required to conduct triggered source water monitoring, representative of all water sources in use at the time that resulted in the total coliform-positive sample. All triggered source water monitoring sites are to be identified in the BSSP.

A waterworks map or sketch must be included and must indicate the location of every routine, repeat, and (for groundwater systems) triggered source water monitoring site. The map does not have to be to scale, but it should accurately represent the distribution system, the raw water sources, and the sample locations.

For the special case of “dual purpose sampling,” a waterworks consisting of a single groundwater well, without treatment, serving 1,000 persons or fewer, and required to conduct triggered source water monitoring under the GWR, may use a groundwater raw sample to satisfy the requirements of both the triggered source water monitoring requirement of the GWR and the repeat sampling requirement of the RTCR. [This type of sample is called a “dual purpose sample”].

¹ This is a change from the TCR, which required four repeat samples.

4.1.2. Routine Source Water Monitoring

Groundwater sources that provide chlorination or UV disinfection and which may be at risk of being GUDI are required to monitor each source in accordance with Chapter 7 of this manual.

4.2. Water Distribution System Sample Sites

4.2.1. General Considerations

Sample locations shall be representative of all significant conditions that exist in a water distribution system. All sites selected should be readily accessible, regularly used, cold water taps or dedicated sampling stations. Factors to consider for site selections:

- Water distribution system configuration, including mains, laterals, loops and dead ends;
- Storage tank proximity and surrounding pressure zones;
- Pipe materials;
- Age and condition of pipe;
- Water use;
- Population density;
- Areas with 'mixed' water from different sources;
- Areas with longer hydraulic retention times; and
- Areas of the distribution system with lower system pressure.

4.2.2. Site Selection Criteria

1. A minimum of three (3) routine sample sites shall be identified for each required routine sample for waterworks serving 3,300 or fewer people. [For waterworks with extremely limited water distribution systems, exceptions are appropriate if documented following consultation with the field office staff.]
2. A minimum of 12 routine sample sites shall be identified for waterworks serving more than 3,300 people; however each large waterworks shall be evaluated on a case-by-case basis to determine the number of sample locations needed to assure representative sampling.
3. For each routine sample site, two repeat sample sites – one within five service connections upstream and one within five service connections downstream of the routine location are to be identified. When a routine sample tests positive, these three sites are to be used to collect repeat samples. Only readily identifiable repeat sample locations should be selected.
4. Each sample location must be accessible, such as a customer's water faucet, dedicated sampling station, or other designated compliance sample site, and preferably identified by a physical address (e.g., a 911 address). Each sample location must have an identifying code number; e.g., 010 for a routine site, and a 01U (upstream site) and a 01D (downstream site) as its associated repeat sites.
5. Each plan must include a statement indicating how the sample locations will rotate through each site from month to month or quarter to quarter.
6. Alternative monitoring locations for repeat samples that better characterize possible contamination routes into the distribution system can be allowed via an approved waterworks-generated Standard Operating Procedure (SOP). Waterworks can choose to specify either alternative fixed locations or criteria for selecting other repeat sampling locations on a situational basis using these SOPs. Refer to Attachment A.1 for guidance (available on \\odwshare\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals\WM898- Sampling Manual\BSSP.) All SOPs must be included in the BSSP, and are subject to review and revisions, when significant changes are observed at the waterworks during sanitary surveys.

7. The number of samples to be taken in the monitoring period is based on population served. For waterworks with mixed populations, it is important to consider both residential and transient population together to determine an “average” population, hence the number of samples required. In addition, a seasonal waterworks may have varying populations throughout the operating period, so the number of routine samples required may vary from month-to-month.
8. The RTCR requires groundwater TNCs on a quarterly monitoring frequency to increase to monthly monitoring for 12 months if the waterworks incurs any of the following:
 - Triggers a Level 2 assessment or two Level 1 assessments in a rolling 12-month period;
 - Has an *E. coli* MCL violation;
 - Has a total coliform TT violation; or
 - Has two RTCR monitoring violations or one RTCR monitoring violation and one Level 1 assessment in a rolling 12-month period for a waterworks on quarterly monitoring.
9. Groundwater TNC waterworks may return to routine monitoring (quarterly frequency) after 12 months of monthly monitoring and the waterworks meets all of the following:
 - A sanitary survey, site visit, or a voluntary Level 2 assessment has been performed;
 - Free of sanitary defects;
 - Has a protected water source; and
 - Has a clean compliance history².

4.3. Repeat Monitoring

Whenever a routine sample is tested and the result indicates the presence of total coliform, **three repeat samples** must be collected for each positive routine sample in accordance with the BSSP. However, a waterworks that has a small distribution system (i.e., limited site selection options) and consists of a single well without treatment may use the GWR triggered source water monitoring sample to meet the upstream repeat sample requirement.

If a coliform treatment technique trigger is exceeded and a Level 1 assessment is required (as described in Working Memo 917), no further repeat monitoring is performed. Note that a waterworks required to take more than one routine sample must take at least one set of repeat samples for each positive routine sample.

4.4. Representative Groundwater Source Sample Sites

4.4.1. General Requirements

Waterworks with multiple groundwater sources may conduct representative untreated source water sampling in order to reduce the burden of triggered untreated source water monitoring. One of the following specific conditions must be met and listed in the approved BSSP:

1. Hydraulic conditions dictate that a source provides water to an isolated area of the distribution system. Consequently, only source(s) identified as providing water to specific RTCR monitoring locations must be used to collect the triggered source water samples based on sample results from the specified RTCR sample point. The plan must clearly identify groundwater sources linked to each RTCR monitoring site in the waterworks.
2. Documentation accepted by ODW exists that clearly demonstrates that the sources are chemically, physically, and hydro-geologically similar. Consequently, one source may serve as

² A “clean compliance history” is defined as 12 consecutive months of: no *E. coli* PMCL exceedances; continuous compliance with RTCR monitoring requirements and treatment technique requirements; and no occurrence of coliform treatment technique triggers.

the triggered source water sample location representing two or more sources. The plan must clearly list representative triggered source water monitoring procedures, based on the documentation. References to the documentation must be included in the plan.

4.4.2. Source Water Site Selection Criteria

The selection of triggered source water monitoring sites is based on representative sampling of the sources in use at the time the total coliform-positive sample was collected. These sites are to be incorporated in the combined BSSP waterworks map (or sketch) used to indicate where every routine and repeat monitoring site is located.

4.5. Templates & ODW Review

BSSP templates were developed to assist staff in selecting and “tailoring” a BSSP for a particular waterworks in these attachments (available on \\odwshare:\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals\WM898- Sampling Manual\BSSP):

- B.1. BSSP GW Serving 1,000 or Fewer People
- B.2. BSSP GW Serving More than 1,000 People
- B.3. BSSP SW & GUDI
- B.4. BSSP TNC Seasonal Waterworks
- B.5. BSSP Table for Multiple Pressure Zones – Example

Three templates (Attachments B.1, B.2, and B.4) were developed by ODW for bacteriological monitoring of groundwater waterworks, and include provisions that can be adapted to meet the sampling requirements of both the RTRC and GWR.

A wholesaler and a consecutive waterworks each need to have their own BSSP regardless of source type. However, if the wholesaler has a groundwater source, the consecutive waterworks BSSP needs to indicate that it will promptly notify the wholesaler of any positive samples collected from their distribution system (per RTRC) so that the wholesaler can collect the triggered source water monitoring sample (per GWR) in coordination with the repeat samples in the consecutive waterworks.

Attachments C.1. BSSP Review Sheet, and C.2. BSSP Approval Letter, have been developed for ODW staff to evaluate all monitoring plans and communicate with owners (available on \\odwshare:\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals\WM898- Sampling Manual\BSSP.)

4.6. TNCs

TNCs operated on a year-round basis are the only classification of waterworks that may be allowed to monitor routinely on a quarterly frequency. A monthly frequency is required for TNCs serving more than 1,000 people and for seasonal waterworks of all sizes.

The number of samples to be collected is based on the population served in accordance with Table 2.1 of the *Waterworks Regulations*. However, in cases where the population may vary during the monitoring period, as in the case of seasonal waterworks, the number of samples must be adjusted accordingly and accounted for in the BSSP.

4.7. Additional Monitoring

TNCs collecting samples on a quarterly frequency shall collect at least three additional routine samples during the month following one or more total coliform-positive samples (with or without a Level 1

treatment trigger exceedance). This requirement may be waived if at least one of the following conditions is met:

1. ODW performs a site visit before the end of the next month to determine if additional monitoring or corrective action is needed, or
2. ODW has determined the cause of the positive sample, that the waterworks has corrected the problem or will correct the problem before the end of the next month and documented this, or
3. ODW has determined that the waterworks has corrected the contamination problem before taking the repeat samples and all of which tested total coliform negative.

4.8. Reduced Monitoring

ODW will not allow any waterworks to conduct reduced monitoring as is allowed in the federal regulations.

4.9. Seasonal Waterworks

Seasonal waterworks must perform routine monitoring on a monthly frequency. In cases where the population may vary during the monitoring period, the number of samples must be adjusted accordingly. The number of samples to be collected is based on the population served in accordance with the *Waterworks Regulations*.

Seasonal waterworks must have an approved start-up procedure, which includes the collection of two special bacteriological samples taken a minimum of 16 hours apart, from a sample site listed in its approved BSSP. These samples must test negative for the presence of total coliform before water is served to the public. WM 917 provides further guidance on seasonal waterworks start-up procedures.

5. Disinfectants and Disinfection Byproducts Regulatory Requirements and Monitoring Plans

Sampling of disinfectant residuals, disinfection byproducts and disinfection byproduct precursors is covered in section 12VAC5-590-370-B.3 of the *Waterworks Regulations*. The *Waterworks Regulations* establish maximum contaminant level goals (MCLGs), maximum contaminant levels (MCLs), and maximum residual disinfectant levels (MRDLs). The *Waterworks Regulations* also establish a treatment technique for disinfection byproduct precursors.

5.1. Monitoring Plans

All Community and NTNC waterworks using chlorine, chloramines, chlorine dioxide (as a disinfectant or oxidant) and/or ozone must develop and implement a plan for disinfectant residual monitoring and for disinfection byproduct monitoring.

Community and NTNC waterworks with surface water or GUDI sources using conventional filtration treatment and/or ozone must also develop and implement a plan for disinfection byproduct precursor monitoring. TNC waterworks using chlorine dioxide as a disinfectant or oxidant must develop a plan for disinfectant residual monitoring.

Each waterworks should have one monitoring plan that includes disinfectant residual, disinfection byproduct monitoring, and disinfection byproduct precursor monitoring, as required. In order to facilitate compliance, ODW will draft the initial monitoring plan for all waterworks regardless of water source or size. The plan must include monitoring location and dates for routine monitoring, increased monitoring, and calculation procedures for compliance and operational evaluation level. Templates have been created for this purpose, and are posted here [:\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals\WM898- Sampling Manual\Stage 2 - DDBP Rule](#)

Reduced and increased monitoring requirements for TTHM/HAA5 are not included in the monitoring plans because the details are dependent on results of routine monitoring.

Stage 2 Monitoring Plans will replace Stage 1 Monitoring Plans. The table below lists monitoring start dates for Stage 2 monitoring as well as recommended dates for plan preparation and approval. These dates are earlier than the deadlines given to the waterworks in the template approval letter (Appendix D of WM909). Note also that while the number of sites and sampling frequency is based on current population and water source, the ‘Schedule’ is based on the 4/1/06 population.

PWS or CDS³: Population	Draft Plan Date	Approved Plan Date	Monitoring Start Date
Sch 1: ≥ 100,000	October 1, 2011	January 1, 2012	April 1, 2012
Sch 2: 50,000-99,999	April 1, 2012	July 1, 2012	October 1, 2012
Sch 3: 10,000-49,999	April 1, 2013	July 1, 2013	October 1, 2013
Sch 4: < 10,000 w/o crypto monitoring	April 1, 2013	July 1, 2013	October 1, 2013
Sch 4: <10,000 w/crypto monitoring	April 1, 2014	July 1, 2014	October 1, 2014

The plan must be approved by ODW no later than the date of the first required report, and must be made available for inspection by the ODW and the public.

³ If a waterworks is included in a Combined Distribution system (CDS), their schedule is based on the population of the largest waterworks’ service population in the CDS.

5.2. Disinfectant Residual Monitoring

5.2.1. Monitoring Frequency (12-VAC 5-590-370 B.3.h)

Community and NTNC waterworks using **chlorine or chloramines** for disinfection or oxidation must sample for the disinfectant residual at the same time and same locations as total coliform are sampled. NOTE: Separate locations may be approved for monitoring if the location is more representative of the treated water quality.

Community, NTNC and TNC waterworks using **chlorine dioxide** for disinfection or oxidation must sample daily for disinfectant residual at the entrance to the distribution system. Each day following a MRDL exceedance, three additional chlorine dioxide residual samples must be collected at intervals of at least 6 hours. These samples must be collected as close to the first customer as possible. If booster chlorination (re-chlorination) is provided, the three samples must be collected as follows: 1) close to the first customer as possible, 2) at a location representative of average residence time, and 3) as close to the end of the distribution system as possible reflecting maximum residence time. NOTE: Chlorine dioxide monitoring may not be reduced.

5.2.2. Reporting and Recordkeeping Requirements

DISINFECTANT RESIDUALS	
Parameter	Must Report
Chlorine or Chloramines 12 VAC 5-590-530 F.1.	<ul style="list-style-type: none">• The number of samples taken during each month of the last quarter.• The monthly average of all samples taken in each month for the last 12 months.• The average of all monthly averages for the last 12 months.• Whether the MRDL was violated.
Chlorine Dioxide 12 VAC 5-590-530 F.2.	<ul style="list-style-type: none">• The dates, results and locations of samples taken during the last quarter.• Whether the MRDL was violated.• Whether the MRDL was exceeded in any two consecutive daily samples and whether the resulting violation was acute or non-acute.

5.3. Disinfection Byproduct Precursors Monitoring

5.3.1. Monitoring Frequency (12 VAC 5-590-370 B.3.j)

Routine Monitoring – Community and NTNC surface water and GUDI sources using conventional treatment must collect one source water (prior to any treatment) TOC and alkalinity sample and one treated water (no later than the point of combined filter effluent turbidity monitoring representative of the treated water) TOC sample at each treatment plant per month. The source water and treated water samples must be collected at the same time (representing normal operating conditions and influent water quality) and are referred to as paired samples.

Reduced Monitoring – Waterworks which have an average treated water TOC of less than 2.0 mg/l for two consecutive years, or less than 1.0 mg/l for one year may reduce monitoring to one paired TOC and alkalinity source water samples quarterly from each treatment plant. The waterworks must revert to routine monitoring in the month following the quarter when the annual average treated water TOC is equal to or is greater than 2.0 mg/l.

5.3.2. Reporting and Record Keeping Requirements

DISINFECTION BYPRODUCTS PRECURSORS	
Parameter	Must Report
Waterworks monitoring monthly or quarterly for TOC and required to meet the enhanced coagulation or enhanced softening requirements. 12 VAC 5-590-530 G.1.	<ol style="list-style-type: none"> 1. The number of paired (source water and treated water) samples taken during the last quarter. 2. The location, date and results of each paired sample and associated alkalinity taken during the last quarter. 3. For each month in the reporting period that paired samples were taken, the average of the percent reduction of TOC for each paired sample and the required TOC percent removal. 4. Calculations for determining compliance with the TOC percent removal requirements. 5. Whether the waterworks is in compliance with the enhanced coagulation or enhanced softening percent removal requirements for the last four quarters.
Waterworks monitoring monthly or quarterly for TOC and meeting one or more of the alternative compliance criteria. 12 VAC 5-590-530 G.2.	<ol style="list-style-type: none"> 1. The alternative compliance criterion that the system is using. 2. The number of paired samples taken during the last quarter. 3. The location, date and result of each paired sample and associated alkalinity taken during the last quarter. 4. The running annual average based on monthly averages (or quarterly samples) of source water TOC or of treated water TOC 5. The running annual average based on monthly averages (or quarterly samples) of source water SUVA or of treated water SUVA. 6. The running annual average of source water alkalinity and of treated water alkalinity. 7. The running annual average for both TTHM and HAA5. 8. The running annual average of the amount of magnesium hardness removal (as CaCO₃, in mg/L). 9. Whether the waterworks is in compliance with the particular alternative compliance criterion.

5.4. Disinfection Byproducts Monitoring

5.4.1. Monitoring Requirements

Routine, Increased and Reduced Monitoring requirements for the following parameters are specified in the Waterworks Regulations 12VAC5-590-370 B.3: e. TTHM/HAA5, f. Chlorite, and g. Bromate.

Routine monitoring frequency is established based on source water type and population served. The intent of the Stage 2 rule is that compliance samples be collected in evenly spaced intervals. For waterworks required to sample quarterly, this would mean sampling in the same week in equally spaced months.

Example: A waterworks has a peak historical month of August. The waterworks schedules sample collection for the 1st week of August. Then, to space evenly, sample collection is scheduled for the 1st weeks of November, February and May.

Chlorite monitoring will be required for waterworks that use chlorine dioxide. Bromate monitoring will be required for waterworks that use ozone. The reduced monitoring requirement for bromate has changed from Stage 1 Rule; as of April 1, 2009 it is based on bromate results. Sampling may be reduced to quarterly if the bromate RAA \leq 0.0025 mg/l using methods 317.0 Rev. 2, 326.0 or 321.8.

Further information on Stage 2 compliance monitoring location selection is given in WM 909. Should there be a lab accident affecting any sample, only a replacement sample for the single sample is required (i.e. no paired sample or dual sample or full sets required.)

The number of sites and frequency of routine monitoring will be in accordance with the following table.

Service Population (a)	Routine Monitoring	
	Frequency	# Sites
Groundwater		
<500	annual	2 (b)
500-9,999	annual	2
10,000-99,999	quarter	4
Surface Water & GUDI		
<500	annual	2 (b)
500-3,300	quarter	2 (b)
3,301-9,999	quarter	2
10,000-49,999	quarter	4
50,000-249,999	quarter	8
250,000-999,999	quarter	12
1,000,000-4,999,999	quarter	16

(a) Refer to *Waterworks Regulations* for larger waterworks' monitoring requirements.

(b) 1 site for TTHM (only) and 1 site for HAA5 (only), or 1 site for both TTHM & HAA5.

For systems that submitted an IDSE report, site selection will be in accordance with the report. If systems have changed since the IDSE, sites may need to be revised. Changes should be made in accordance with the IDSE criteria and documented.

For systems that did not submit an IDSE report, an updated plan is still required, including month(s) of sampling, revised calculation, operational evaluation. Note that some systems that did not perform an IDSE will need additional sites. For these waterworks:

- The peak historic month of sampling should be selected using IDSE monitoring plan methodology (probably July or August).
- If the number of sites is the same, the Stage 1 site(s) becomes the Stage 2 site(s).
- If there is a decrease in sites, IDSE report methodology is used to pick between the existing sites (see WM 909).
- If there is an increase in sites, IDSE monitoring plan methodology is used to identify additional sites (see WM 895), specifically alternating between likely TTHM and HAA5 sites. ODW staff will determine the general location for the additional sample sites and contact the owner if specific addresses are needed. Many groundwater systems or consecutive surface water systems with 500-10,000 population will probably need 1 new site.

New waterworks, or newly-disinfecting waterworks, will require Stage 2 sampling sites. The waterworks may need to conduct an IDSE to determine these sites. This shall be determined on a case by case basis by the District Engineer, with concurrence of the Deputy Field Director or Field Director. The IDSE monitoring plan methodology may be appropriate.

A system that is conducting Stage 1 sampling at an increased or routine frequency will begin Stage 2 sampling at the same frequency. If a system is sampling at a reduced frequency, it may begin Stage 2 sampling at the next scheduled sampling period as identified under Stage 1 and continue with a reduced

frequency only if it meets **all** of the following criteria (otherwise it must begin sampling at routine frequency):

- Received a VSS waiver or 40/30 certification (refer to WM 909 for these terms),
- Meets reduced monitoring criteria for Stage 2 for all sites, and
- Stage 2 and Stage 1 locations are the same (typically only met for SW<3,300 or GW<500.)

If the waterworks was required to either change the number of sites (increase or decrease) or change the location of their site(s), they are not eligible to remain on reduced monitoring. These waterworks must begin routine monitoring under Stage 2 and can qualify again for reduced monitoring once criteria under Stage 2 are met.

Locations for reduced monitoring are not identified in the monitoring plan. They will be selected from the routine sites at the time monitoring is reduced. Site selection will be documented in R&R Scheduler and a letter to the waterworks owner amending the Sampling Plan shall be issued. Refer to letter template provided.

5.4.2. DBP Compliance & Operational Evaluation Level (OEL) Calculations

At the end of each Stage 2 monitoring period, the Operational Evaluation Level (OEL) is calculated along with the compliance level at each location. R&R will automatically calculate the compliance and OEL levels for each location based on the following formulae:

$$\text{Compliance} = (A + B + C + D) / 4$$

(if a quarterly sample is missed, then = $A+B+C / 3$)

$$\text{OEL} = [B + C + (2 * D)]/4$$

Where:

A = TTHM or HAA5 result for the 3rd previous quarter (mg/L)

B = TTHM or HAA5 result for the 2nd previous quarter (mg/L)

C = TTHM or HAA5 result for the previous quarter (mg/L)

D = TTHM or HAA5 result for the current quarter (mg/L)

The OEL weights more recent quarters and provides an indication of unusual things in the distribution system, or of rising DBP levels, either of which may require special attention. The OEL is exceeded if TTHM is >0.080 mg/l or if HAA5 is >0.060 mg/l. If the OEL is exceeded, the owner must produce a report to the ODW within 90 days of being notified by ODW. The Operation Evaluation report shall cover:

- A review of the results (calculations and history of the site)
- An examination of possible causes of the exceedance(s) including: storage tank operations, excess storage capacity, distribution system flushing, sources of supply and source water quality, treatment processes and finished water quality. Further information is provided in ST2 Operational Evaluation Guidance Manual (EPA 815-R-08-018). Operation Evaluation forms from the ST2 Operational Evaluation Guidance Manual have been reproduced on ODWSHARE, and may be provided to the owner for the evaluation. If the owner can clearly show the reason for the exceedance in writing, then a detailed examination of possible causes is not warranted.
- Actions that could minimize future exceedances or compliance level violations.

The OEL exceedance is not a violation, and does not need to be included in the CCR. Failure to submit the report is, and must be included in the CCR. ODW is *required* to review and approve the report, and must keep a copy in the system file. If the review shows the report to be incomplete (either a minor problem missing basic items or a significant problem missing additional details), then ODW shall require the owner to complete the report. If the owner fails to do so, then ODW shall issue a notice of violation for failure to comply with the regulations (submit a complete report). A form for review of the OEL report and the approval letter are provided with the other ST2 Rule templates on odwshare.

5.4.3. Stage 2 Reduced Monitoring

The following table summarizes reduced monitoring and the procedure to select the locations and frequencies. **Staff should document reduced monitoring in the R&R Scheduler comments.** To qualify for reduced monitoring:

- For all systems, each LRAA must have TTHM ≤ 40 ppb and HAA5 ≤ 30 ppb.
- For a SW or GUDI system, each source must also have a Running Annual Average raw water TOC ≤ 4.0 .
- For consecutive waterworks serving more than 500 people, with SW or GUDI primary source(s), each SW or GUDI source must also have a Running Annual Average raw water TOC ≤ 4.0 .⁴

A waterworks may be kept at routine monitoring by the FD or DFD if unusual circumstances dictate.

Service Population (a)	Reduced Monitoring		
	Frequency	# Sites	Comments
Groundwater			
<500	Triennial	2 (b)	1 individual TTHM at site and quarter of single highest TTHM, and 1 individual HAA5 at site and quarter of single highest HAA5.
500-9,999	Annual	2 (b).	1 individual TTHM at site and quarter of single highest TTHM, and 1 individual HAA5 at site and quarter of single highest HAA5.
10,000-99,999	Annual	2	1 dual sample (TTHM & HAA5) at site and quarter of single highest TTHM, and 1 dual sample (TTHM & HAA5) at site and quarter of single highest remaining HAA5.
Service Population (a)	Reduced Monitoring		
	Frequency	# Sites	Comments
Surface Water & GUDI			
<500			No reduced monitoring.
500-3,300	Annual	2 (b)	1 individual TTHM at site and quarter of single highest TTHM, and 1 individual HAA5 at site and quarter of single highest HAA5.

⁴ Memorandum dated Feb 2, 2012 from Mindy Eisenberg, Acting Chief Protection Branch, Drinking Water Protection Division, EPA, Washington, D.C.

3,301-9,999	Annual	2	1 dual sample (TTHM & HAA5) at site and quarter of single highest TTHM, and 1 dual sample (TTHM & HAA5) at site and quarter of single highest remaining HAA5.
10,000-49,999	Quarter	2 (c)	Dual samples, with one site chosen using highest TTHM LRAA and another site using the highest HAA5 LRAA.
50,000-249,999	Quarter	4 (c)	Dual samples, as above for total of 2 TTHM and 2 HAA5.
250,000-999,999	Quarter	6 (c)	Dual samples, as above for total of 3 TTHM and 3 HAA5.
1,000,000-4,999,999	Quarter	8 (c)	Dual samples, as above for total of 4 TTHM and 4 HAA5.

(a) Refer to *Waterworks Regulations* for larger waterworks' monitoring requirements.

(b) 1 site for TTHM (only) and 1 site for HAA5 (only), or 1 site for both TTHM & HAA5

(c) Generally, sites will be selected alternating highest TTHM and HAA5. This may be modified slightly to optimize health protection, such as using historic problem sites or seeking geographic diversity.

Determining reduced sampling at most GW waterworks should be fairly simple. Some odd sampling schedules can occur at small SW/GUDI systems. Consider the following:

Example 1- SW/GUDI, population: 500-3300

Routine Results (individual quarterly)					Reduced Schedule (individual, annually)	
	Jan	Apr	Jul	Oct		
TTHM	10	20	30	20		TTHM, one individual sample in Jul
HAA5	10	30	20	10		HAA5, one individual sample in Apr

Note that the site may be the same or different for TTHM and HAA5.

Example 2- SW/GUDI, population: 3301-9,999

Routine Results (2 dual, quarterly)					Reduced Schedule (2 dual, annually)	
	Jan	Apr	Jul	Oct		
TTHM – Site 1	10	20	50	20		Site-1, one dual sample set in Jul (based on high THM)
TTHM – Site 2	10	10	40	10		
HAA5 – Site 1	10	20	40	10		
HAA5 - Site2	10	30	20	10		Site-2, one dual sample set in Apr (based on highest HAA5 at remaining sites)

Waterworks may remain on reduced monitoring as long as:

- Waterworks on quarterly monitoring have TTHM ≤ 40 ppb and HAA5 ≤ 30 ppb.
- Waterworks on annual or triennial monitoring have TTHM ≤ 60 ppb and HAA5 ≤ 45 ppb.
- SW or GUDI waterworks also have a Running Annual Average raw water TOC ≤ 4.0 mg/l.
- For consecutive waterworks serving more than 500 people, with SW or GUDI primary source(s), each SW or GUDI source must also have a Running Annual Average raw water TOC ≤ 4.0.⁵

A waterworks must return to routine or increased monitoring if these conditions are not met. The FD or DFD may also put a system on routine or increased monitoring if unusual circumstances dictate.

⁵ Memorandum dated Feb 2, 2012 from Mindy Eisenberg, Acting Chief Protection Branch, Drinking Water Protection Division, EPA, Washington, D.C.

5.4.4. Stage 2 Increased Monitoring

Waterworks that use only groundwater and serve fewer than 10,000 people and waterworks that use SW or GUDI and serve fewer than 500 must proceed to increased monitoring if either the TTHM annual average is >0.080 mg/L or the HAA5 annual average is >0.060 mg/L. Increased monitoring must begin in the quarter immediately following the monitoring period where either of the above values was exceeded. A TTHM and HAA5 sample must be collected once a quarter at all locations under increased monitoring.

Waterworks may return to routine monitoring once increased monitoring has been conducted for at least four consecutive quarters and the LRAA for all monitoring locations is ≤0.060 mg/L for TTHM and ≤0.045 mg/L for HAA5. Otherwise, they must remain on increased monitoring.

5.4.5. Reporting and Recording Keeping Requirements

DISINFECTION BYPRODUCTS	
Parameter	Must Report
TTHM & HAA5	<ol style="list-style-type: none"> 1. Number of samples taken during the last quarter. 2. Location, date and result of each sample taken during the last quarter. 3. Average of all samples taken in the last quarter for each monitoring location. 4. Locational Running Annual Average (LRAA) of the quarterly arithmetic averages for the last four quarters for each monitoring location. 5. Whether the PMCL was exceeded at any monitoring location. 6. Whether any Operational Evaluation Level (OEL) was exceeded. If yes, the location, date, and calculated TTHM and HAA5 Operational Evaluation Level. <p>Subpart H systems qualifying for reduced monitoring must also report whether the raw water TOC RAA exceeded 4.0 mg/L.</p>
Systems using Chlorine Dioxide: Chlorite 12-VAC5-590-530 B.3.f.	<ol style="list-style-type: none"> 1. Number of entry point samples taken each month for the last 3 months. 2. Location, date, and result of each sample (both entry point and distribution system) taken during the last quarter. 3. For each month in the reporting period, the average of all samples taken in each three sample set taken in the distribution system. 4. Whether the PMCL was violated, in which month, and how many times it was violated each month.
Systems using Ozone: Bromate 12-VAC 5-590-530 B.3.g	<ol style="list-style-type: none"> 1. Number of samples taken during the last quarter. 2. Location, date and result of each sample taken during the last quarter. 3. The average of the monthly averages of all samples taken in the last year. 4. Whether the PMCL was violated.

5.5. Stage 2 DBPR Monitoring & Compliance Decision Flowcharts

Charts for Surface Water Systems

5.5.1. Surface Water Systems Serving $\geq 10,000$ People

5.5.2. Surface Water Systems Serving 500 – 9,999 People

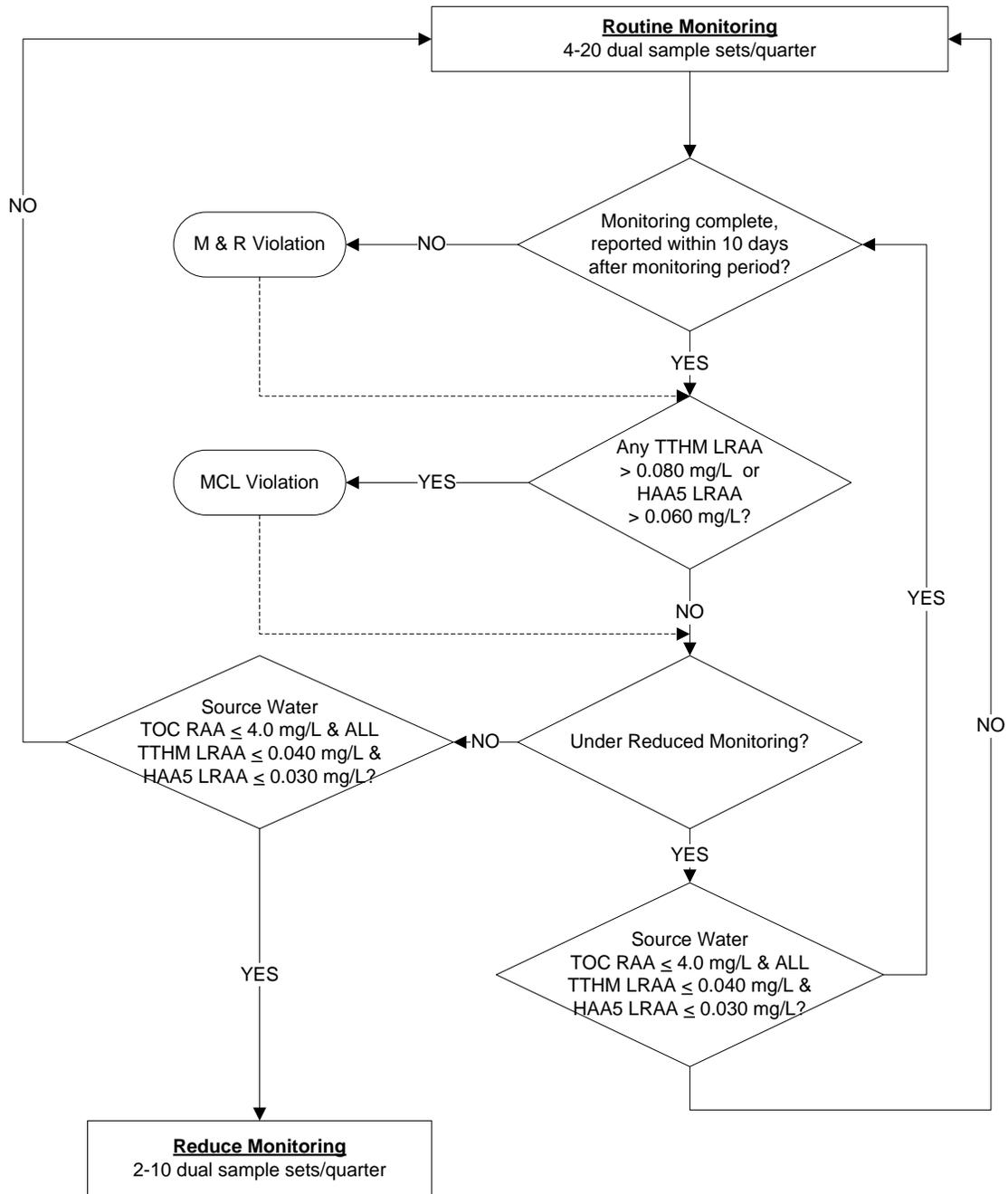
5.5.3 Surface Water Systems Serving < 500 People

Charts for Groundwater Systems

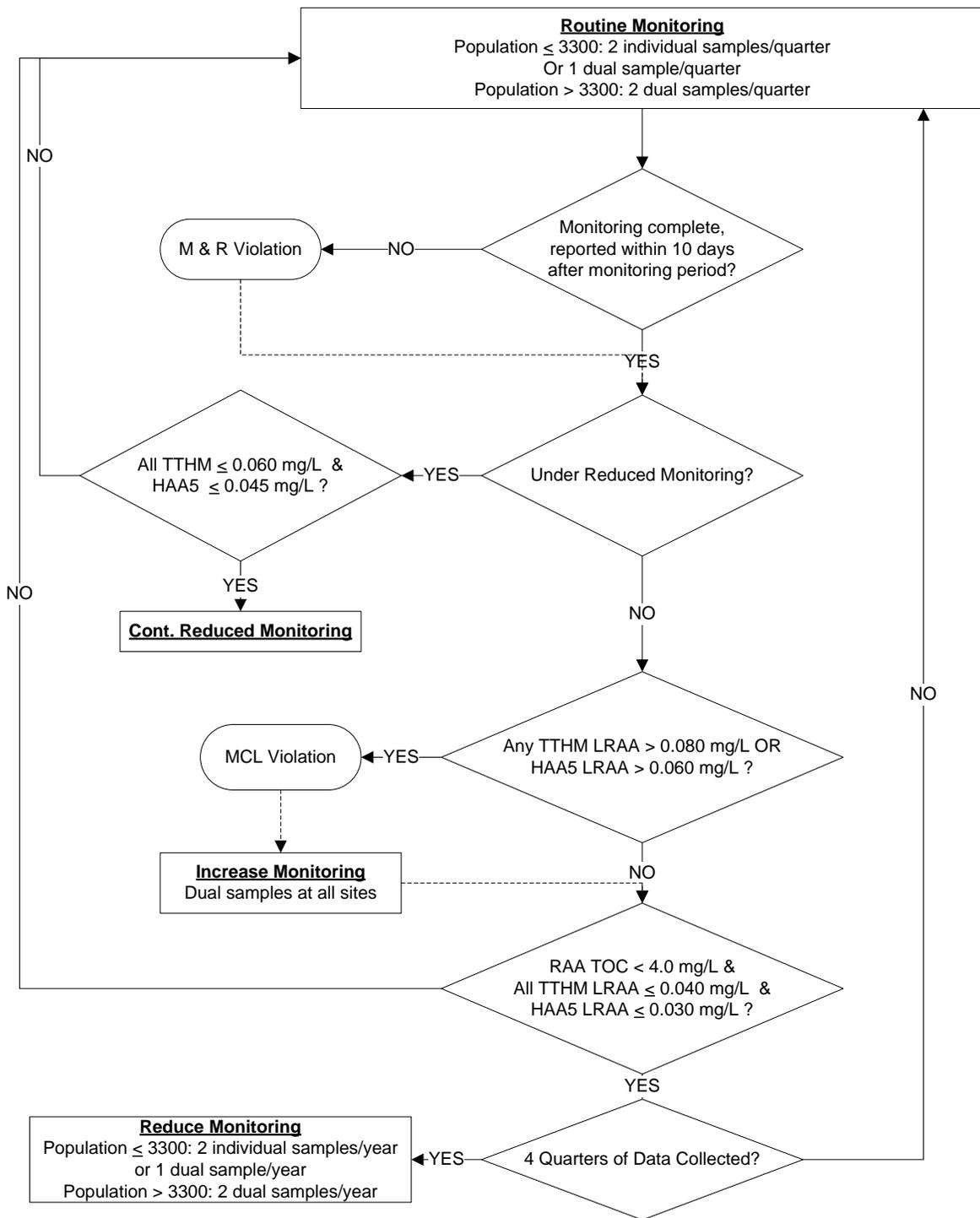
5.5.4. Groundwater Systems Serving 10,000 – 99,999 People

5.5.5 Groundwater Systems Serving $< 10,000$ People

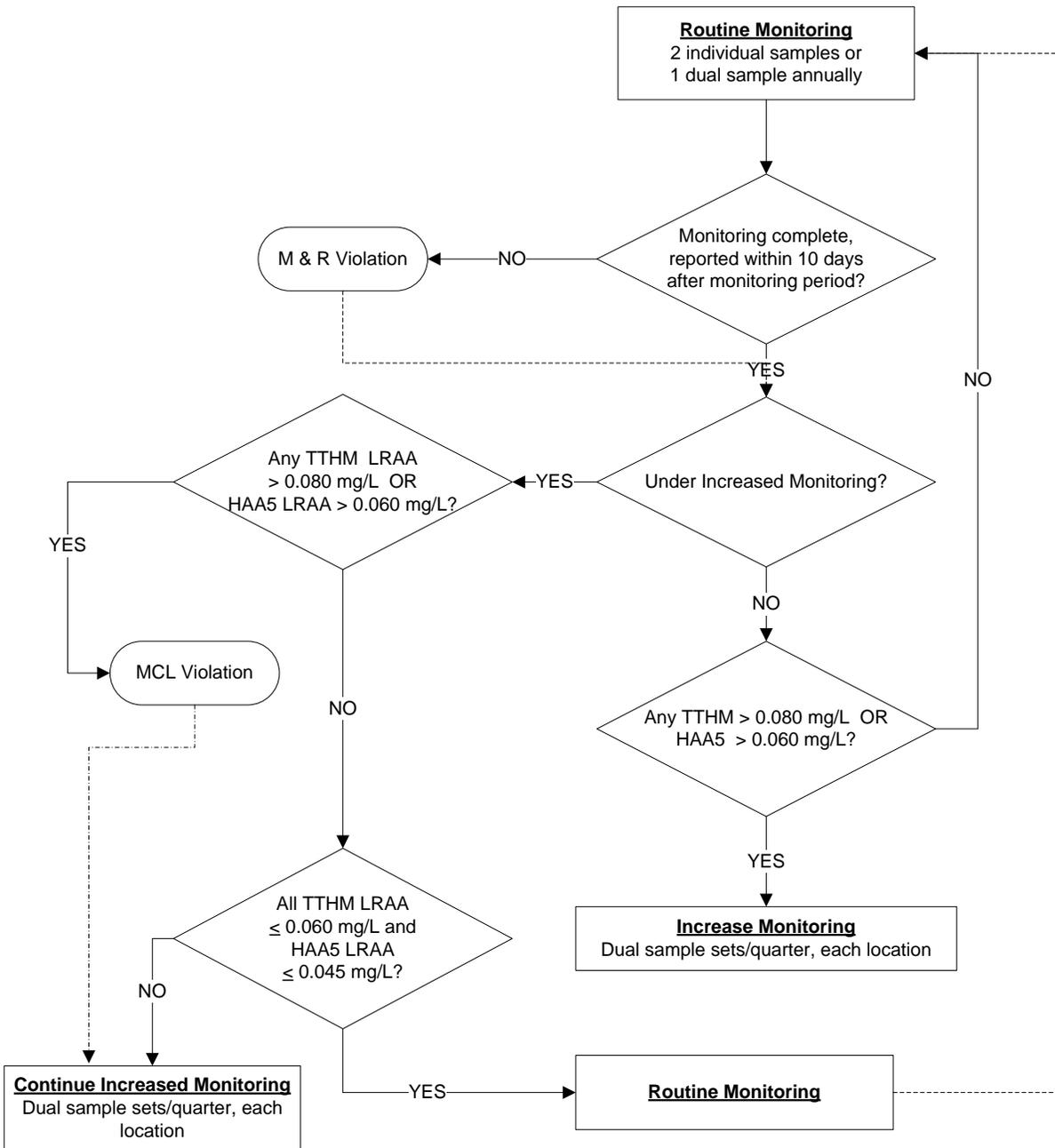
5.5.1. ST2: Surface Water Systems Serving $\geq 10,000$ People



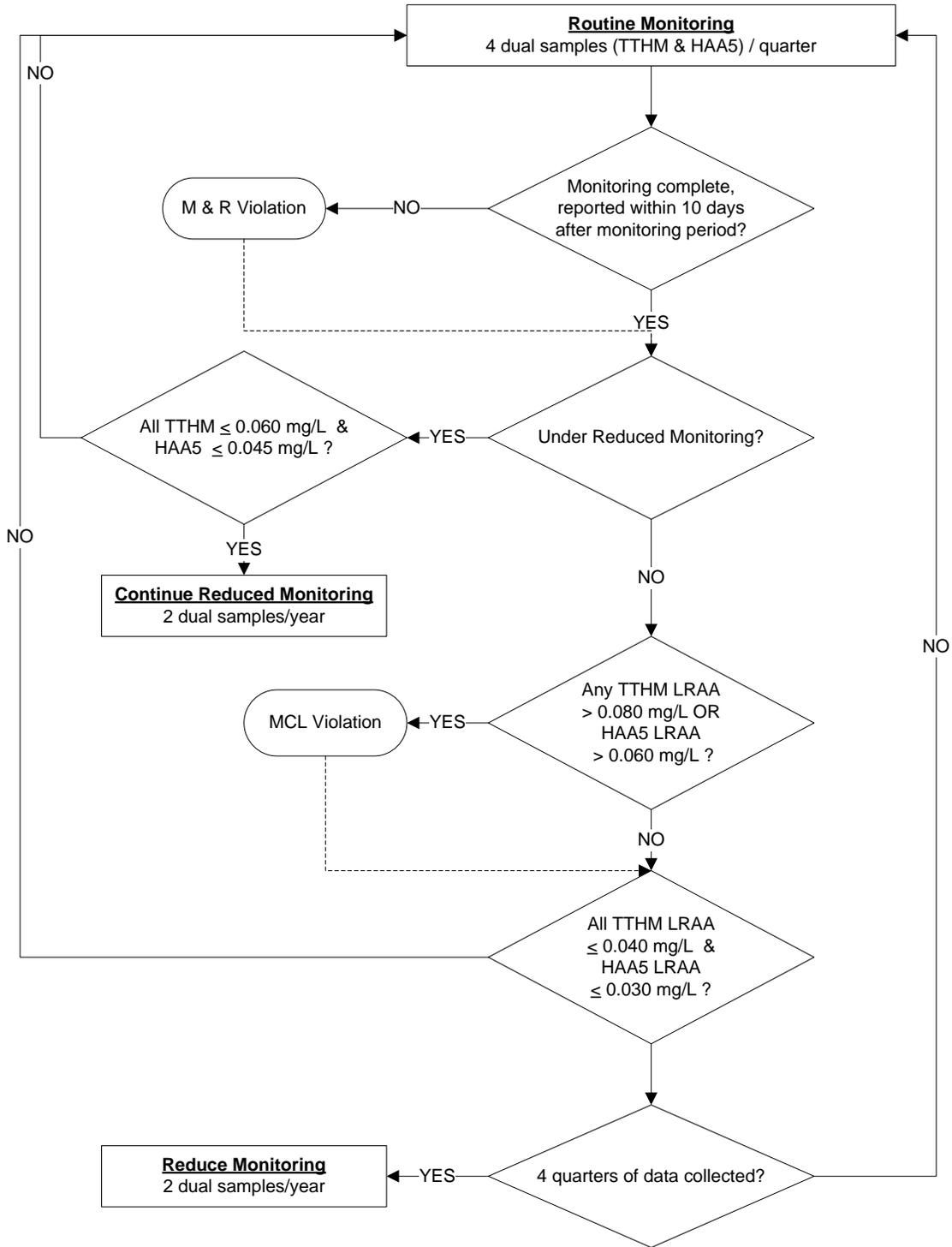
5.5.2. ST2: Surface Water Systems Serving 500 – 9,999 People



5.5.3. ST2: Surface Water Systems Serving < 500 People



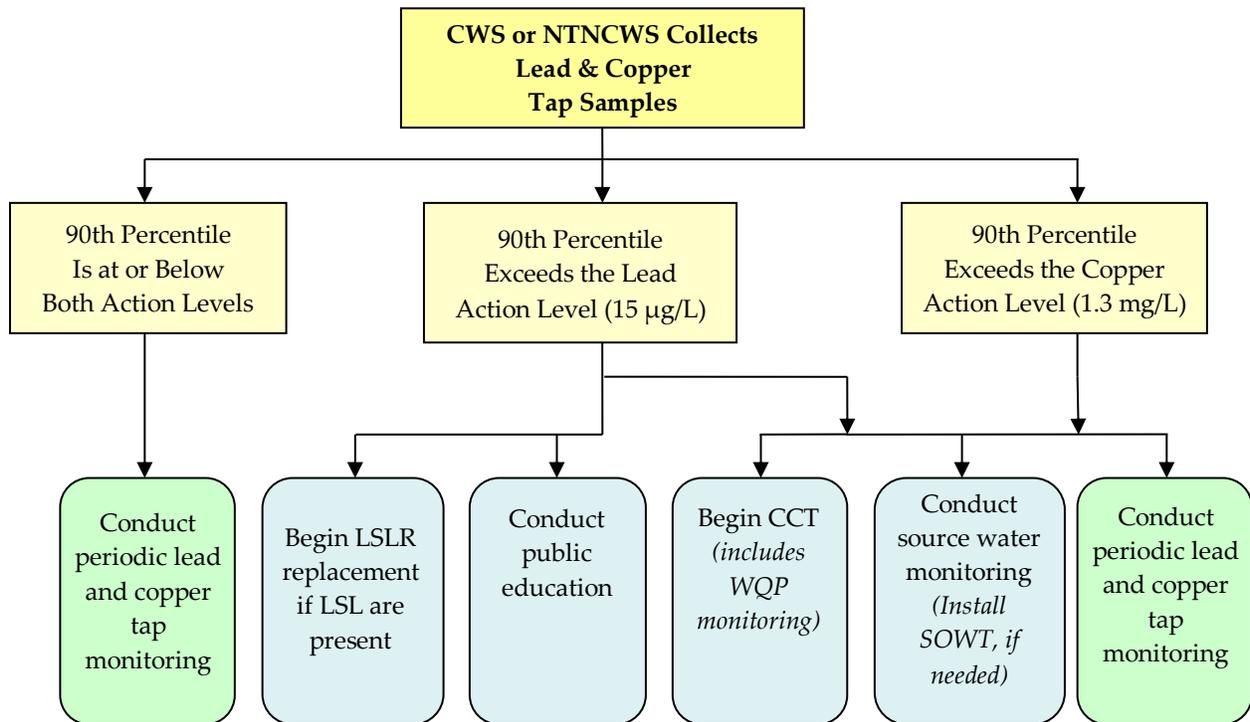
5.5.4. ST2: Groundwater Systems Serving 10,000 – 99,999 People



6. Lead and Copper Sampling and Treatment Techniques

The Lead and Copper Rule (LCR), originally published on June 7, 1991; amended on January 12, 2000 with the Lead and Copper Rule Minor Revisions; amended October 10, 2008 with the Lead and Copper Rule - Short Term Revisions and Clarifications, stipulates lead and copper monitoring requirements and treatment techniques for all community (C) and nontransient noncommunity (NTNC) waterworks. The LCR monitoring requirements are contained in the *Waterworks Regulations* 12VAC5-590-375 and the LCR treatment technique requirements are contained in the *Waterworks Regulations* 12VAC5-590-405.

LCR Decision Flow Chart



6.1. Lead and Copper Monitoring at Consumers Taps

Lead and copper tap monitoring must be conducted at sample sites deemed to be the highest risk locations within the distribution system for leaching lead. This priority "Tier and Category" of sample sites is based on a survey of the plumbing materials found at residences and other buildings located within the distribution system. An acceptable sampling location should be a tap that is normally used for human consumption. This is typically a cold water kitchen or bathroom tap, or drinking fountains and water coolers located in schools or other buildings. Outside hose bibs or utility sinks are not acceptable sampling locations.

6.2 Materials Survey

Prior to collecting any lead and copper tap samples the waterworks will need to perform a survey of their water distribution system piping materials and the plumbing materials of all service connections including interior plumbing materials to develop a list of priority sample sites. Local plumbing codes, building officials, contractors and door to door visits with residents are sources and methods that can be used to complete the survey. A survey letter form is located at ...:\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals\WM898- Sampling Manual\LCR

which the owner should use to report the results of the survey and their list of chosen sample sites. Note that all monitoring for lead and copper (initial monitoring and all future monitoring) must come from sites that are identified in the materials survey. As such we should encourage waterworks owners to identify more sites than the minimum number required. This will allow for a pool of replacement locations when the site may become unavailable in the future.

6.3 Preferred Sample Sites (Defined in descending order)

Tier 1:

- Category A → Single family residences (SFRs) with 50% of the sample sites consisting of lead service lines (LSLs) and 50% consisting of either internal lead pipe or copper pipe with lead solder installed between 1983 and 1986. Since lead plumbing materials were banned in 1986 no newly developed waterworks with new homes will meet this category.
- Category B → All SFRs with all LSL sites included and the remainder consisting of homes with lead pipe or copper pipe with lead solder installed between 1983 and 1986. Again no newly developed waterworks with new homes will meet this category.
- Category C → If the waterworks can prove that there are no LSLs then 100% of the sample pool should be from tap samples collected from homes with lead pipe or copper pipe with lead solder installed between 1983 and 1986.
- Multiple-Family residences (MFRs) may be included in the Tier 1 sampling pool when they comprise at least 20 percent of the structures served.

Tier 2:

- Category D → If enough SFRs with LSLs , lead pipe and/or copper pipe with lead solder cannot be identified then the sample pool may be substituted from sites with MFRs and/or public and private buildings supplied by LSLs or containing lead pipe or copper pipe with lead solder installed between 1983 and 1986.

Tier 3:

- Category E → If the above categories cannot be fully met then the remainder of the sample sites must be filled with SFRs having copper pipe with lead solder installed prior to 1983.

Exceptions:

- Category F.1 → Those PWSs with only interior plastic plumbing that cannot demonstrate “lead free” conditions due to brass faucets and fittings. Monitoring should be at SFRs with brass faucets.
- Other Category F → SFRs with copper piping installed after 1986.

Additional information concerning preferred sample sites:

- Tier 3, Category E may still apply to many new and some existing waterworks that have older homes with lead soldered copper plumbing.
- Category F.1 appears to be the classification for many new waterworks with new homes due to only having brass that may contain some lead. The EPA has defined lead free brass materials as having up to 8 % lead. This has caused some problems in areas with very soft corrosive waters.

The general sample priority can be viewed in descending order as follows:

Lead service lines or lead pipe (LED) SFR → Copper pipe with lead solder (CP/LS) SFRs → CP/LS MFRs → CP/LS plumbed Public/Private buildings → Copper without lead solder SFRs → Copper MFRs → Copper plumbed Public/Private buildings → Plastic SFRs → Plastic MFRs → Plastic plumbed Public/Private buildings.

- The pool of sample sites should be made up entirely of the highest tier and category (priority) samples to the greatest extent possible.
- It is recommended that the waterworks owner identify more sites than the minimum number of samples required to ensure sufficient participation to obtain the minimum number of samples.

6.4. Tap Monitoring Sample Procedures

1. All lead and copper tap samples must be collected from approved locations identified in the approved materials survey.
2. Each sample must a “first draw” sample and be a volume of 1 liter. The tap to be sampled should be thoroughly flushed prior to a 6 hour period of no water use or holding time. The sample tap and other taps including the toilet are not to be operated for a period of at least 6-hours to insure that a standing undisturbed sample is collected (note that there is no regulatory maximum holding time and a high lead result cannot be invalidated due to excessive standing times).
3. Faucet aerators (screens) should not be removed for sampling purposes. Consumers should periodically clean aeration screens to remove particles of copper, brass or solder that often accumulate and can increase the levels of lead and copper in their drinking water.
4. The sample tap should be operated at a moderate flow that does not splash when the sample is collected
5. The time of last water usage and sample collection time and date must be recorded
6. Residents can collect the lead and copper tap sample with proper instruction from the waterworks owner. Sample preservation requirements include the addition of nitric acid, however in order to eliminate any hazard with homeowners collecting the samples the LCR allows this preservation

to be accomplished within 14 days of sample collection. This sample preservation is normally conducted by the testing laboratory so samples must be delivered to the lab within the 14 day time limit.

6.5. Initial Lead and Copper Tap Monitoring

After review and approval of the waterworks materials survey, the owner must begin initial monitoring. Initial monitoring consists of collecting two consecutive sets of samples in 6 month sampling periods (January – June and July - December) from the number of routine sample sites specified in the following table:

Minimum Number of Tap Samples		
System Population	No. of Routine Sample Sites	No. of Reduced Sample Sites
>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

For small systems with a population ≤ 100 and less than 5 acceptable sampling locations that are normally used for human consumption, the *Waterworks Regulations* allow that less than 5 samples may be collected if one sample is taken from each available tap.

If the 90 percentile results for both lead and copper do not exceed the 0.015 mg/L Action Level for lead or the 1.3 mg/L Action Level for copper during both consecutive initial monitoring periods, then the waterworks can proceed to reduced monitoring.

6.6. Reduced Lead and Copper Tap Monitoring

Reduced monitoring consists of collecting two additional consecutive sets of annual samples at the reduced number of sample sites indicated in the preceding table. These samples must be collected between June 1 and September 30.

Annual reduced lead and copper tap monitoring starts the next year after the 2nd 6-month period:

If 2 nd 6-month sampling period is:	Annual Monitoring Begins:
January – June:	June 1 of the next year
July – December:	

If the 90th percentile lead and copper sample concentrations are still below the action levels for both sets of annual samples (a total of three years of monitoring) then the waterworks can proceed to ultimate reduced monitoring.

Ultimate reduced monitoring consists of collecting samples at the reduced number of sites at 3 year intervals. All samples must be collected between June 1 and Sept. 30 of the sampling year. The system cannot exceed 3 years between sampling events and sampling can not be spread out over a 3 year period; samples must be collected within the same year, between June and September.

Accelerated ultimate reduced monitoring - Systems can proceed immediately to ultimate reduced monitoring (3 year intervals) if the monitoring results for two consecutive 6-month periods indicated a 90th lead concentration of ≤ 0.005 mg/L for lead and ≤ 0.65 mg/L for copper

6.7. Monitoring Waivers

There is a provision in the LCR and the *Waterworks Regulations* 12VAC5-590-375 B 7 for monitoring waivers. To date no waterworks has requested a monitoring waiver. Should a waterworks apply for a monitoring waive use the *Waterworks Regulations* as guidance.

6.8. Determining the 90th Percentile Concentrations

The LCR established Action Levels for both lead and copper. The lead Action Level is exceeded if the concentration of lead in more than 10% of tap water samples collected during any monitoring period than 0.015 mg/L (i.e., if the 90th percentile lead level is greater than 0.015 mg/L). The copper Action Level is exceeded if the concentration of copper in more than 10% of tap water samples collected during any monitoring period is greater than 1.3 mg/L (i.e., if the 90th percentile copper level is greater than 1.3 mg/L).

The District Engineer is responsible to ensure that the 90th percentile concentrations are determined for both lead and copper following receipt of all lead and copper sample results for each respective monitoring period. The procedure to determine the 90th percentile concentrations can be found the *Waterworks Regulations* 12VAC5-590-385.

- All valid sample results must be included in the 90th percentile calculation. A valid sample is a sample:
 1. Collected from a pre-approved sample location that was identified in the original or in a revised Lead and Copper Materials Survey and Sample Plan (Section 6.2)
 2. Collected from an approved alternate sample location that meets the same site tier and category as in the Sampling Plan
 3. Collected within the respective monitoring period – no exceptions - do not include any sample that was collected outside of the monitoring period
- Samples collected outside the compliance monitoring period (June 1 – September 30 for reduced monitoring) are not to be included in the 90th percentile calculation. However, samples collected outside the monitoring period containing elevated levels of lead must be addressed as a separate issue, and may require some type of public notice.
- If a waterworks collects fewer than the minimum number of samples, the lead and copper 90th percentile concentrations must be determined using the number of samples submitted. A monitoring violation must also be issued.
- Waterworks can collect samples or review the sample collection information before the sample is analyzed by the laboratory. If something is suspected to be incorrect, the sample should not be tested and another one collected. Once sample results are received, ODW can only invalidate the sample if one or more of the following occurs:
 - Improper sample analysis verified by the laboratory
 - Site selection criteria has not been met
 - Sample container was damaged in transit
 - Sample subjected to tampering

6.9. Monitoring for Water Quality Parameters (WQP's)

In addition to the lead and copper tap monitoring, the LCR also contains requirements for monitoring of WQP's. This monitoring is used to determine an appropriate optimum corrosion control treatment, if applicable, and to ensure that the corrosion control treatment at large systems is optimized. The WQP monitoring requirements are contained in the *Waterworks Regulations* 12VAC5-590-375.

All large waterworks (those serving >50,000 population) are required to conduct WQP monitoring. Small size (serving ≤ 3,300 population and medium size (serving 3,301 – 50,000 population) waterworks are required to monitor for WQP's only if either the lead or copper Action Level is exceeded.

WQP monitoring, when required, includes sampling from representative locations within the distribution system (such as sites used for routine total coliform monitoring) and from all entry points to the water distribution system. Distribution system monitoring includes two sets of samples collected from each site during each respective monitoring period. The number of distribution system sites to be sampled is based on population shown in the following table:

System Size – Number of Persons Served	Number of Sites for WQP Monitoring
> 100,000	25
10,001 to 100,000	10
3,301 to 10,000	3
501 to 3,300	2
101 to 500	1
Less than or equal to 100	1

Monitoring of WQP's at each entry point to the distribution system must include at least one sample at each entry point no less frequently than every two weeks (bi-weekly).

The following WQP's must be monitored: pH; alkalinity; orthophosphate, when an inhibitor containing a phosphate compound is used; silica, when an inhibitor containing a silicate compound is used; calcium; conductivity; and water temperature.

WQP's must be monitored during initial lead and copper tap monitoring; following the installation of corrosion control treatment; and after the State Health Commissioner (Commissioner) specifies optimal WQP's. See the *Waterworks Regulations* 12VAC5-590-375 for more specific requirements.

6.10. Reduced Monitoring for Water Quality Parameters (WQP's)

The LCR requires that states establish optimum water quality parameters (OWQP's) for all large size systems and for small and medium size systems that install corrosion control treatment and still fail to meet the established lead and/or copper Action Levels. The *Waterworks Regulations* state that the Commissioner shall designate:

- A minimum value or a range of values for pH measured at each entry point to the distribution system;
- A minimum pH value, measured in all tap samples. Such value shall be equal to or greater than 7.0, unless the Commissioner determines that meeting a pH level of 7.0 is not technologically feasible or is not necessary for the owner to optimize corrosion control;
- If a corrosion inhibitor is used, a minimum concentration or a range of concentrations for the inhibitor, measured at each entry point to the distribution system and in all tap samples, that the

Commissioner determines is necessary to form a passivating film on the interior walls of the pipes of the distribution system;

- If alkalinity is adjusted as part of optimal corrosion control treatment, a minimum concentration or a range of concentrations for alkalinity, measured at each entry point to the distribution system and in all tap samples; or
- If calcium carbonate stabilization is used as part of corrosion control, a minimum concentration or a range of concentrations for calcium, measured in all tap samples.

The values for the applicable water quality control parameters listed above shall be those that the Commissioner determines to reflect optimal corrosion control treatment for the waterworks.

Once OWQP's are established, waterworks must operate within the established range or above the minimum established values. The owner of any waterworks that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment during each of two consecutive six-month monitoring periods must continue monitoring at the entry point and entry points to the distribution system. The waterworks must continue to collect two tap samples for applicable water quality parameters on the six-month frequency but at the following reduced number of sites.

System Size – Number of Persons Served	Number of Sites for WQP Monitoring
> 100,000	10
10,001 to 100,000	7
3,301 to 10,000	3
501 to 3,300	2
101 to 500	1
Less than or equal to 100	1

The owner of any waterworks that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment during three consecutive years of monitoring may reduce the frequency of tap samples from every six months to annually. The owner of any waterworks that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment during three consecutive years of annual monitoring may reduce the frequency from annually to every three years. Note that WQP monitoring at the entry point locations continue to be on the every two weeks (bi-weekly) frequency.

6.11. WQP Treatment Technique Violations

Once the Commissioner has established WQP's, the waterworks must continue to operate within the established range of values or above the established minimum value. Failure to maintain the established WQP's is a treatment technique violation. Compliance is determined over a six month timeframe – January – June and July – December. Guidance on determining compliance with the WQP can be found in the *Waterworks Regulations* 12VAC5-590-405.

6.12. Consumer Notification

A revision by the LCR STR requires waterworks owners to provide a consumer notification following each lead and copper monitoring period. All systems, both community and NTNC, must provide notification of the lead and copper sampling results to the occupants at each site that was tested in the LCR tap monitoring program within 30 days of receipt of results. This consumer notice is required even if both lead and copper Action Levels are met. ODW will calculate this 30 day period from the date that the lead and copper results letter is sent to the waterworks. NTNC waterworks must post the results of tap monitoring. In addition to the consumer notification, the waterworks must provide ODW with a

certification that the consumer notice requirements were met. This certification must be provided no later than three months from the end of the respective monitoring period.

Additional guidance and consumer notification templates for both community and NTNC waterworks is at: \\.\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals\WM898- Sampling Manual\LCR\

6.13. Consumer Confidence Report

A revision by the LCR STR regarding Consumer Confidence Reports (CCR's) will affect all community systems, even if results are not detected for lead and copper. All CCR's must contain mandatory language concerning lead in drinking water that includes Health effects on children and a flushing recommendation of 15 to 30 seconds prior to using the water. Waterworks can write their own educational statement to be approved by the ODW Field Office.

The CCRs must contain the following mandatory language, and any modifications must be approved by ODW:

“If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. *[Name of Utility]* is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 15 to 30 seconds or until it becomes cold or reaches a steady temperature before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>. “

6.14. Required Actions if an Action Level is Exceeded

The LCR contains four specific treatment techniques that must be implemented by the waterworks owner if the lead and/or copper Action Level is exceeded. These are summarized in the following table:

Action Level Exceeded	Required Treatment Technique
Lead	Corrosion Control Treatment
Copper	Corrosion Control Treatment
Lead	Source Water Monitoring and Treatment
Copper	Source Water Monitoring and Treatment
Lead	Public Education
Lead	Lead Service Line Replacement

6.15. Source Water Treatment

Whenever either the lead or copper Action Level is exceeded, the waterworks owner must collect source water samples for lead and/or copper to verify that the elevated levels at consumer's taps is the result of internal pipe corrosion and not from high source water concentrations. These samples must be collected from each entry point to the distribution system within six months from the end of the respective monitoring period in which the Action Level was exceeded. Additional guidance for the source water monitoring requirements can be found in the *Waterworks Regulations* 12VAC5-590-375 D.

The results of the routine metals monitoring from the waterworks may be substituted for this required source water monitoring if the results are less than one year old.

In the event that elevated lead or copper source water concentrations are found, the waterworks must install an appropriate source water treatment technology and conduct routine source water monitoring. To date no waterworks has been required to install source water treatment. Should this occur in the future additional guidance can be found in the *Waterworks Regulation* 12VAC5-590-405 B.

6.16. Corrosion Control Treatment

Any waterworks that exceeds either the lead or copper Action Level must install and continuously operate corrosion control treatment. Specific guidance and requirements are contained in the *Waterworks Regulation* 12VAC5-590-405 A.

- All large systems (>50,000 people) and, at the states discretion, small and medium systems ($\leq 50,000$ people) shall perform corrosion control treatment studies to investigate treatment options and determine which will provide optimum corrosion control treatment (OCCT is defined as treatment that minimizes lead and copper concentrations at the users' tap without violating any National Primary Drinking Water Standards). The following three types of treatment must be investigated:
 1. pH and alkalinity adjustment
 2. Calcium hardness adjustment
 3. Phosphate or silicate corrosion inhibitors
- For the large systems, the OCCT study must be completed within 18 months following the completion of initial monitoring. The District Engineer must review the submitted study and OCCT recommendation and the Commissioner must approve the OCCT within 12 month of receiving the study.
- Small or medium size systems are considered to have optimized treatment (and are not required to complete the corrosion control treatment steps) after two consecutive 6-month monitoring periods of monitoring (Section 6.5) indicate both lead and copper are below their 90th percentile action levels.
- Any size system is considered to have optimized treatment if the results of two consecutive 6-month monitoring periods indicate the difference between the 90th percentile tap water lead concentration and the highest source water lead concentration is less than 0.005 mg/L.
- Small or medium size systems that exceed an Action Level are required to recommend an optimal CCT to the District Engineer within 6 months from the end of the monitoring period in which the AL was exceeded, unless the OCCT study is required.
- Assuming that the OCCT study is not required, the District Engineer must review the systems treatment recommendation and the Commissioner must either approve the treatment recommendation by the system or designate an alternate corrosion control treatment. This treatment designation must be made within 12 months from the end of the monitoring period in which the AL was exceeded.
- If the District Engineer requires the small or medium size system to conduct a corrosion study, the study must be completed within 18 months for medium size systems and within 24 months for small size systems. The District Engineer has the option of performing a "Desk top" evaluation for the waterworks (WM 740 provides detailed instructions, review forms and sample notification letters for performing the "Desk top" evaluation) in lieu of requiring the waterworks to perform the corrosion control treatment studies.

- If a corrosion control treatment study is required, the District Engineer must review the submitted study and OCCT recommendation and the Commissioner must approve the OCCT within 6 month of receiving the study.
- The waterworks owner must install the designated corrosion control treatment within 24 months following the Commissioner's decision.
- After the waterworks installed the corrosion control treatment follow-up monitoring shall be conducted. Follow-up monitoring consists of 2 consecutive 6-month rounds of lead and copper tap samples and WQP monitoring beginning immediately after installation of the CCT.

6.17. Public Education

Any waterworks that exceeds the lead Action Level is required to complete the prescribed Public Education requirements. Public Education is complicated in that there are different requirements depending upon the size and type of waterworks. The initial Public Education tasks must be completed within 60 days of the end of the monitoring period in which the lead Action Level is exceeded (for waterworks in reduced monitoring the end of the monitoring period is normally September 30 so any required Public Education must be completed no later than November 30). If the waterworks continues to exceed the lead Action Level or ceases to conduct lead and copper tap samples (until corrosion control treatment is installed) then certain Public Education tasks must be repeated either on a 6 month or 12 month frequency.

Following any required Public Education task, the waterworks must submit a certification to the District Engineer indicating that the required task was satisfactorily completed. This certification must be submitted within 10 days after the end of each period in which the owner is required to perform a public education task.

Specific and detailed Public Education guidance including templates for both community and NTNC waterworks can be found at: ..\..\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals\WM898- Sampling Manual\LCR\

6.18. Lead Service Replacement

Any waterworks that continues to exceed the lead Action Level after installing corrosion control treatment is required to replace any existing lead service lines (LSL). To date there are no waterworks that have been required to replace lead service lines under the LCR. There are waterworks that are voluntarily replacing lead service lines when these lines are encountered.

Specific guidance regarding LSL replacement can be found in the *Waterworks Regulation 12VAC5-590-405 C*.

6.19. Advanced notification and approval of any change in water treatment or addition of a new water source

The LCR – Short Term Revisions requires waterworks owners to notify and gain approval from the States prior to making any changes in water treatment or adding a new water source. This is a direct result of the events where a change from free chlorine disinfection to chloramines resulted in increased distribution system lead levels. Additionally, the States, in granting approvals, must make an assessment as to whether the addition of a new water source or a change in water treatment will adversely affect optimal corrosion control treatment and result in an increase in distribution system lead or copper levels. Our assessment

may result in requiring optimal corrosion control studies to be conducted prior to implementing a long term treatment change or adding a new source and/or requiring that additional lead and copper monitoring be conducted.

The Virginia *Waterworks Regulations* already require waterworks owners to obtain a Construction Permit for any changes in treatment or the addition of a new water source. As such we should be notified of significant treatment changes or new sources. The potential for a new water source or long-term changes in treatment to impact corrosion control treatment and distribution system lead levels should be addressed in the preliminary engineering conference and/or preliminary engineering report.

6.20. Long term treatment changes

Long-term treatment changes do not include chemical dose fluctuations associated with daily raw water quality changes or normal seasonal changes. The LCR STR guidance gives specific examples of long-term changes in treatment. These include:

- Changing disinfectants such as chlorine to chloramines
- Changing primary coagulants such as alum to ferric chloride
- Changing corrosion inhibitor chemicals such as orthophosphate to a blended phosphate
- Making a change in dose of an existing chemical if the system is planning long-term changes to its finished water pH or residual inhibitor concentration

Additional examples of long-term treatment changes include the installation of major unit processes such as membrane filtration, ozonation, enhanced coagulation/enhanced softening to reduce disinfectant by-product precursors, and other treatments or processes or combinations of processes that can greatly affect the pH, oxidation-reduction potential, alkalinity, or the major composition of the ionic background of the water.

The ODW's policy is to evaluate treatment changes on a case-by-case basis to determine if the waterworks must conduct optimum corrosion control studies and/or additional lead and copper tap monitoring. The District Engineer makes this evaluation and obtains concurrence of the Deputy Field Director in consultation with the Division of Technical Services staff in the Central Office. EPA has provided guidance to the states to evaluate the potential impact on corrosion and lead levels resulting from treatment changes. This guidance can be found in Chapter 4 of the Simultaneous Compliance Guidance Manual for the Stage 2 Rules, which is located on EPA's website :

http://www.epa.gov/safewater/disinfection/stage2/pdfs/guide_st2_pws_simultaneous-compliance.pdf

ODW will require a waterworks to conduct lead and copper "follow-up monitoring" (monitoring for two consecutive 6 - month periods at the original number of tap sample sites) following proposed treatment changes that include:

1. Change in disinfection from free chlorine to chloramines
2. Any change in the method of optimum corrosion control treatment (i.e. changing from a corrosion inhibitor to pH and alkalinity adjustment, or from pH and alkalinity adjustment to a corrosion inhibitor or change in the type of corrosion inhibitor such as from a blended phosphate to a zinc orthophosphate)
3. Any other treatment change that results in a permanent change to the finished water pH and / or to the corrosion inhibitor concentration

Prior to implementing a treatment change, ODW may require a waterworks to conduct an optimum corrosion control study to assess the impact of the proposed treatment changes on distribution system lead concentrations. Such a study may benefit the waterworks to avoid making an expensive change in treatment that will result in an increase in distribution system lead concentrations. The need to conduct

the optimum corrosion control study should be discussed during the preliminary engineering conference and/or the preliminary engineering report.

Other treatment changes (such as changing coagulants or installing new treatment processes) will be evaluated to assess the impact on corrosion related water quality parameters. If the evaluation indicates that the treatment change may result in increased distribution system lead or copper levels, the return to “follow-up monitoring” is required. If the evaluation indicates that the treatment change will not have an impact on distribution system lead or copper levels it is still advisable to require some additional lead and copper tap monitoring. This additional monitoring will provide data to demonstrate that the treatment change did not result in increased lead or copper levels. The number of samples to be collected will be determined by the District Engineer. Suggested additional monitoring would include 5 to 10 lead and copper tap samples to be collected from previously approved locations. This monitoring should be conducted 30 to 60 days after the treatment change has been initiated.

Several examples are posted at:...\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals\WM898- Sampling Manual\LCR

6.21. Addition of a new water source

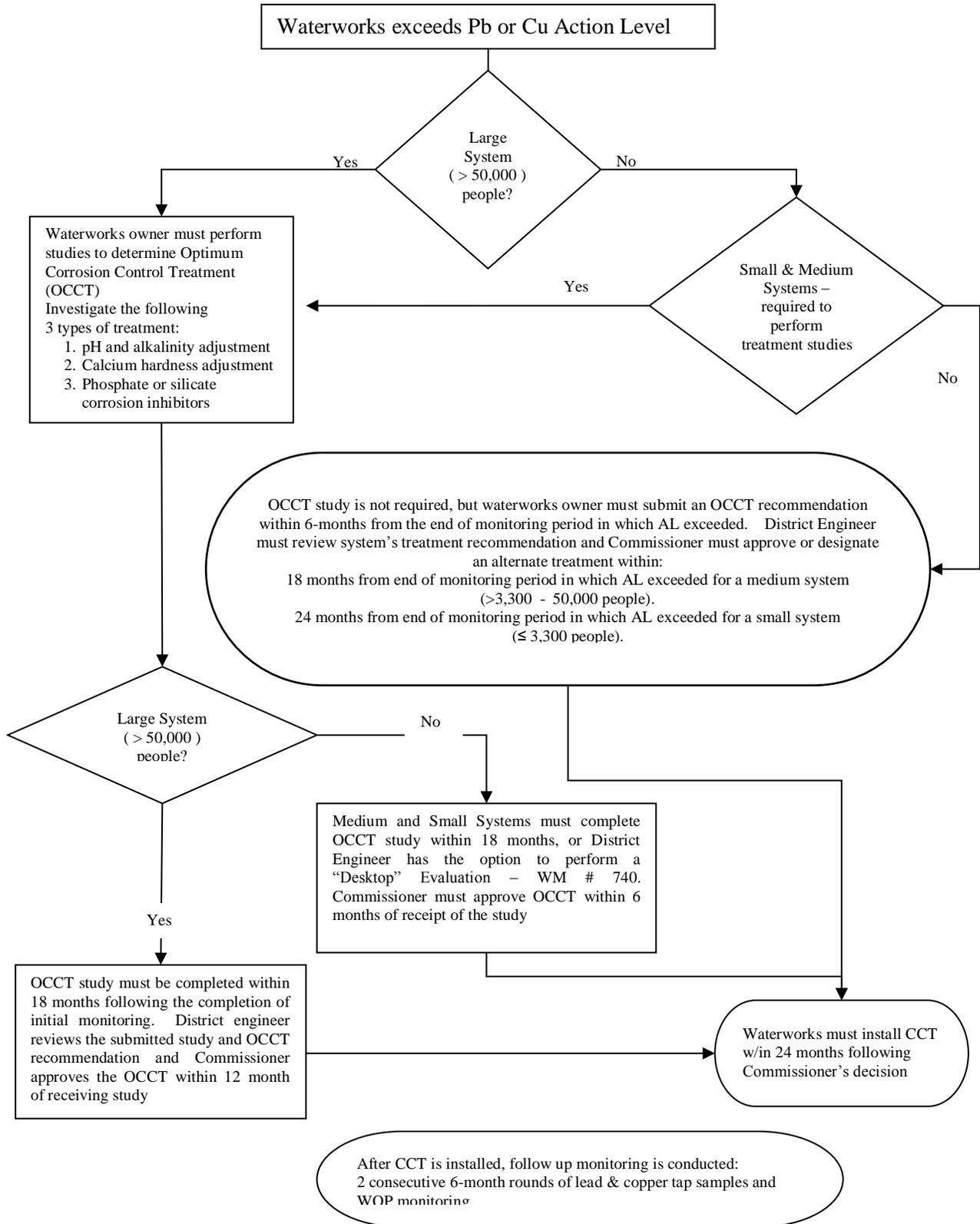
The LCR-STR requires states to approve the addition of new water sources and to make an assessment as to whether the new water source will adversely affect optimal corrosion control treatment and/or result in an increase in distribution system lead or copper levels. The ODW’s policy is to evaluate the addition of new water sources on a case-by-case basis to determine if the waterworks must conduct optimum corrosion control studies and/or additional lead and copper tap monitoring. The District Engineer makes this evaluation and obtains the concurrence of the Deputy Field Director. The decision to require the waterworks to conduct a corrosion control study or additional monitoring must be made in consultation with the Division of Technical Services staff in the Central Office.

ODW requires the corrosion control study or additional monitoring when the new water source is significantly different in water quality characteristics that may impact corrosion. If a waterworks using wells decides to add an additional well source, and the new well has similar water quality to the existing wells, it would not be necessary to conduct a corrosion control study or additional monitoring. However, if the new well is significantly different in water quality then the OCCT or additional monitoring should be required. If a waterworks using wells decides to add a surface water source and abandon the wells, then the corrosion control study and/or additional monitoring (based upon both the different, new water source and the addition of new treatment for the surface water source), are required.

In situations where the new water source may adversely affect optimal corrosion control treatment and/or result in an increase in distribution system lead or copper levels, additional lead and copper tap monitoring as described for long-term treatment changes will be required.

EPA has developed guidance to assist States in making decisions related to the impact on lead corrosion resulting from the addition of a new water source or a long-term treatment change. See Appendix D of the “**Simultaneous Compliance Guidance Manual for the Long Term 2 and Stage 2 DBP Rules**” March 2007. This document can be accessed from the following EPA web site:
http://www.epa.gov/safewater/disinfection/stage2/pdfs/guide_st2_pws_simultaneous-compliance.pdf

6.22. Corrosion Control Treatment Flowchart



6.23. Examples

- **Example 1- Change in corrosion control treatment**

Anytown has a 3.0 MGD conventional WTP and is using a zinc orthophosphate inhibitor for corrosion control. Because of new and more stringent zinc limits contained in Anytown's VPDES Permit they are proposing to change from the zinc orthophosphate inhibitor to a blended phosphate inhibitor.

Because Anytown is changing to a new corrosion inhibitor they must return to lead and copper "follow-up" monitoring after changing to the blended phosphate inhibitor. Follow-up monitoring consists of lead and copper tap monitoring conducted during two consecutive 6-month monitoring periods (January – June and July – December) at the original, non-reduced number of sites based upon population.

- **Example 2 – Treatment change**

Anytown has a 3.0 MGD conventional WTP and is using liquid alum as the primary coagulant. Anytown wants to improve plant performance to meet the VOP sedimentation and filtration goals and has found that a poly- aluminum chloride (PACL) as the primary coagulant provide superior performance. The change to PACL will not result in any changes to the corrosion related water quality parameters. The finished water pH, alkalinity and blended phosphate inhibitor dosage will remain unchanged.

In this situation we can reasonably assume that this change from alum to PACL will not alter the finished water corrosion characteristics. As such no additional monitoring would be required.

- **Example 3 – Addition of a new water source**

Anytown is experiencing source water deficits during drought conditions and proposes to drill a new well to supplement the WTP. The well will be a new entry point to the distribution system. Anytown proposes to treat the well with chlorine, fluoride, and the same blended phosphate inhibitor used at the WTP.

Even though Anytown proposes to treat the well water with the same blended phosphate inhibitor, some additional lead and copper monitoring should be required to demonstrate that the new source does not result in increased lead concentrations at consumer's taps. In this situation a return to full "follow-up" monitoring is not appropriate as the well is a new entry point pumping directly into the distribution system and the entire system will not receive the well water. The District Engineer requires Anytown to collect 6 lead and copper tap samples from the portion of the service area that will receive water from the new well. These samples should be collected from locations that meet the same tier and category as the previously approved lead and copper sample sites for Anytown. Assuming that the results of the 6 special samples indicate lead and copper concentrations that are below the AL's no additional actions are necessary.

7. Groundwater Monitoring and GUDI Determinations

7.1. Introduction

Source water monitoring is required as part of the ODW's continuing efforts to:

- a. Detect any changes in a groundwater source quality over time;
- b. Determine if the groundwater source is at risk of being directly influenced by surface water; and
- c. Determine whether disinfection treatment alone is sufficient to protect public health.

This monitoring program is entirely different and separate from any source water monitoring required by the GWR described in Section 4.2. While the GWR requires treatment techniques to protect against the presence of viruses and bacteria, the SWTR requires treatment techniques to protect against the presence of large-diameter pathogens such as *Giardia lamblia* and *Cryptosporidium* found in surface water and GUDI sources. This section describes sampling required to determine if the SWTR applies to a groundwater source.

This section of the Manual includes detailed procedures for routine monitoring at existing groundwater sources, GUDI determinations, and interim actions for GUDI sources.

7.2. Routine Monitoring at Existing Sources

Routine source water monitoring of groundwater is required in the *Waterworks Regulations* (12VAC5-590-425) for sources that use chlorine disinfection or some other treatment that may alter or affect the bacteriological quality of the source water. ODW must insure that an acceptable source water sample tap is provided for all groundwater sources. An acceptable sample location must be representative of the source water prior to any treatment. The source water monitoring location and sampling procedure shall be reviewed and evaluated during each sanitary survey.

The source water monitoring frequency for existing groundwater sources depends upon geology and whether the source is a well or a spring. Existing groundwater sources shall be grouped as either a karst well, non-karst well, or spring. The *minimum* source water monitoring frequency for these source types is as follows:

Source Type	Minimum Source Water Monitoring Frequency	Parameters
Well located in non-karst geology	One sample per year	Total Coliform and <i>E. coli</i>
Well located in karst geology	One sample per quarter	Total Coliform and <i>E. coli</i>
Spring	One sample per month	Total Coliform and <i>E. coli</i>

The above table contains the minimum source water monitoring frequency. ODW may require more frequent monitoring for any source that is deemed to be "at risk" of being directly influenced by surface water, or subject to bacteriological or other sources of contamination. This determination may be made based upon geology, well construction, historical monitoring results, or any other evidence that the source is susceptible. ODW will notify owners of these source water monitoring requirements and determine whether waterworks provide treatment as described above.

Owners shall be encouraged to conduct some of the sampling within 72 hours after a significant rainfall event to get the best information relative to potential surface water influence or bacteriological contamination.

7.3. Microbiological Testing Methods

A method yielding a Most Probable Number (MPN) result for both Total Coliform and *E. coli* is required for source water tests. All analyses must be performed by the DCLS or by laboratories certified by the DCLS for both Total Coliform and *E. coli* MPN analysis, using EPA approved analytical methods found in 40 CFR Part 141.

All Microscopic Particulate Analysis (MPA) testing and reporting of results shall be in accordance with the USEPA "Consensus Method for Determining Groundwaters Under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA)", dated October 1992. All MPA tests must include both *Giardia lamblia* and *Cryptosporidium*.

7.4. Additional Monitoring (Confirmation Samples)

ODW will ensure that all source water monitoring results are reviewed and evaluated each month. Additional monitoring and other actions may be required depending upon the monitoring results and type of water source.

For any source with a source water monitoring frequency less than monthly, ODW must notify the owner to collect at least one confirmation sample as soon as possible following any single sample result indicating Total Coliform in excess of 50 colonies per 100 ml, or any sample indicating the presence of *E. coli*. ODW may require more than one additional sample.

7.5. Evaluation of Routine Source Water Monitoring Results

The *routine* source water monitoring results, and any additional samples required by section 7.4 above, will be evaluated as follows:

- a. Annual or Quarterly Sampling: If results indicate Total Coliform greater than 50 colonies per 100 ml in two or more samples collected during any running 6 calendar month period, routine source water sampling will be increased to monthly.
- b. If results indicate total coliform greater than 50 colonies per 100 ml in three or more samples collected during any running 6 calendar month period, additional water quality monitoring is needed to determine if disinfection treatment alone is sufficient. A GUDI re-evaluation is required beginning with the 20 sample MPN series. ODW shall notify the waterworks owner to increase the source water monitoring frequency to weekly for a minimum of 20 weeks.
- c. If results indicate the presence of *E. coli* in two or more samples collected during any running 6 calendar month period, the 4-log virus treatment technique and compliance monitoring requirements of the GWR is required. See Working Memo 910 for additional guidance. A GUDI re-evaluation is required beginning with the 20 sample MPN series. ODW shall notify the waterworks owner to increase the source water monitoring frequency to weekly for a minimum of 20 weeks.

7.6. GUDI Determination Procedure

7.6.1. Background

The SWTR and the *Waterworks Regulations* define GUDI sources to mean: "...any water beneath the surface of the ground with significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia*, or (2) significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH that closely correlate to climatological or surface water conditions".

Once a source is determined to be GUDI, it is subject to the filtration and disinfection treatment technique requirements of the SWTR (Subpart H of the federal regulations) and the requirements of other applicable EPA Regulations.

Groundwater sources can be triggered into a GUDI evaluation (or re-evaluation) based upon three circumstances (see also section 7.6.3):

- a. A groundwater source is new;
- b. An existing groundwater's source water monitoring results, triggered by the GWR, require a GUDI re-evaluation;
- c. An existing groundwater source's routine source water monitoring results indicate a change in water quality that warrant a GUDI re-evaluation.

Use the GUDI Determination Review Sheet posted in ..\..\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals\WM898- Sampling Manual\GUDI\ to document the evaluation of the source and all monitoring data used. The Review Sheet proceeds stepwise, following the procedures outlined in the following paragraphs. The corresponding steps in the Review Sheet are shown in boxes (Step 1a).

Model letters for transmitting results of GUDI determinations to waterworks owners are also posted in ..\..\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals\WM898- Sampling Manual\GUDI\.

7.6.2. Initial Assessment (Step 1)

Step 1. The GUDI determination begins with evaluation of the source history, well or spring construction, well or spring protection and location. Has the source been associated with a disease outbreak (Step 1a), a chemical contamination event from the surface (Step 1b), or evidence of direct surface water intrusion (Step 1c)?

Note: Many of the compounds found in petroleum products are very soluble and can travel for long distances in groundwater. Use caution when applying the "chemical contamination event from the surface" criteria (Step 1b) in declaring a source GUDI based upon a petroleum contamination event.

Most sources cannot be characterized on the basis of source history, construction and location alone, and the evaluation must proceed to Step 2.

7.6.3. Microbial Sampling and Evaluation (Step 2)

Step 2. The **Step 2** evaluation begins with a microbiological sampling series. The microbiological sampling series is usually a minimum of 20 samples analyzed by an approved laboratory, using an MPN test method for both total coliform and *E. coli*. A minimum of 20 weeks of monitoring, to include multiple significant rainfall events, is normally required. The number of samples, frequency, and the duration of sampling will be determined by ODW. Sample collection may be adjusted within the week to collect samples immediately following rainfall events, as practical.

The GUDI evaluation 20 sample MPN series can be triggered by three different circumstances:

- a. New source - development sampling results. A new groundwater source that is being developed will require the MPN series. For new wells drilled in non-Karst geology, the 20 samples collected during the well development yield test can be used to make the GUDI determination. For new wells drilled in Karst geology or springs, the development MPN series will provide only a preliminary

determination. A second MPN series will be used to make the final GUDI determination, which must start with the minimum 20 weekly samples.

- b. Existing source - GWR-triggered monitoring results. If the triggered and additional source water samples required under the Ground Water Rule are *E. coli* positive, additional water quality monitoring is needed to determine if the disinfection treatment to achieve 4-log virus inactivation alone will provide adequate public health protection. A GUDI re-evaluation is required starting with the 20 sample MPN series.

Note: the GWR requires that treatment be installed to achieve a 4-log inactivation of viruses within 120 days. This requirement must be met by the waterworks owner to comply with the GWR and is considered to be separate from the additional monitoring and GUDI re-evaluation. The purpose of the GUDI re-evaluation is to ensure that the GWR required disinfection treatment alone is sufficient.

- c. Existing source - routine source water monitoring results. All groundwater sources with disinfection treatment shall collect periodic source water samples for Total Coliform and *E. coli* MPN analysis. The results from this source water monitoring may indicate that a GUDI re-evaluation is required. In addition, if multiple *E. coli* results are positive, the treatment technique requirements of the GWR will be necessary.

7.6.4. Review of Step 2 Total Coliform Results

The presence of high concentrations of Total Coliform is cause for concern and is an indication that the groundwater source is at risk of being directly influenced by surface water.

- a. If the 20 sample MPN series indicate Total Coliform greater than 100 colonies/100 mL in three or more samples [Step 2a] during any time during the 20 weeks of sampling, the source is considered to be at risk and the additional **Step 3** water quality monitoring shall be initiated immediately. In addition, the owner is required to initiate the interim measures during the Step 3 evaluation period.

Example: Samples are being collected weekly from a well source. The sample collected during the 9th week indicates a Total Coliform of 250 / 100 ml and this is the third sample with Total Coliform exceeding 100 / 100 ml. ODW shall notify the owner that the Step 3 monitoring is required and begin immediately to develop the Step 3 monitoring plan. Do NOT wait until 20 weekly samples are collected.

- b. Special Circumstance - Any source with Total Coliform geometric mean greater than 100/100mL (based upon a minimum of 20 weekly samples) is not acceptable for single barrier disinfection treatment alone. The source is considered to be at risk, the additional **Step 3** water quality monitoring is required and the owner is required to initiate the interim measures during the Step 3 evaluation. If the source is **NOT** determined to be GUDI following the Step 3 evaluation, the Field Office must evaluate all of the available water quality data, source construction, geology, degree of source protection and any other relevant factors and shall require appropriate treatment technologies to be installed and operated by the owner. In addition, the owner is required to conduct compliance monitoring specific to the specified treatment technologies if the source is to be utilized as part of a waterworks.

7.6.5. Review of Step 2 *E. coli* Results

The presence of *E. coli* in multiple source water samples is cause for concern. If the results of the *E. coli* MPN series indicate ≥ 5 *E. coli* / 100 ml in three or more samples [Step 2b], or if 5 or more samples indicate *E. coli* to be present [Step 2c], then the source is considered to be at risk and the additional **Step 3** water

quality monitoring is required. The owner is required to initiate the interim measures during the Step 3 evaluation.

Also, the GWR 4-log virus treatment technique and compliance monitoring is required (see WM 910 for additional guidance).

7.6.6. Mitigation Measures

If the Total Coliform MPN criteria (Section 7.6.4) or the *E. coli* MPN criteria (Section 7.6.5) are exceeded, or if the source has been declared GUDI, the owner may propose mitigation measures and/or a plan to correct deficiencies that may be the cause for the contamination. Any proposed mitigation measures or corrective actions must be detailed in a report that is submitted to the Field Office for approval. The report must also include a follow-up monitoring plan to be implemented upon completion of the mitigation measures or corrective actions.

A final summary report detailing the results of the corrective actions and follow-up monitoring, the conclusions, and recommendations with supporting data, must be submitted to the Field Office for approval. The ODW Field Director will review the report and the commissioner will make a final (or revised) GUDI determination, *or direct that the source must proceed to the Step 3 evaluation.*

Both reports must be prepared by a Virginia licensed professional engineer, Virginia licensed professional geologist, or other licensed professional approved by the Field Director.

7.6.7. Additional Water Quality Data Collection (Step 3)

Step 3. Additional water quality and meteorological data may be required to determine if there is a direct connection between the subsurface aquifer and the surface. The Step 3 monitoring and evaluation is time-consuming and may take several months to complete. In addition, the waterworks owner may need to acquire a turbidimeter, pH meter and other water quality monitoring equipment.

A monitoring plan shall be developed by ODW Field Office in cooperation with the owner (or in some cases by the owner and reviewed by ODW), which is site-specific to the source being evaluated. The waterworks owner shall conduct all monitoring prescribed in the approved monitoring plan and shall submit the monitoring data to the Field Office on a frequency defined in the monitoring plan.

The monitoring plan must include Microscopic Particulate Analysis (MPA), and physical water quality parameter monitoring such as source water temperature, pH, turbidity, conductivity, etc. If a surface water source is located nearby, monitoring of the nearby surface water is required, using the same physical parameters and frequency as the groundwater source. In addition to the water quality parameter monitoring, records of rainfall and other meteorological events at the water source location must be recorded.

The following parameters may be included in the monitoring plan. Ideally, monitoring will last for several months to establish seasonal variations, but shorter periods may be allowed. The monitoring period must include significant rainfall events.

Temperature:

- Take measurements daily; minimum of 4 days per week.
- Monitor at the source being evaluated and the nearest surface water source (no more than 1,000 feet distant).
- An alcohol-filled thermometer or electric probe may be used.
- Use an instrument capable of reading $\pm 0.5^{\circ}$ F increments.
- Use the same instrument for all readings.

Conductivity and / or pH:

- Take measurements daily; minimum of 4 days per week.
- Monitor the source being evaluated and the nearest surface water source (no more than 1,000 feet distant).
- Calibrate the instrument per manufacturer's recommendations, or submit to a State-certified laboratory.

Turbidity:

- Take measurements daily; minimum of 4 days per week.
- Monitor the source being evaluated and the nearest surface water source (no more than 1,000 feet distant).
- Use an instrument capable of reading 0.1 NTU increments.
- Standardize and calibrate instrument per manufacturer's recommendations.

Specific Ions:

Any specific ions known to differ in concentration between the surface water and groundwater. ODW will determine applicability of these analyses. Establish frequency, accuracy and calibration requirements on a case-by-case basis.

Rainfall:

- Identify source of rainfall gauging or measure rainfall at the site.
May need to use more than one rainfall location if utilizing existing gauges not in close proximity to the groundwater source (i.e. compare rainfall data from two wastewater treatment plants, each located greater than 10 miles from the source).

MPA testing shall be conducted by laboratories acceptable to the commissioner and shall include both *Giardia lamblia* and *Cryptosporidium*.

- All MPA testing and reporting of results must be in accordance with the USEPA "*Consensus Method for Determining Groundwaters Under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA)*" dated October 1992. {There is no Standard Method for the MPA.} This document is posted in the following folder: Y:\02-Committees\203-Task_Teams\GUDI Determination.
- To optimize the detection of direct surface water influence, MPA samples are typically collected during both wet and dry periods. The purpose of collecting both wet-period and dry-period samples is to analyze water that is most likely to contain indicator organisms typical of surface water, if any exist, at times when conditions for transport to the potential GUDI source are optimal. A minimum of four MPA tests are required, two samples collected each during a wet and a dry period. The MPA tests must be at least 60 days apart.

The waterworks owner must provide the Field Office with all of the monitoring results required in the monitoring plan. MPA results must be provided within 10 days of receipt by the owner if the laboratory does not provide the ODW with the results directly. Other monitoring (physical parameters) can be provided along with applicable rainfall / meteorological data to the Field Office on a monthly or quarterly frequency as stipulated in the monitoring plan. All water quality monitoring data and rainfall data must be detailed and presented in the final report.

If the owner does not perform the monitoring stipulated in the Step 3 monitoring plan, or fails to provide the required monitoring data, the source shall be designated as GUDI and a Boil Water Advisory issued by the commissioner.

7.6.8. Interim Measures During Step 3

The Step 3 data collection and evaluation will take several months to complete. During this time, the waterworks owner must, as a minimum, perform the following interim measures:

- a. Provide disinfection treatment to achieve a 4-log inactivation of virus. Chlorine disinfection treatment shall meet the requirements of Working Memo 915.
- b. Conduct the GWR compliance monitoring (i.e. daily chlorine residual monitoring).
- c. If the owner has to install disinfection treatment to achieve the 4-log virus inactivation, public notice with continuous boil water advisory is required during the design, approval, and installation period.
- d. Consider increasing the frequency of routine bacteriological monitoring of the finished water to twice the number of samples required based upon the population served.

Proceeding to Step 3 based on Total Coliform and/or *E. coli* monitoring data indicates that an essential component of the multiple barrier approach to public health protection may have been compromised. Depending upon factors such as the type of waterworks, population served and the technical, financial, and managerial capacity of the waterworks; the Field Office staff may consider consulting with the waterworks owner, waterworks operator, and the District Medical Director to determine if additional interim measures are necessary to provide optimum public health protection.

7.6.9. Evaluation of the Step 3 Sampling Results

The evaluation of Step 3 water quality data will include various physical parameters and MPA test results.

Physical parameters such as water temperature, turbidity, pH, conductivity, etc. may be indicators of direct surface water influence. Examples are a direct correlation between groundwater monitoring results and monitoring results from a nearby surface water source, taking into account significant rainfall or other meteorological events [Step 3a](#), or a fluctuation in source water temperature (or other physical parameters) following a significant rainfall or other meteorological event [Step 3b](#).

Microscopic Particulate Analysis (MPA) is a method to identify organisms that occur only in surface waters, and whose significant occurrence in groundwater clearly indicates that at least some surface water is present. The parameters that are believed to be indicators of surface water contamination of groundwater include *Giardia lamblia* cysts, *Cryptosporidium*, Coccidia, diatoms, algae, insects/larvae, rotifers, and chlorophyll-containing plant debris.

MPA laboratory results must be reported in accordance with the above mentioned EPA consensus method. Application of this method results in relative risk factors (scores) that will be used to determine the degree of risk associated with influence by surface water. The following relative risk factors will be used to make the GUDI determination:

- High risk – A lab-provided MPA risk calculation ≥ 20
- Moderate risk – A MPA risk calculation equal to or greater than 10 and ≤ 19
- Low risk – A MPA risk calculation ≤ 9

EPA Relative Risk Tables are provided in section 7.8.

- a. If any single MPA sample result indicates a score greater than or equal to 20, the source is determined to be GUDI [Step 3c](#).

- b. If any two MPA sample results indicate scores equal to or greater than 15, the source is determined to be GUDI [Step 3d](#).
- c. If all MPA sample results indicate scores of equal to or less than 9, the source is determined to be a groundwater source (NOT GUDI) [Step 3e](#). Note that source water monitoring continues. The District Engineer may increase the frequency of this monitoring or require additional monitoring parameters.
- d. If the source is not determined to be GUDI based upon the physical monitoring criteria [Step 3a](#), and [Step 3b](#), or the MPA sample results [Step 3c](#), or [Step 3d](#); and if all the MPA results are not equal to or less than 9 [Step 3e](#), a decision on future actions will have to be made.

All of the available water quality data, geology, well construction, and any other relevant factors are to be reviewed and evaluated by the District Engineer. Proceed to one of the following actions with concurrence of the Field Director:

- Consider the source to be “at risk” and continue to monitor. The District Engineer will establish the monitoring parameters and monitoring frequency.
- Declare the source to be a groundwater source (NOT GUDI). Note that even with this action source water monitoring continues.

7.7. Interim Action for GUDI Sources

Any waterworks with a source that has been determined to be GUDI must comply with the requirements of the SWTR and the *Waterworks Regulations* by installing acceptable filtration and disinfection treatment within 18 months of the determination.

During the interim period until filtration and disinfection is installed and in operation, the waterworks owner shall discontinue use of the GUDI source. If the GUDI source must remain in service because discontinuing use of the source is not a viable option, a continuous boil water notice will be required and the waterworks owner shall provide chlorine disinfection during the interim period before filtration is installed as follows:

- Provide disinfection treatment to achieve a 4-log inactivation of virus. Chlorine disinfection treatment shall meet the requirements of Working Memo 915.
- The waterworks owner shall issue a boil water notice through the public notification procedure in the *Waterworks Regulations* until such time as the required filtration and disinfection treatment is installed.
- For waterworks that collect routine distribution system bacteriological samples at a monthly frequency, the waterworks shall collect twice the number of samples required for that population each month. For waterworks that collect routine bacteriological samples at a quarterly frequency, the waterworks shall increase the sampling frequency to monthly.

7.8. EPA Relative Risk Tables

The following tables are excerpted from the USEPA “Consensus Method for Determining Groundwaters Under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA)” dated October 1992.

Table A. Numerical range of each bio-indicator based on numbers counted per 100 gallons filtered water*

Indicators of Surface Water*	Extremely Heavy	Heavy	Moderate	Rare	None Found
Giardia**	>30	16-30	6-15	1-5	0
Coccidia**	>30	16-30	6-15	1-5	0
Diatoms	>150	41-149	11-40	1-10	0
Other Algae	>300	96-299	21-95	1-20	0
Insects/Larvae	>100	31-99	16-30	1-15	0
Rotifers	>150	61-149	21-60	1-20	0
Plant Debris	>200	71-200	26-70	1-25	0

Table B. Relative surface water risk factors associated with scoring of bio-indicators present during MPA of subsurface water sources.

Particulates Indicative of Surface Water*	Extremely Heavy***	Heavy	Moderate	Rare	None Found
Giardia	40	30	25	20	0
Coccidia	35	30	25	20	0
Diatoms	16	13	11	6	0
Other Algae	14	12	9	4	0
Insects/Larvae	9	7	5	3	0
Rotifers	4	3	2	1	0
Plant Debris	3	2	1	0	0

Table C. Risk of Groundwater Contamination by Surface Water Influence

≥20****	High Risk
10-19	Moderate Risk
≤ 9	Low Risk

* According to EPA “Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources,” March, 1991 ed.

** If *Giardia* cysts, *Cryptosporidium*, or other coccidia are found in any sample, irrespective of volume, score as above.

*** Refer to Table A for range of indicators counted per 100 gallons under 100X.

**** Refer to Table B for numerical relative risk factor.

8. Radiological

The radionuclides regulation effective on December 8, 2003 requires routine monitoring of gross alpha activity, radium226, radium228 and uranium at each entry point to the distribution system for community waterworks. The initial sampling requirement for a new source is quarterly for four quarters. The next sampling period is determined based on the initial or most recent compliance period results and could be a quarterly, 3-year, 6-year, or 9-year frequency. The required sample periods and cycles fit into a standardized monitoring framework of three 3-year periods comprising a 9-year compliance cycle. The three 3-year sampling periods following the initial sampling period of 2004–2007 are 2008-2010, 2011-2013, and 2014-2016 comprising a 9-year cycle of 2008-2016.

8.1. Monitoring Substitutions and Calculated Values

The rule allows substitution of gross alpha activity for radium226 when the gross alpha activity is less than 5 pCi/L and substitution of gross alpha activity for uranium when the gross alpha activity is less than 15 pCi/L. Since the combined radium PMCL is based on the sum of radium226 + radium228, DCLS has agreed to analyze for radium226 when gross alpha activity is more than 3 pCi/L to minimize potential radium violation issues from gross alpha substitution. When a sample result exceeds the PMCL, both radium226 and radium228 analyses should be specifically required for the follow-up quarterly sampling.

Also, some laboratories measure uranium activity when uranium measurement is required. The uranium PMCL is based on mass rather than activity; however, uranium mass may be calculated from activity using a factor of 0.67pCi/ug (e.g. 20 pCi/L = 30 ug/L). Uranium mass should be analyzed when the value from the uranium activity calculation indicates a uranium exceedance (i.e. >30 ug/L) since the calculated value may be conservative and the actual mass value may be less.

8.2. Monitoring Groups

For simplicity, the intent of ODW is to maintain routine monitoring requirements for radionuclides as a group rather than individual analytes. Also, DCLS routinely analyzes radionuclide samples for gross alpha activity and radium228 with values for radium226 and uranium subsequently obtained by substitution and calculation by ODW. Of course, DCLS will perform the additional analyses required when the gross alpha triggers are exceeded. The exception to monitoring radionuclides as a group is when an MCL value is exceeded and quarterly monitoring is required. In this case, quarterly monitoring is only required for those radionuclides which exceeded the MCL. For practical purposes, these will be two subgroups, one being gross alpha and uranium and the second being radium226 and radium228.

8.3. Scheduling

For community waterworks, the radionuclides regulation requires initial quarterly sampling for four quarters for each entry point into the distribution system. Frequency for the next sampling event depends on the results for the current period. If the monitoring result is below detection limit for each contaminant, the next sampling frequency is 9 years. However, due to the routine testing arrangement in which gross alpha is substituted for radium226 and the detection limit for gross alpha is greater than the detection limit for radium226, a below-detection limit determination for radium226 cannot be made. In this case, the next sampling event frequency is 6 years. When the monitoring result is at or above detection limit but less than or equal to $\frac{1}{2}$ the MCL, the next sampling event frequency is 6 years. When the monitoring result is greater than $\frac{1}{2}$ the MCL but less than or equal to the MCL, the next sampling event frequency is 3 years. When the monitoring results exceed the MCL, quarterly sampling must continue until the results are at or below the MCL. A summary of the sampling frequencies is shown in the table below.

Next Radionuclides Monitoring Frequency Based on Current Period Result(s):

Sample Result(s)	Monitoring Frequency
Below Detection Limit	9 years
Above Detection Limit but $\leq \frac{1}{2}$ MCL	6 years
$> \frac{1}{2}$ MCL but \leq MCL	3 years
$>$ MCL	Quarterly (4 Consecutive Quarters Minimum)

Except where quarterly sampling is required, the monitoring frequency for the radionuclides group will be governed by the highest frequency requirement of the component radionuclides. Also, when establishing the actual radionuclides sampling schedule, an effort should be made to integrate the radionuclides schedule to match the Phase II/V sampling schedule for the waterworks. Also, to the extent practical, the radionuclides schedules for each ODW field office should be evenly spread over time to even workload at the DCLS radiochemistry lab.

When reporting sample results to the owner, the writer may wish to provide an explanation about substitutions and the uranium conversion factor. A statement similar to the following may be used for this purpose:

Where applicable, radium226 and uranium activity values may be obtained by gross alpha substitutions as allowed by regulation. Combined radium is obtained by the addition of radium228 and radium226 activities. If gross alpha activity is less than 5 pCi/L, then radium226 may be obtained by substitution of the gross alpha activity. If the gross alpha activity is less than 15 pCi/L then uranium activity may be obtained by substitution of gross alpha activity. The uranium activity may be converted to uranium mass for compliance evaluation purposes using the relationship of 20 pCi/L \approx 30 μ g/L.

8.4. CCR Reporting

The CCR Rule requires reporting of detections of all regulated contaminants including gross alpha and combined radium. There are no individual MCLs for radium226 or radium228; however, since radium228 is part of combined radium, anytime radium228 is detected combined radium must be reported, even if radium226 is not analyzed or not detected. To avoid confusion with application of the CCR Rule, we will require only contaminants measured and reported by the laboratory to be included. In the case where radium228 is analyzed but radium226 is not, combined radium is reported as the radium228 value. In cases where radium226 is detected and reported, but radium228 is absent or below detection levels, the radium226 result should be reported in the CCR as combined radium. Keep in mind that whenever a potential violation exists, additional analyses will be required by ODW for compliance determination and reporting.

For information on Gross Beta and Photon Emitters, refer to WM 872.

9. Contaminants of Concern

9.1. Methyl Tertiary Butyl Ether (MTBE)

MTBE is a synthetic volatile organic chemical with no natural sources. It is a blending component of gasoline that started replacing the use of lead in gasoline in the late 1970's. It is used in gasoline and reformulated gasoline (RFG) as an octane enhancer and to promote more complete burning, thereby reducing carbon monoxide and ozone levels in the air. The most common source of groundwater and surface water contamination by MTBE is leakage from storage tanks (both underground and above ground) and pipelines; spills at gasoline stations; disposal at landfill sites and dumps; emissions from marine engines into lakes and reservoirs; and to some extent from air deposition and storm water run-off.

MTBE moves rapidly into groundwater because of its solubility in water, relative mobility in soils, and resistance to decomposition. It generally migrates faster than other organic components of gasoline. As a result, MTBE can serve as an early indicator of potential gasoline contamination. MTBE has been detected in public and private drinking water wells. The reported concentrations of MTBE in wells can vary widely but generally are in the range of 1 to 10 parts per billion (ppb).

According to the Environmental Protection Agency (EPA), based on the limited sampling data available, most concentrations at which MTBE has been found in drinking water sources are unlikely to cause adverse health effects. However, there are no studies on the effects on humans of drinking MTBE-contaminated water.

There are significant uncertainties about the degree of risk associated with human exposure to low concentrations typically found in drinking water.

MTBE has a very unpleasant taste and odor that can make contaminated drinking water unacceptable to the public. Studies have shown that humans vary widely in the concentrations they are able to detect. The Environmental Protection Agency has issued a drinking water advisory of 20 to 40 ppb on the basis of odor and taste thresholds. Several states have set their action levels (or remediation trigger level) for MTBE in the 15 to 250 ppb range.

ODW has adopted 15 ppb as a “trigger” level for MTBE in public drinking water. The trigger level means the concentration at which MTBE should be more closely monitored, and increased technical assistance provided to the waterworks. ODW recommends that drinking water exhibiting taste and odor problems attributed to petroleum constituents, including MTBE, not be consumed. When this occurs, treatment or alternate sources of supply should be considered.

The Virginia General Assembly enacted a law in 2000 that requires every public water supply system to be tested for MTBE at least quarterly (15.2-2144 of the Code of Virginia.) The most pertinent excerpt of the law is as follows:

B. Every public water supply operator shall at least quarterly test the public water supply for the presence of methyl tertiary-butyl ether (MTBE). The locality shall maintain a record of testing conducted pursuant to this subsection. If the results of any test conducted pursuant to this subsection indicate the presence of MTBE in excess of fifteen parts per billion, the locality shall immediately notify the Department of Environmental Quality and the Department of Health. The Division of Consolidated Laboratory Services shall maintain and make available, upon the request of any person, a list of laboratories, accredited under the provisions of the federal Safe Drinking Water Act (42 U.S.C. § 300f et seq.) to analyze samples, located throughout the Commonwealth that possess the technical expertise to analyze water samples for the presence of MTBE. Any lab seeking accreditation under the Safe Drinking water Act may contact the Division of Consolidated Laboratory Services.

This law does not supersede the Waterworks Regulations, nor does it invoke any action on the part of ODW except to receive the notification from the waterworks that the sample was in excess of 15 ppb.

While the law does not specify the exact location of the samples, ODW recommends that each entry point to the distribution system be sampled quarterly.

9.2. Hexavalent Chromium (Chromium-6)

Chromium is an odorless and tasteless metallic element found in rocks, soil, plants, and animals. Chromium is also used in steel making, metal plating, leather tanning, paints, dyes and wood preservatives. The most common forms of chromium in the environment are trivalent (chromium-3), hexavalent (chromium-6) and the metal form, chromium-0.

EPA has established a drinking water Maximum Contaminant Level (MCL) standard of 0.1 mg/L or 100 ppb for total chromium, which includes all forms of chromium. The Virginia Department of Health has adopted this total chromium standard in the *Waterworks Regulations*.

Community and NTNC waterworks currently take a minimum of one sample at each entry point to the distribution system. Samples are taken once every three years for waterworks having solely groundwater sources, and once annually for waterworks with surface water source(s).

States may set more stringent drinking water standards than EPA. California has a 50-µg/L MCL for total chromium. EPA plans to finalize the human health assessment, and after an external scientific peer review, it is likely that drinking water standards for chromium-6 will be established.

EPA recommends that systems voluntarily collect samples and test for chromium-6. Their guidelines are:

Locations to be sampled on the same day:

- 1) Samples of untreated water at the Intake/well locations,
- 2) Entry points to the distribution system,
- 3) Distribution System

Frequency:

- 1) Surface water sources: quarterly;
- 2) Ground water sources: semi-annually.

Sampling for Chromium-6 is voluntary in Virginia. However, ODW suggests that any waterworks that detects Total Chromium should test for chromium-6. Waterworks that test for Chromium-6 should request that the modified version of EPA Method 218.6, "Determination of Dissolved Hexavalent Chromium in Drinking Water, Groundwater and Industrial Wastewater Effluents by Ion Chromatography" be used. It is recommended that waterworks first look for total chromium using a more accessible method, then use the more complex EPA method to further refine any results requiring such testing.

9.3. Perchlorate

Perchlorate is both a naturally occurring and man-made chemical that is used to produce rocket fuel, fireworks, flares and explosives. Perchlorate can also be present in bleach and in some fertilizers. Scientific research indicates that this contaminant can disrupt the thyroid's ability to produce hormones needed for normal growth and development. EPA has included perchlorate on the first, second, and third Contaminant Candidate Lists (CCLs) published in the Federal Register on March 2, 1998, February 24, 2005, and October 8, 2009, respectively.

Perchlorate has been found in just over 4 % of public water systems nationally. Perchlorate was sampled in drinking water supplies as part of the Unregulated Contaminant Monitoring Regulation 1 (UCMR 1) program. EPA collected data on perchlorate from 3,865 public water supplies between 2001 and 2005.

This included all large public water systems (serving more than 10,000 people), and a statistical sample of 800 small water systems, which together serve more than 80% of the population. In this (4.1%) of the systems reported a detection of perchlorate (in at least 1 entry/sampling point) at levels greater than or equal to 4 µg/L (the minimum reporting level of the test).

The EPA decision to propose a formal rule for perchlorate was published in the Federal Register on February 11, 2011. This action initiates a process to develop and establish a national primary drinking water regulation (NPDWR). The first public meeting was held September 20, 2012. The meeting focused on treatment technologies and analytical methods. The SDWA deadline for EPA's "notice of proposed rulemaking" is February 2013.

9.4. Harmful Algal Blooms (HABs)

Harmful algal blooms (HABs) are accumulations of phytoplankton that can produce toxins harmful to humans, animals, and ecosystems. Freshwater HABs often produce a scum or unusual color on the surface of the water. Cyanobacteria, sometimes referred to as "blue-green algae", are photosynthetic bacteria that share some properties with algae and have the capacity to produce toxins. Cyanobacteria are found naturally in lakes, streams, ponds, and other surface waters.

The scientific community agrees that the incidence of HABs is increasing both in the U.S. and worldwide. Increased concentrations of nitrogen and phosphorus have been related to HABs occurrence, particularly during summer. These nutrients are found in agricultural runoff and sewage treatment discharges.

Human exposure to cyanotoxins found in drinking water can occur through dermal contact, inhalation, and ingestion of water containing the toxin. Illnesses caused by cyanotoxins include poisoning from Anatoxin-a, Cylindrospermopsin, Lyngbyatoxin, and Microcystin. There are no federal standards for cyanotoxins in drinking water. Microcystins in drinking water are not yet regulated by the US EPA but is expected to be addressed in the near future. The World Health Organization has a provisional drinking water guideline of 1 µg/L for microcystin-LR.

10. Monitoring Waivers

10.1. Background

Monitoring waivers originated with the Phase II/V Rule, with various effective dates from 1989 through 1994. The *Waterworks Regulations* allow Community and Non-transient, Non-community (NTNC) waterworks to apply for Monitoring Waivers for Volatile Organic Chemicals (VOCs), Inorganic Chemicals (IOCs), and Synthetic Organic Chemicals (SOCs) contaminants. However, it is ODW's policy to consider monitoring waivers for SOCs and cyanide only, and to prescribe monitoring schedules for IOCs (with cyanide and asbestos excluded) and VOCs based on analytical results and in accordance with guidance on the Standardized Monitoring Framework outlined in Chapter 11 "Sample Scheduling" of this manual. Contaminants can be waived by contaminant group, region, or statewide.

Waterworks that are not granted waivers must comply with the minimum sampling requirements defined in Section 12VAC5-590-370 of the *Waterworks Regulations*. Waivers may be granted for a maximum of 3, 6 (for VOCs but not used), or 9 years, depending on the contaminant and waterworks' specific conditions of the waterworks' source water assessment (or "evaluation") area.

10.2. Types of Waivers

There are two types of waivers – "Use Waiver" and "Susceptibility Waiver" – that are available to all community and NTNC waterworks.

Use waivers may be granted when there is no previous use of the contaminant within the watershed or delineated source water assessment area, including transport, storage, or disposal.

Susceptibility waivers may be granted where the contaminant has been used or where the extent of its use is unknown, after considering several factors that would influence the probability of its occurrence in the source water. When the probability of occurrence is high, sampling and analysis should be required to establish baseline data before a monitoring waiver can be considered.

10.3. Statewide-Specific Waivers

The State Health Commissioner (or Commissioner), under the *Waterworks Regulations*, has allowed a statewide waiver for Dioxin, Endothall, Asbestos, and Glyphosate based on geographic vulnerability assessments. Therefore, no monitoring for these contaminants is required by the waterworks owners.

10.4. Contaminant-Specific Waiver

The Commissioner has also granted waivers for three SOCs and one IOC, based on a statewide use and susceptibility determination. The SOCs are dibromochloropropane (DBCP), ethylene dibromide (EDB), and diquat; and the IOC is cyanide. Cyanide can only be waived after the initial monitoring requirements have been completed with no detection. Specific waiver requirements for these contaminants are as follows:

- Diquat: Diquat binds readily to clay particles, is absorbed by aquatic plants, is rapidly degraded by sunlight, and is rendered biologically unavailable in clay soils. Most soils in the Commonwealth contain a high percentage of clay, except in the Tidewater region. Therefore, for sandy soils, as with waterworks in the Tidewater region, a monitoring waiver will not be granted.
- Ethylene Dibromide (EDB): Studies have found concentrations of EDB associated with gasoline contamination, and EDB has been added to some leaded gasolines. Therefore, well samples detecting any of the following VOCs: benzene, ethylbenzene, toluene, xylene, 1,2-dichloroethane, or MTBE must analyze for EDB at least once before a monitoring waiver can be considered.

- **Dibromochloropropane (DBCP):** DBCP may have been used as a soil fumigant (notably as a pesticide); its use was discontinued in 1979.
- **Cyanide:** Cyanide monitoring may be waived after the initial monitoring requirements have been completed with no detection. For new sources, three rounds of annual monitoring must first be completed before a monitoring waiver can be considered. For an existing waterworks that have monitored previously for cyanide, a waiver can be granted for a complete compliance cycle (i.e., 9 years). However, a condition of this waiver requires the waterworks owner to collect a minimum of one sample while the waiver is effective. A decision flow chart for cyanide monitoring is provided in Chapter 12 of this manual.

10.5. Waiver Application Form and Letters

The waiver review process follows the schedule outlined in the Standard Monitoring Framework (see Chapter 11 of this manual), which is based on a 9-year compliance cycle consisting of three 3-year compliance periods. This framework initially started in 1993. (1st cycle: 1993-1998; 2nd cycle: 2002-2010; 3rd cycle: 2011-2019; 4th cycle: 2020-2028; and so on, repeating every 9 years.) Typically, SOC waivers are granted over a compliance period (i.e., 3 years), and cyanide waivers are granted over a compliance cycle (9 years), with the condition that the owner take a minimum of one sample while the cyanide waiver is in effect.

The waterworks owner is responsible for submitting the monitoring waiver requests to the ODW for consideration. However, in practice, ODW initiates the waiver process by sending a letter to the owner with the application form. ODW is required to review the waiver application and decide if the monitoring requirements can be reduced through the granting of an appropriate contaminant waiver. The following attachments are available for field staff to assemble a waiver application package to the waterworks for their use:

- Attachment A.1. *Instructions and General Information* to the waterworks owners for the completion of the waiver application.
- Attachment A.2. Waiver Application Form.
- Attachment A.3. VDH SWAP User Guide: SOC Monitoring Waiver Evaluations.

Use the following letter templates to initiate and document the waiver determination:

- Attachment B.1. Reminder letter to the waterworks on the expiring monitoring waivers in the last year of the compliance period, as well as transmitting an application form for “new” monitoring waivers for the next compliance period.
- Attachment B.2. Letter stating that all or some of the SOC and cyanide (if applicable) waivers for the next compliance period or cycle have been approved/denied to the subject waterworks.

10.6. ODW Review and Waiver Determination

The source water assessment area is defined as the watershed drainage area associated with a surface water intake or a groundwater well, typically represented geographically by zones.

Zone 1 - This is an assessment area where contamination events are considered to have the highest risk to impact drinking water supplies under VDH Source Water Assessment Program (SWAP). Typically, Zone 1 represents a 5-mile radius from the surface water intake to the treatment facility, and a 1,000-ft radius from the groundwater source.

Zone 2 - This is an assessment area beyond Zone 1 where contamination events are considered to possibly exist and may still have an impact on drinking water supplies under the VDH SWAP. Zone 2 represents the watershed area beyond Zone 1 for a surface water intake, and the area between Zone 1 and a 1-mile radius from the groundwater source.

ODW staff should review available Source Water Assessment (SWA) information for existing sources (i.e., Zone 1 and Zone 2) to validate/corroborate a monitoring waiver request. This information includes maps, GIS locational data on potential sources of contamination, etc. It is located on the ODW shared drive at ...[\15-SWAP-Processing\08-SWA_Outputs.](#) The proximity of the waterworks to potential sources of contamination is most important in evaluating a monitoring waiver. Potential spills or leaks at or near the water treatment facility from commercial or industrial use, disposal, or storage of contaminants; and from hazardous and municipal waste landfills and other waste handling facilities need to be considered. Guidance on using the SWA information is provided in Attachment A.3.

There are five SOC contaminant groups (volatile fumigants, carbamates, chlorinated acid herbicides, semi-volatiles, and diquat) and one IOC (cyanide) for which contaminant waivers can be considered. A listing of the regulated SOC contaminants in these groups is provided in Attachment A.1, Table 1. Generally, these contaminants include insecticides, herbicides, pesticides, fungicides, and others used on agricultural areas, forest lands, home and gardens, and other land application uses. The relationship between land use/activity and these contaminants and how water quality can be impacted is also provided in Attachment A.1, Table 3.

Additional waiver considerations should include, but are not limited to the following:

- Elevated nitrate levels may be an indicator of the potential for pesticide contamination.
- The presence of polychlorinated biphenyls (PCBs) may be due to the proximity of water pumps, electrical transformers or other equipment that may contain PCBs.
- All previous analytical results of a contaminant, the degree of variation in the contaminant concentration, and other factors affecting concentration; e.g., changes in well pumping rates, system configuration, waterworks' operating procedures, and in-stream flows or characteristics.
- Environmental persistence and transport of a contaminant in the source water assessment area.
- Groundwater source features including depth of the well and integrity of its casing, and type of soil in the Zone 1 and Zone 2 areas.

10.7. Monitoring Schedules

The standard monitoring schedule (framework) associated with VOCs, IOCs, and SOCs is to be used to establish monitoring schedules, except when a monitoring waiver has been granted. These contaminants are discussed in Chapters 11 and 12 of this manual, and summarized in Sections 11.5 and 11.6 and tabulated in Section 11.8. All waiver determinations shall be entered in R&R. For additional guidance, see WM 824, "R&R User's Guide".

11. Sample Scheduling

Compliance sampling at each waterworks is based on the type of waterworks (TNC, NTNC or Community); the type of sources (Groundwater, Groundwater Under the Direct Influence of Surface Water (GUDI), Surface Water, Purchased); population; and the type of treatment provided.

Tables 11.2 through 11.7 include a listing of initial and reduced compliance chemical and bacteriological sampling at the three types of waterworks using groundwater, groundwater under direct influence of surface water (GUDI), surface water or purchased water sources. These tables assume the waterworks have one type of source.

The Entry Point compliance schedule for waterworks with a combination of GUDI or surface water sources with groundwater, and/or purchased water sources must collect routine compliance chemical samples at a frequency listed for the GUDI/surface water sources. For example, a waterworks with a surface water source and a groundwater source will have to collect entry point samples annually for metals, and inorganic chemicals from the surface water source entry point and the groundwater source entry point.

11.1. Standardized Monitoring Framework

In order to standardize monitoring requirements across rules and contaminant groups, EPA established a nine-year (based on a calendar year) compliance cycle, with the first cycle beginning on January 1, 1993. The 3rd nine year compliance cycle contains three three-year compliance periods:

- 1st period: 2011 to 2013
- 2nd period: 2014 to 2016
- 3rd period: 2017 to 2019

The Standard Monitoring Framework encompasses both sampling and vulnerability assessment activities.

The Standardized Monitoring Framework only applies to entry point sampling for inorganic contaminants, synthetic and volatile organic contaminants, radionuclides, Nitrate + Nitrite (Combined), Nitrite, Cyanide and Asbestos. Table 11.8 is a table of the Standardized Monitoring Framework for the third cycle which began on January 1, 2011 and ends December 31, 2019. This section is provided as a tool to determine the appropriate sampling cycle or period the entry point is currently in and will aid in determining when a violation for failure to sample has occurred.

The *Waterworks Regulations* and the Standardized Monitoring Framework use the terms “Reliably and Consistently” when establishing sample schedules for entry points based on an initial sample result exceeding a trigger value, such as an MCL or ½ MCL or the detection of, various inorganic, synthetic organic, volatile organic, nitrate + nitrite (combined) and nitrite contaminants. Listed below are procedures for interpreting when “Reliably and Consistently” applies.

- Initial Required Samples (Routine + any required Confirmation samples) > MCL
Quarterly water samples must be collected from the entry point for a minimum of 4 additional quarters. If the running annual average is less than the MCL and not trending toward the MCL, the District Engineer has the discretion to reduce sampling as indicated in the Standardized Monitoring Framework.
- Detection of Synthetic Organic or Volatile Organic Contaminants < MCL

Quarterly water samples must be collected from the entry point. If the first two subsequent quarterly samples do not detect the organic contaminant, the District Engineer has the discretion of reducing the sampling to the previous routine frequency or to annually.

- If the SOC/VOC contaminant continues to be detected and is less than or equal to the MCL, sampling must continue for a minimum of 4 quarters. At the end of 4 quarters, the District Engineer has the discretion of reducing the sampling to annually during the quarter with the highest detection.
- Nitrate + Nitrite (Combined) or Nitrite $\geq \frac{1}{2}$ MCL and \leq MCL
Quarterly water samples must be collected from the entry point for a minimum of 4 quarters. If all samples are below the MCL and not trending toward the MCL, the District Engineer has the discretion of reducing sampling to annually during the quarter with the highest result detected.

11.2. Compliance Monitoring Requirements: TNC with a Groundwater Source

Parameter	Frequency	Locations	Sample schedule comments
Bacteria - distribution system	Quarterly ¹	Requires approved plan	The approved plan provides a repeat monitoring schedule should a positive result occur.
Bacteria (MPN), source	See (2) below	Source tap	Samples are collected at the source tap prior to treatment as indicated in (2) below.
Chlorine (for systems that use chlorine as a disinfectant or oxidant) – distribution system	Same as Bacteria – distribution system	Same as Bacteria Requires approved plan	A chlorine residual measurement shall be performed and recorded at the same time and location as each required bacteriological sample collection.
Chlorine Dioxide (for systems that use chlorine dioxide as a disinfectant or oxidant)	Daily	Entry points ³ Requires approved plan	If the chlorine dioxide residual exceeds MRDL of 0.8 mg/l, a minimum of three chlorine dioxide residual analysis will be performed at a sample site as close to the first customer as possible, at intervals of at least 6 hours.
Nitrates + Nitrites (Combined)	Once per year	Entry points ³	If analysis result is > 5 ppm and ≤ 10 ppm, quarterly monitoring is required for at least 4 consecutive quarters. If all 4 quarterly samples are below 10 ppm and not trending toward 10 ppm, the District Engineer has the discretion of reducing sampling to annually during the quarter with the highest result detected. If analysis result is >10ppm, a confirmation sample must be collected within 24 hours and quarterly monitoring must begin and continue for the duration of the MCL exceedance
Nitrites	One sample	Entry points ³	If the sample is < 0.5 ppm no further sampling is required; otherwise increase to quarterly for at least one year.

Notes:

- (1) Most systems are required to collect only one routine sample per quarter. However, if the population served is > or = 1001 the sample frequency increases to monthly in accordance with 12 VAC5-590-370 A. of the Waterworks Regulations.
- (2) Groundwater sources with treatment which could alter bacteriological quality are required to collect MPN raw source water samples as follows :
 - Springs, collect one sample per month prior to treatment.
 - Karstian wells, collect one sample per quarter prior to treatment.
 - Non-karstian well, one sample per year prior to treatment.
- (3) Entry points are either at water source downstream of treatment or at a point where more than one water source is mixed before entering system.

11.3. Compliance Monitoring Requirements: TNC with a Surface Water or GUDI Source

Parameter	Initial Frequencies	Locations	Sample schedule comments
Bacteria ¹ – distribution system	Monthly	Requires approved plan	The approved plan provides a repeat monitoring schedule should a positive result occur
Chlorine (for systems that use chlorine as a disinfectant or oxidant) – distribution system	Same as Bacteria	Same as Bacteria Requires approved plan	A chlorine residual measurement shall be performed and recorded at the same time and location as each required bacteriological sample collection.
Nitrates + Nitrites (Combined)	Yearly	Entry point tap ²	If analysis result is > 5 ppm and ≤ 10 ppm, quarterly monitoring is required for at least 4 consecutive quarters. If all 4 quarterly samples are below 10 ppm and not trending toward 10 ppm, the District Engineer has the discretion of reducing sampling to annually during the quarter with the highest result detected. If analysis result is >10ppm, a confirmation sample must be collected within 24 hours and quarterly monitoring must begin and continue for the duration of the MCL exceedance
Nitrites	One sample	Entry point tap ²	If the sample is < 0.5 mg/l no further sampling is required; otherwise increase to quarterly for at least one year.
Chlorine Dioxide (for systems that use chlorine dioxide as a disinfectant or oxidant)	Daily	Entry point tap ²	If the chlorine dioxide residual exceeds MRDL of 0.8 mg/l, a minimum of three chlorine dioxide residual analysis will be performed at a sample site as close to the first customer as possible, at intervals of at least 6 hours.
Notes:			
(1) The number of samples required per quarter or per month is dependent on the population served. See 12 VAC5-590-370 A. of the <i>Waterworks Regulations</i> .			
(2) Entry points are either at water source downstream of treatment or at a point where more than one water source is mixed before entering system.			

11.4. Compliance Monitoring Requirements: TNC Consecutive Waterworks

Parameter	Frequency	Locations	Sample schedule comments
Bacteria - distribution system	Quarterly ¹	Requires approved plan	The approved plan provides a repeat monitoring schedule should a positive result occur.
Chlorine (for systems that receive chlorine as a disinfectant or oxidant) – distribution system	Same as Bacteria	Same as Bacteria Requires approved plan	A chlorine residual measurement shall be performed and recorded at the same time and location as each required bacteriological sample collection.
Notes: (1)Systems are required to collect routine samples based on population served in accordance with 12 VAC5-590-370 A. of the <i>Waterworks Regulations</i> .			

11.5. Compliance Monitoring Requirements: Community or NTNC with a Groundwater Source

Parameter	Initial Frequency	Locations	Sample schedule comments
Bacteria - distribution system ¹	Monthly	Requires approved plan	The approved monitoring plan requires additional monitoring should a positive result occur.
Bacteria (MPN), source water	See (2) below	Source tap	Samples are collected at the source tap prior to treatment as indicated in (2) below.
Chlorine (for systems that use chlorine as a disinfectant or oxidant) – distribution system	Same as Bacteria	Same as Bacteria Requires approved plan	A chlorine residual measurement shall be performed and recorded at the same time and location as each required bacteriological sample collection.
Chlorine Dioxide (for systems that use chlorine dioxide as a disinfectant or oxidant)	Daily	Entry points Requires approved plan	If the chlorine dioxide residual exceeds MRDL of 0.8 mg/l, a minimum of three chlorine dioxide residual analysis will be performed. These samples must be collected as close to the first customer as possible at 6 hour intervals. If booster chlorination (re-chlorination) is provided, the samples must be collected as close to the first customer as possible, at a location representative of average residence time and as close to the end of the distribution system as possible reflecting maximum residence time.
Nitrates + Nitrites (Combined)	Once per year	Entry points	If analysis result is > 5 ppm and ≤ 10 ppm, quarterly monitoring is required for at least 4 consecutive quarters. If all 4 quarterly samples are below 10 ppm and not trending toward 10 ppm, the District Engineer has the discretion of reducing sampling to annually during the quarter with the highest result detected. If analysis result is >10ppm, a confirmation sample must be collected within 24 hours and quarterly monitoring must begin and continue for the duration of the MCL exceedance
Nitrites	One sample	Entry points	If the sample is < 0.5 mg/l no further sampling is required; otherwise increase to quarterly for at least one year.
Metals	Once per 3 year compliance period	Entry points	Increase to quarterly if a PMCL is exceeded. Samples must be collected in a 3 year window.
Inorganics	Once per 3 year compliance period	Entry points	Increase to quarterly if a PMCL is exceeded. Samples must be collected in a 3 year window.
VOCs	Quarterly	Entry points	If no detects after the initial 4 quarters, reduce to yearly at highest previous quarter; after an additional 2 annual samples with no detects, reduce to once per 3 year compliance period. If detected, see (5) below.
Radionuclides ³ -Community only (includes Gross Alpha, Combined Radium-226/228 and Uranium, also see (3*) below)	Quarterly ²	Entry point tap	If the initial 4 consecutive quarterly average exceeds the MCL the system shall continue to sample quarterly until the average is equal to or below the MCL then see (3) below.
SOCs ⁴	Quarterly ⁴	Entry points	If not detected after the initial 4 quarters see (4) below; if detected, see (5) below.
Cyanide	Once every 3 years	Entry points	After 3 samples with no detects a waiver is granted where only one sample per 9 year cycle is required.
Disinfection Byproducts ⁶	Population dependent	Requires approved plan	See (6) below if chlorine, Chloramination, Chlorine Dioxide or Ozone is used.
Lead & Copper ⁷	See (7) below	Requires approved plan	Sampling locations are based on the population and plumbing materials survey.

11.5. Compliance Monitoring Requirements: Community or NTNC with a Groundwater Source (continued)

Parameter	Initial Frequency	Locations	Sample schedule comments
Notes:			
(1) The number of samples required per month is dependent on the population served. See 12 VAC5-590-370 A. of the <i>Waterworks Regulations</i> .			
(2) Groundwater sources with treatment which could alter bacteriological quality are required to collect MPN raw source water samples as follows : <ul style="list-style-type: none"> - Springs, collect one sample per month prior to treatment. - Karstian wells, collect one sample per quarter prior to treatment. - Non-karstian well, one sample per year prior to treatment. 			
(3) The running average of 4 consecutive quarterly samples determines compliance and sampling frequency for each contaminant. <ul style="list-style-type: none"> a) If the average of initial monitoring results is below detection limits, the sampling frequency will reduce to one sample every 9 years (because of substitutions a 9 year schedule will not normally apply). b) If the average of initial monitoring results is greater than or equal to the detection limit but less than or equal to one half the MCL, the sampling frequency will reduce to one sample every 6 years. c) If the average of initial monitoring results is greater than one half the MCL but less than or equal to the MCL , the sampling frequency will reduce to one sample every 3 years. 			
* Systems determined to have vulnerable or contaminated source water from manmade Radionuclides shall sample on a frequency established by the <i>Waterworks Regulations</i> .			
(4) Waterworks may request a waiver to SOC monitoring requirements for each water source. Waivers must be renewed by submission of an application for each source every 3 years. Waterworks denied a monitoring waiver may reduce the monitoring frequency if SOCs are not detected in the initial 4 quarters as follows: <ul style="list-style-type: none"> a) For populations > 3300, two quarterly samples within a one year window during the 3 year compliance period, or b) For populations < or = 3300, one sample per 3 year compliance period. 			
(5) Waterworks which detect a VOC or SOC must continue to collect quarterly samples for a minimum of four consecutive quarters. If the concentration of the detected contaminant is reliably and consistently below the MCL, sampling may be reduced to annually during the quarter with the highest analytical result. Waterworks which previously detected SOC's but have collected 3 annual samples with no detection of contaminants may apply for SOC Waivers as indicated in (4) above. Waterworks which previously detected VOC's but have collected 3 annual samples with no detection of contaminants may be reduced to once every 3 year compliance period.			
(6) Please refer to Section 5 for information on Disinfection Byproducts Monitoring, and to ..\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals\WM898-Sampling Manual\			
(7) Lead & Copper monitoring is required for 2 successive 6 month periods. If the 90th percentile lead & copper levels do not exceed the action levels, then at least two sets of subsequent satisfactory annual samples are required before reducing the monitoring to every 3 years. Also, samples collected annually and every three years can be reduced to half (but not < 5) of the number required during the initial sampling, but must be collected between June and September. If the initial results exceed action levels, then source treatment or lead containing service line replacement are potential required solutions.			

11.6. Compliance Monitoring Requirements: Community or NTNC with a Surface Water or GUDI Source

Parameter	Initial Frequencies	Locations	Sample schedule comments
Bacteria – distribution system	Monthly ¹	Requires approved plan	The approved plan provides a repeat monitoring schedule should a positive result occur
Chlorine (for systems that use chlorine as a disinfectant or oxidant) – distribution system	Same as Bacteria	Same as Bacteria Requires approved plan	A chlorine residual measurement shall be performed and recorded at the same time and location as each required bacteriological sample collection.
Nitrates + Nitrites (Combined)	Quarterly	Entry point tap	If analysis result is > 5 ppm and ≤ 10 ppm, quarterly monitoring is required for at least 4 consecutive quarters. If all 4 quarterly samples are below 10 ppm and not trending toward 10 ppm, the District Engineer has the discretion of reducing sampling to annually during the quarter with the highest result detected. If analysis result is >10ppm, a confirmation sample must be collected within 24 hours and quarterly monitoring must begin and continue for the duration of the MCL exceedance
Nitrites	One sample	Entry point tap	If the sample is < 0.5 mg/l no further sampling is required; otherwise increase to quarterly for at least one year.
Metals	Yearly	Entry point tap	Increase to quarterly if a PMCL is exceeded
Inorganics	Yearly	Entry point tap	Increase to quarterly if a PMCL is exceeded
VOCs	Quarterly	Entry point tap	If not detected in the initial 4 quarters, reduce to yearly; if detected , see (4) below.
Radionuclides ² -Community only (includes Gross Alpha, Combined Radium-226/228 and Uranium, also see (2*) below)	Quarterly ²	Entry point tap	If the initial 4 consecutive quarterly average exceeds the MCL the system shall continue to sample quarterly until the average is equal to or below the MCL then see (2) below.
SOCs ³	Quarterly ³	Entry point tap	If not detected after the initial 4 quarters see (3) below; if detected see (4) below.
Cyanide	Once every year	Entry point tap	After 3 years with no detects a waiver is granted where only one sample per 9 year cycle is required.
Disinfection Byproducts ⁵	Population dependent	Requires approved plan	See (5) below.
TOC & Alkalinity ⁶	Monthly	Raw & combined filter effluent taps Requires approved plan	A paired set of samples shall be collected each month demonstrating the removal ratio for TOCs . A removal ratio of 1.00 or greater is required on a running quarterly average to be in compliance. The % removal requirements are based on the source water alkalinity and TOC concentrations as listed in the <i>Waterworks Regulations</i> .
Bromate (only if using Ozone)	Monthly	Entry point	Compliance is based on a running annual average
Bromide (if using Ozone)	Monthly	Source water	Collection required to reduce the required Bromate samples to that noted above

11.6. Compliance Monitoring Requirements: Community or NTNC with a Surface Water or GUDI Source (continued)

Parameter	Initial Frequencies	Location	Sample Schedule Comments
Chlorine Dioxide (for systems that use chlorine dioxide as a disinfectant or oxidant)	Daily	Entry points Requires approved plan	If the chlorine dioxide residual exceeds MRDL of 0.8 mg/l, a minimum of three chlorine dioxide residual analysis will be performed. These samples must be collected as close to the first customer as possible at 6 hour intervals. If booster chlorination (re-chlorination) is provided, the samples must be collected as close to the first customer as possible, at a location representative of average residence time and as close to the end of the distribution system as possible reflecting maximum residence time.
Lead & Copper ⁷	See (6) below	Requires approved plan	Sampling locations are based on the population and plumbing materials survey.

Notes:

- (1) The number of samples required per month is dependent on the population served. See 12 VAC5-590-370 A. of the *Waterworks Regulations*.
- (2) The running average of 4 consecutive quarterly samples determines compliance for each contaminant.
 - a) If the average of initial monitoring results is below detection limits, the sampling frequency will reduce to one sample every 9 years (because of substitutions a 9 year schedule will not normally apply).
 - b) If the average of initial monitoring results is greater than or equal to the detection limit but less than or equal to one half the MCL, the sampling frequency will reduce to one sample every 6 years.
 - c) If the average of initial monitoring results is greater than one half the MCL but less than or equal to the MCL, the sampling frequency will reduce to one sample every 3 years.
- * Systems determined to have vulnerable or contaminated source water from manmade Radionuclides shall sample on a frequency established by the *Waterworks Regulations*.
- (3) Waterworks may request a waiver to SOC monitoring requirements for each water source. Waivers must be renewed by submission of an application for each source every 3 years. Waterworks denied a monitoring waiver may reduce the monitoring frequency if SOC's are not detected in the initial 4 quarters as follows:
 - a) For populations > 3300, two quarterly samples within a one year window during the 3 year compliance period, or
 - b) For populations < or = 3300, one sample per 3 year compliance period.
- (4) Waterworks which detect a VOC or SOC must continue to collect quarterly samples for a minimum of four consecutive quarters. If the concentration of the detected contaminant is reliably and consistently below the MCL, sampling may be reduced to annually during the quarter with the highest analytical result. Waterworks which previously detected SOC's but have collected 3 annual samples with no detection of contaminants may apply for SOC Waivers as indicated in (3) above.
- (5) Please refer to Y:\03-Memos\301-Active Working Memos\301.02-Forms Letters Manuals\WM898- Sampling Manual for Disinfection Byproducts Monitoring Plans, Review forms and Approval Letters
- (6) Alkalinity monitoring is only required at the raw water tap.
- (7) Lead & Copper monitoring is required for 2 successive 6 month periods. If the 90th percentile lead & copper levels do not exceed the action levels, then at least two sets of subsequent satisfactory annual samples are required before reducing the monitoring to every 3 years. Also, samples collected annually and every three years can be reduced to half of the number required during the initial sampling but must be collected between June and September. If the initial results exceed action levels, then source treatment or lead containing service line replacement are potential required solutions.

11.7. Compliance Monitoring Requirements: Community or NTNC Consecutive Waterworks

Parameter	Frequency	Locations	Sample schedule comments
Bacteria, distribution system	Monthly ¹	Requires approved plan	The approved plan provides a repeat monitoring schedule should a positive result occur.
Chlorine (for systems that receive chlorine as a disinfectant or oxidant) – distribution system	Same as Bacteria	Same as Bacteria Requires approved plan	A chlorine residual measurement shall be performed and recorded at the same time and location as each required bacteriological sample collection.
Disinfection Byproducts (for systems receiving disinfected water from their supplier or providing disinfection) ³	Population dependent	Requires approved plan	See Chapter 5 for Disinfection Byproducts Monitoring Plans, Review Forms and Approval Letters.
Chlorine Dioxide (for systems that use chlorine dioxide as a disinfectant or oxidant)	Daily	Entry points Requires approved plan	If the chlorine dioxide residual exceeds MRDL of 0.8 mg/l, a minimum of three chlorine dioxide residual analysis will be performed. These samples must be collected as close to the first customer as possible at 6 hour intervals. If booster chlorination (re-chlorination) is provided, the samples must be collected as close to the first customer as possible, at a location representative of average residence time and as close to the end of the distribution system as possible reflecting maximum residence time.
Chlorite (only if using Chlorine dioxide)	Daily	Entry point - Requires approved plan	If daily samples exceed MRDL, then must collect 3 samples from distribution system
Lead & Copper ²	See (2) below	Requires approved plan	Sampling locations are based on the population and plumbing materials survey.

Notes:

(1) Systems are required to collect routine samples based on population served in accordance with 12 VAC5-590-370 A. of the *Waterworks Regulations*.

(2) Lead & Copper monitoring is required for 2 successive 6 month periods. If the 90th percentile lead & copper levels do not exceed the action levels, then at least two sets of subsequent satisfactory annual samples are required before reducing the monitoring to every 3 years. Also both annual and samples collected every three years can be reduced to half (but not < 5) of the number required during the initial sampling, but must be collected between June and September. If the initial results exceed action levels, then source treatment or lead containing service line replacement are potential required solutions.

11.8. Standard Monitoring Schedule

		THIRD CYCLE									FOURTH CYCLE								
		1 ST Period			2 nd Period			3 rd Period			1 ST Period			2 nd Period			3 rd Period		
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Inorganic IOCs	Groundwater < MCL	*			*			*			*			*			*		
	Surface Water < MCL	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Groundwater & Surface Water > MCL ¹	****																	
	Groundwater Reliably and Consistently ≤ MCL	*			*			*			*			*			*		
	Surface Water Reliably and Consistently ≤ MCL	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Groundwater & Surface Water > MCL	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****
Synthetic Organic SOCs	Population > 3,300 – No Waivers < Detection Limit	**			**			**			**			**			**		
	Population ≤ 3,300 – No Waivers < Detection Limit	*			*			*			*			*			*		
	≥ Detection Limit ¹ and	****																	
	Reliably and Consistently ≤ MCL ²	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Not Reliably and Consistently ≤ MCL	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****
Volatile Organic VOC's	< Detection Limit and	****																	
	Groundwater (after collection of 4 initial quarterly samples) ³	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Surface Water (after collection of 4 initial quarterly samples)	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	≥ Detection Limit ¹ and	****																	
	Reliably and Consistently < MCL ²	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Not Reliably and Consistently ≤ MCL	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****
Nitrate + Nitrite (Combined)	Community/NTNC Waterworks	****																	
	Surface Water with 4 Quarters of Results < ½ MCL ⁴	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Groundwater Reliably and Consistently < MCL ⁴	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	≥ ½ MCL or not Reliably and Consistently < MCL	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****
	Transient Noncommunity Waterworks	****																	
	Standard Monitoring	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

**** See Legend on next page

11.8. Standard Monitoring Schedule (continued)

		THIRD CYCLE									FOURTH CYCLE								
		1 ST Period			2 nd Period			3 rd Period			1 ST Period			2 nd Period			3 rd Period		
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Nitrite	$< \frac{1}{2}$ MCL	Established by Commissioner									Established by Commissioner								
	Reliably and Consistently $< \text{MCL}^4$	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	$\geq \frac{1}{2}$ MCL or not Reliably and Consistently $< \text{MCL}$	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****
Radionuclides ⁵	Community Waterworks	Established by Commissioner																	
	$< \text{Detection Limit}^6$ (9-yr schedule)	*									*								
	$\geq \text{Detection Limit}$ and $\leq \frac{1}{2}$ MCL (6-yr schedule)	*						*						*					
	$> \frac{1}{2}$ MCL and $\leq \text{MCL}$ (3-yr schedule)	*			*			*			*			*			*		
	$> \text{MCL}^7$	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****

Legend

* 1 sample at each entry point to distribution system	** 2 quarterly samples at distribution system entry points. Samples must be taken during 1 calendar year during each 3-year compliance period.	**** 4 quarterly samples at each distribution system entry point within time frame.
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Notes

- ¹ A system with a sampling point result above the MCL (IOC) or Detection Level (SOC, VOC) must collect quarterly samples, at that sampling point, until the system is determined to be reliably and consistently below the MCL.
- ² Samples must be taken during the quarter which previously resulted in the highest analytical result. Systems can apply for a waiver after 3 consecutive annual sampling results are below the detection limit.
- ³ If all monitoring results during initial quarterly monitoring are less than the detection limit, the system can take annual samples. If after a minimum of 3 years of annual sampling with all analytical results less than the detection limit, the system may be allowed to take 1 sample during each compliance period.
- ⁴ Samples must be taken during the quarter which previously resulted in the highest analytical result.
- ⁵ Radionuclides – Gross Alpha, Combined Radium and Uranium.
- ⁶ To obtain a nine-year reduced monitoring schedule, all required radionuclides (gross alpha, radium-226, radium-228 and uranium) must be below detection level from direct testing, not obtained by substitution. Where substitutions are used and measured results (typically gross alpha and radium-228) are below detection limit, the resulting reduced monitoring schedule would be a six-year schedule.
- ⁷ When a radionuclide MCL is exceeded, quarterly sampling must be conducted at that entry point until four consecutive quarterly results are below the MCL. The result of the four-quarter average is used to determine the new monitoring schedule.

12. Entry Point Monitoring Decision Flow Charts

Provided in the following pages are various chemical and radiological monitoring flow charts for assisting staff in determining compliance with the various rules, and for assisting staff in determining if and/or when reduced monitoring is allowed.

This section should be used as follows:

1. Use the Section contents to locate the flow chart, description, or form that best describes your need. For instance, the waterworks has completed their first quarter or their 4 consecutive quarterly (baseline) monitoring for a SOC that had been denied a waiver - one would go to the SOC Baseline flow chart, or a waterworks detected a VOC - one would go to the VOC Detected flow chart. Note that the charts are divided as the rules for each contaminant require.
2. Follow the logical flow of the flow chart by answering the questions in the decision diamonds and perform the process (example, Confirmation Procedure or procedure). The flow charts are an aid for you to determine the next action that needs to be taken that applies to that particular waterworks for that particular circumstance. In most cases the sampling is to be done quarterly. The quarterly chart will then lead to an annual flow chart or other reduced monitoring frequency. Note that there are also provisions in the reduced monitoring charts to increase the frequency of monitoring.

EPA has also published “NPDWR Violations and RTC Definitions” that provide this information in a tabular format. The latest release is dated March 9, 2012. Please consult with the SDWIS Administrator for status and availability of this resource.

12.1. IOCs (Inorganic Chemicals) Metals & Nonmetals

12.1.1. IOC Routine

12.1.2. IOC Increased Monitoring

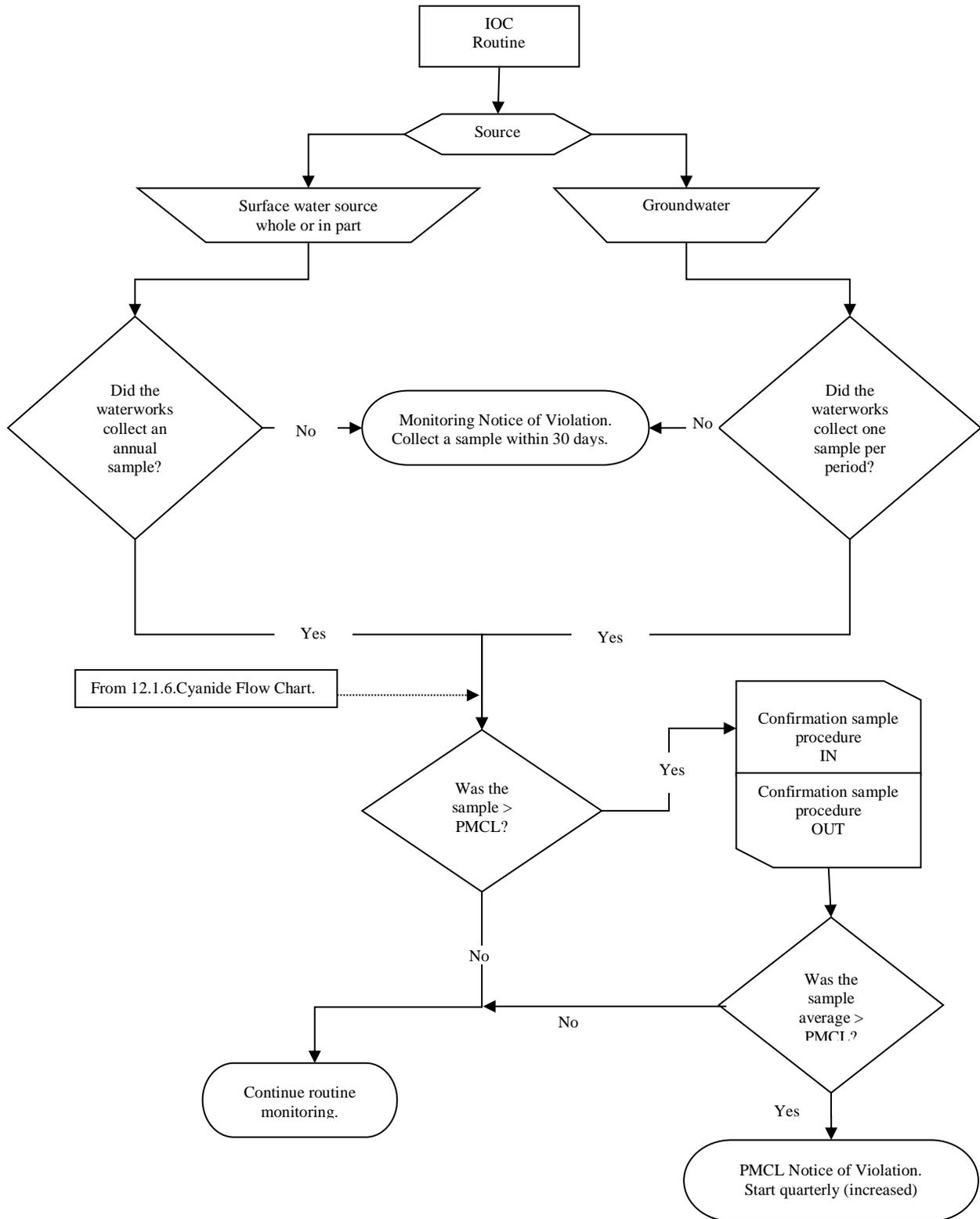
12.1.3. Nitrates + Nitrites (Combined) – Quarterly

12.1.4. Nitrates + Nitrites (Combined) – Annual

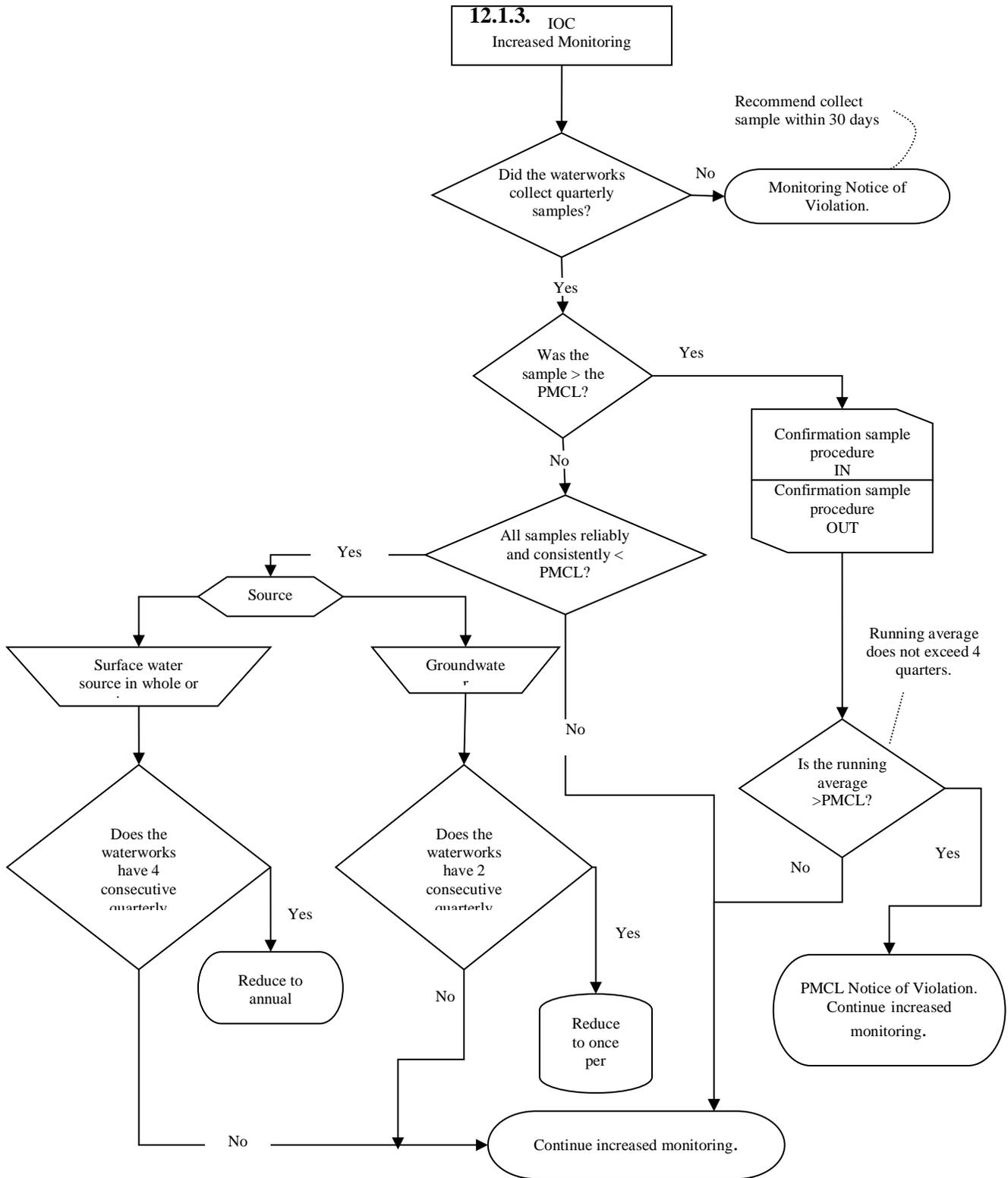
12.1.5. Nitrite

12.1.6. Cyanide

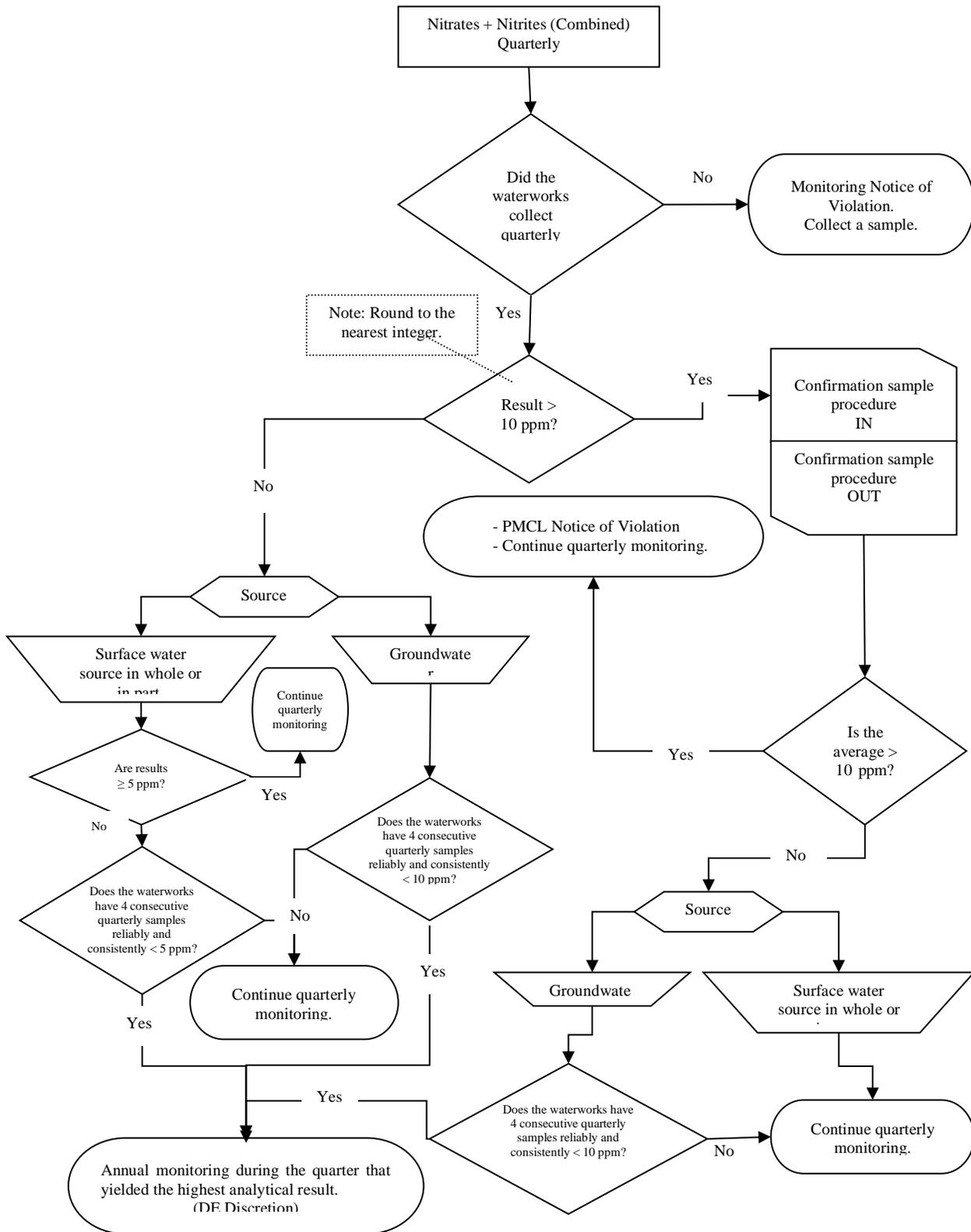
12.1.1. IOC Routine Flow Chart



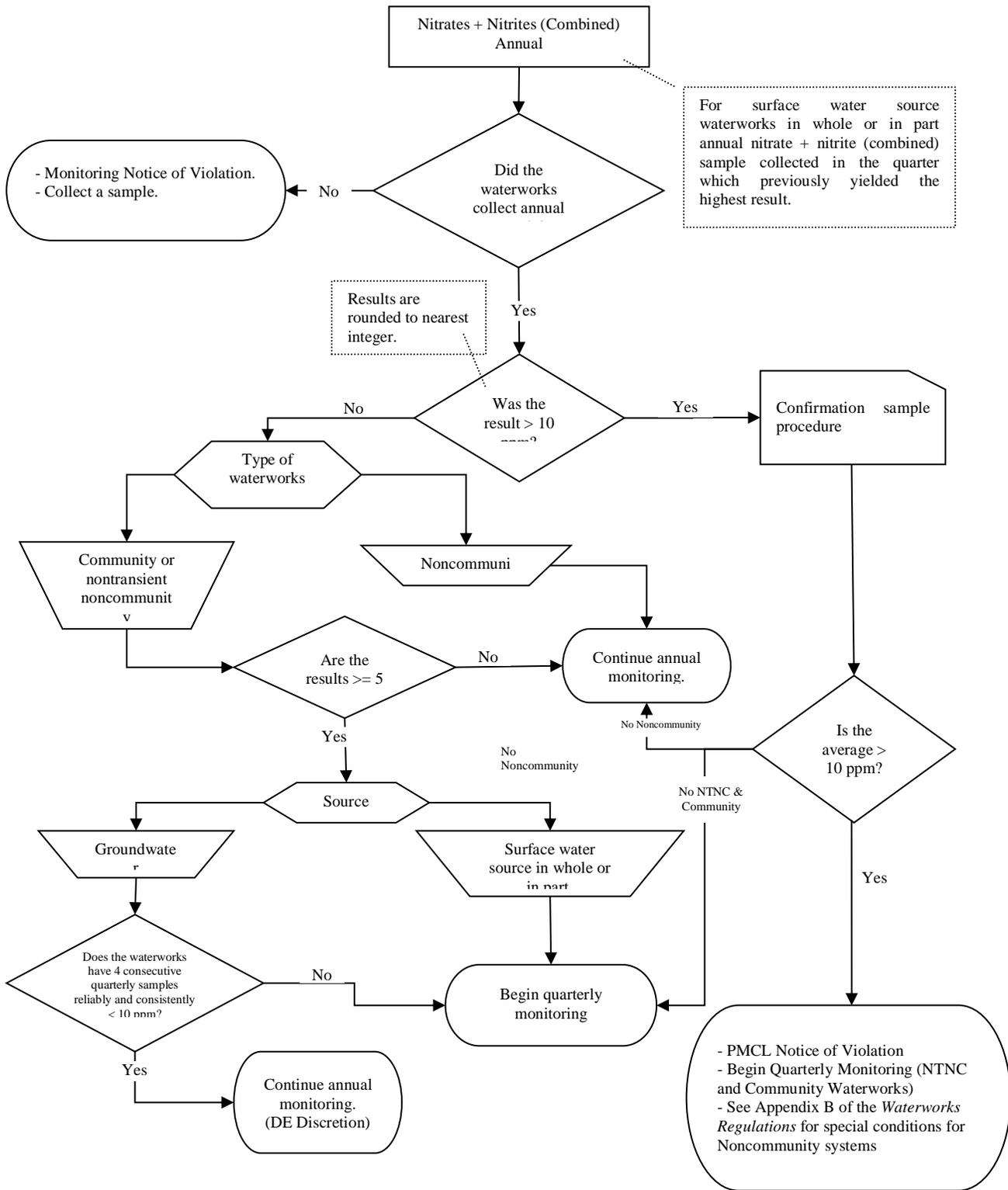
12.1.2. IOC Increased Monitoring Flow Chart



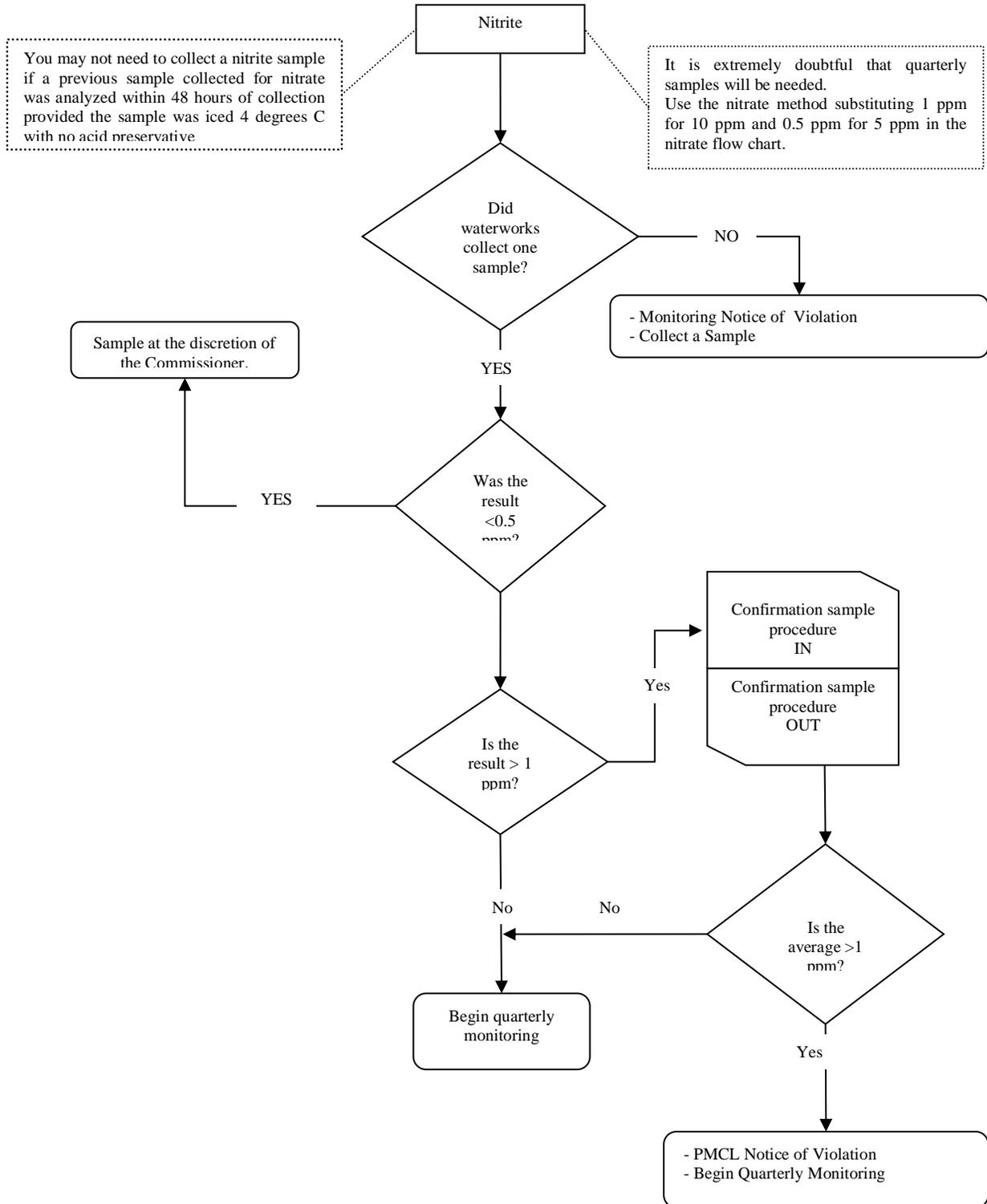
12.1.3. Nitrates + Nitrites (Combined) – Quarterly Flow Chart



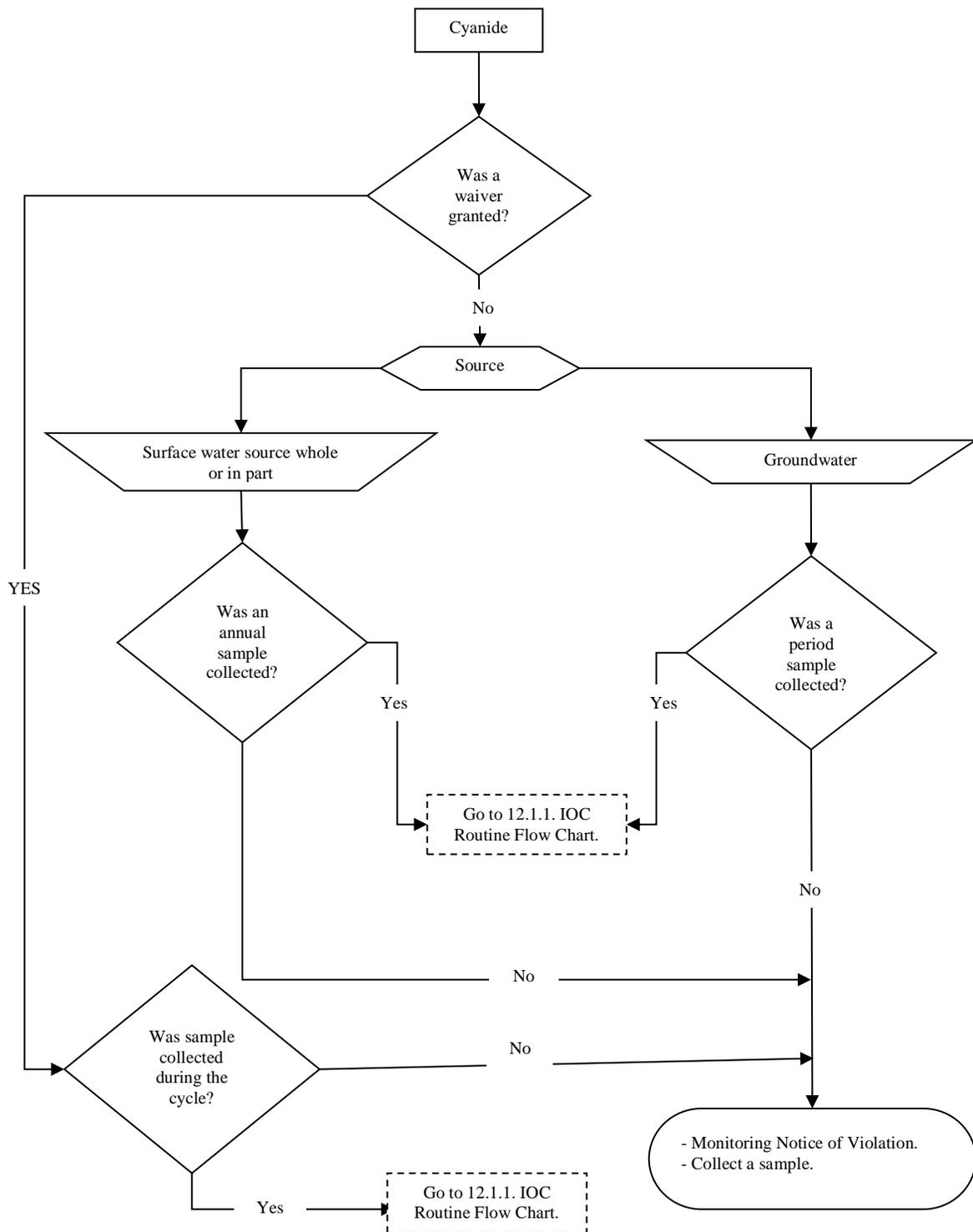
12.1.4. Nitrates + Nitrites (Combined) – Annual Flow Chart



12.1.5. Nitrite Flow Chart



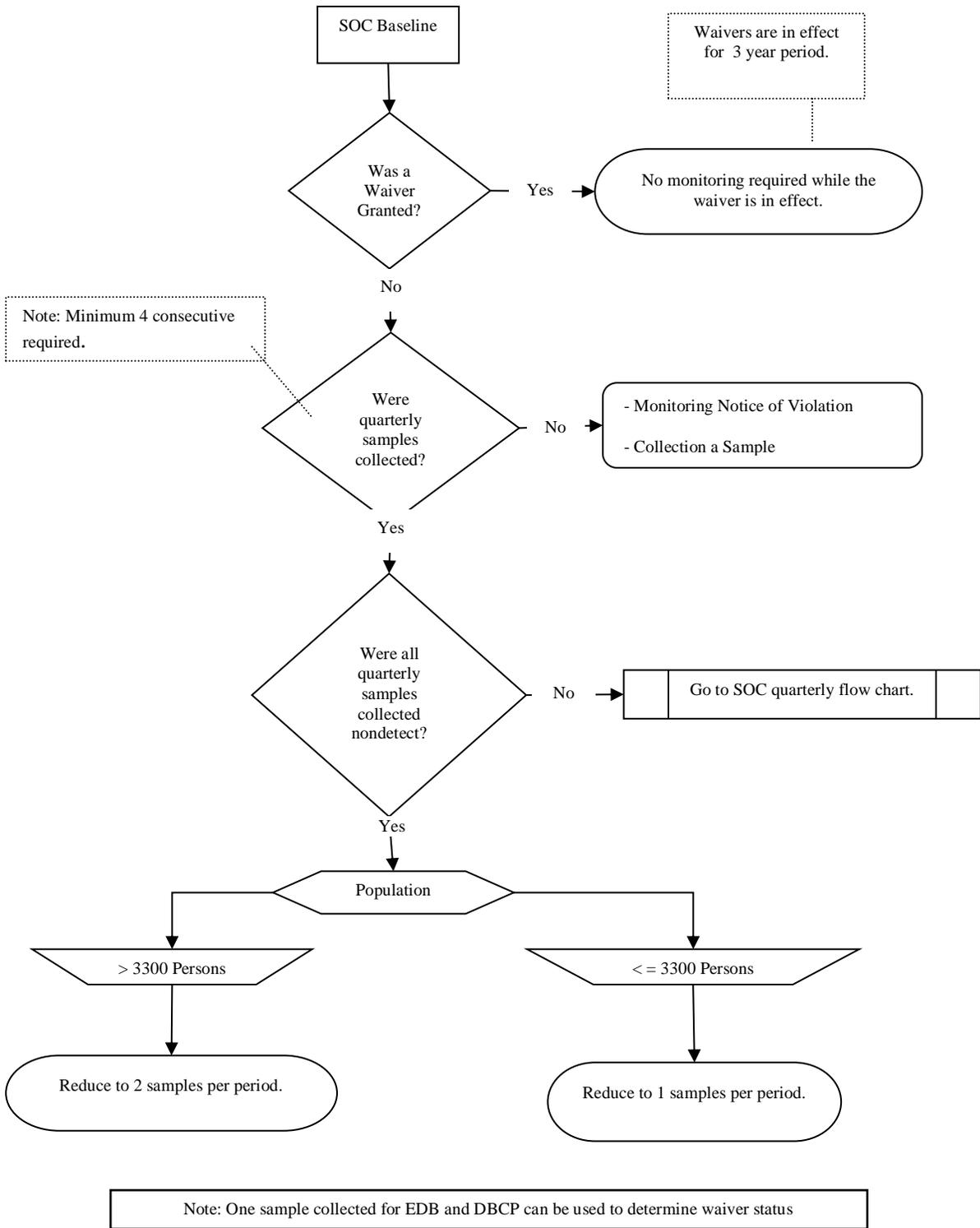
12.1.6. Cyanide Flow Chart



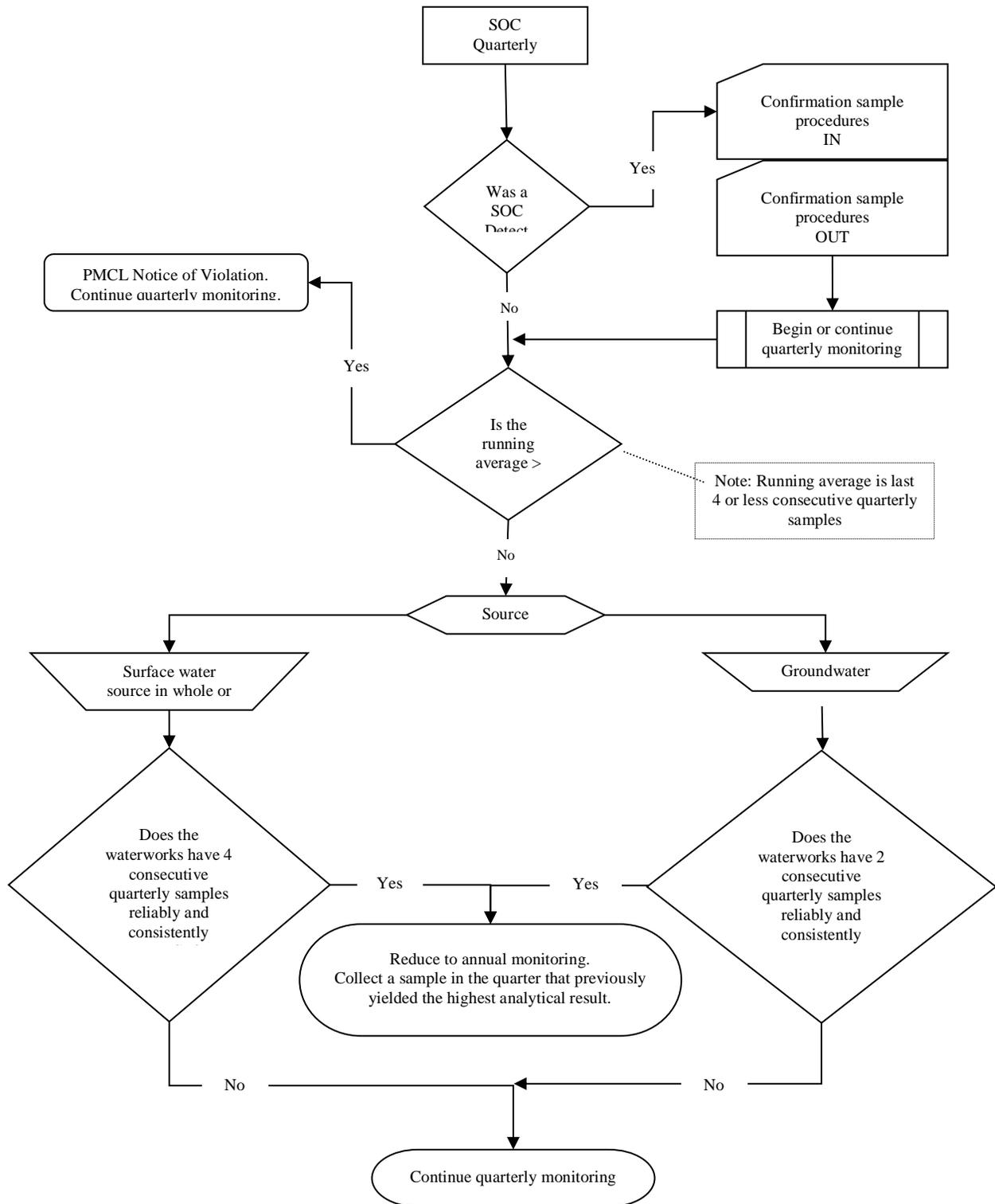
12.2. SOCs (Synthetic Organic Chemicals)

- 12.2.1. SOC – Baseline**
- 12.2.2. SOC – Quarterly**
- 12.2.3. SOC Annual**

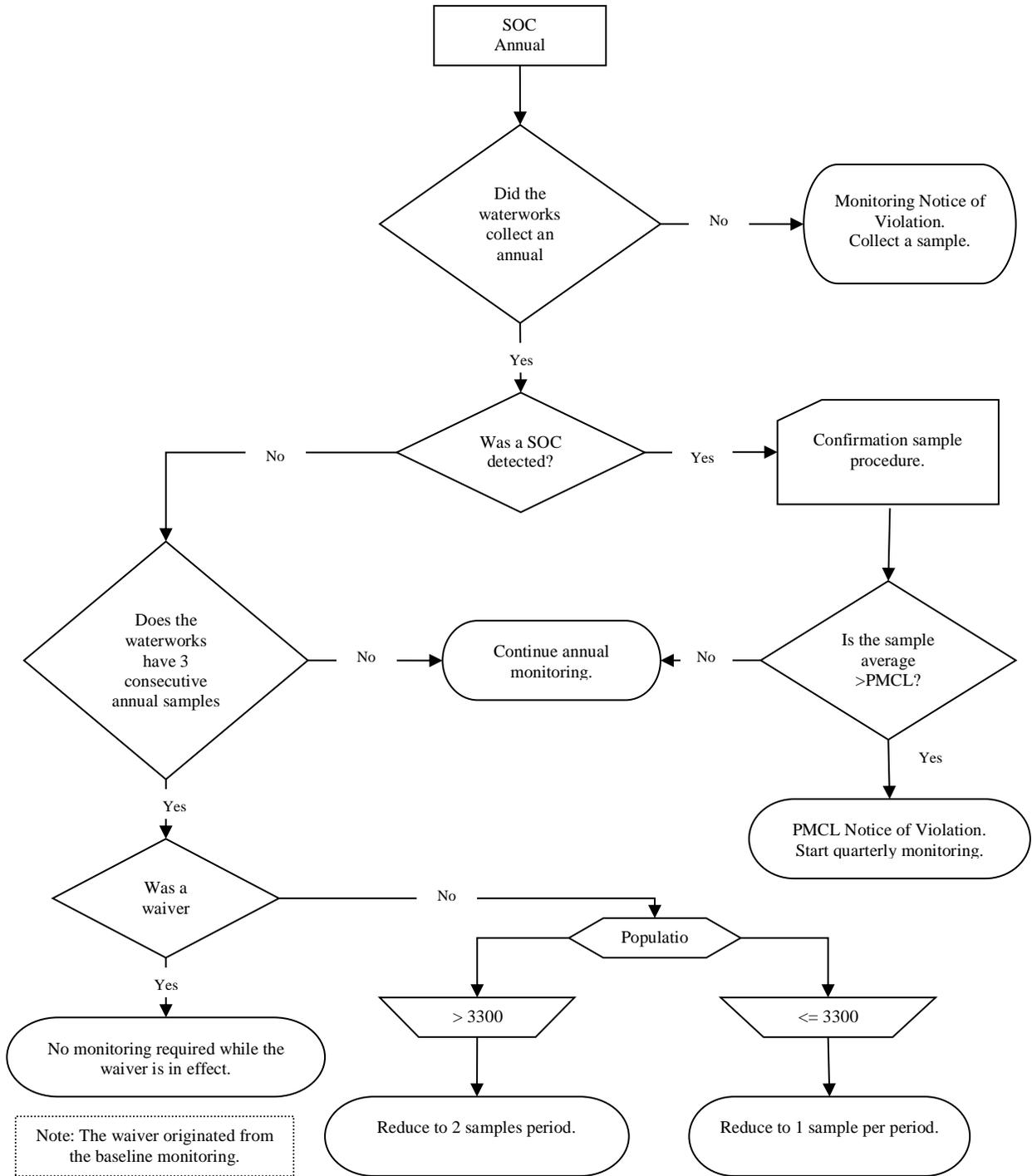
12.2.1. SOC – Baseline Flow Chart



12.2.2. SOC – Quarterly Flow Chart



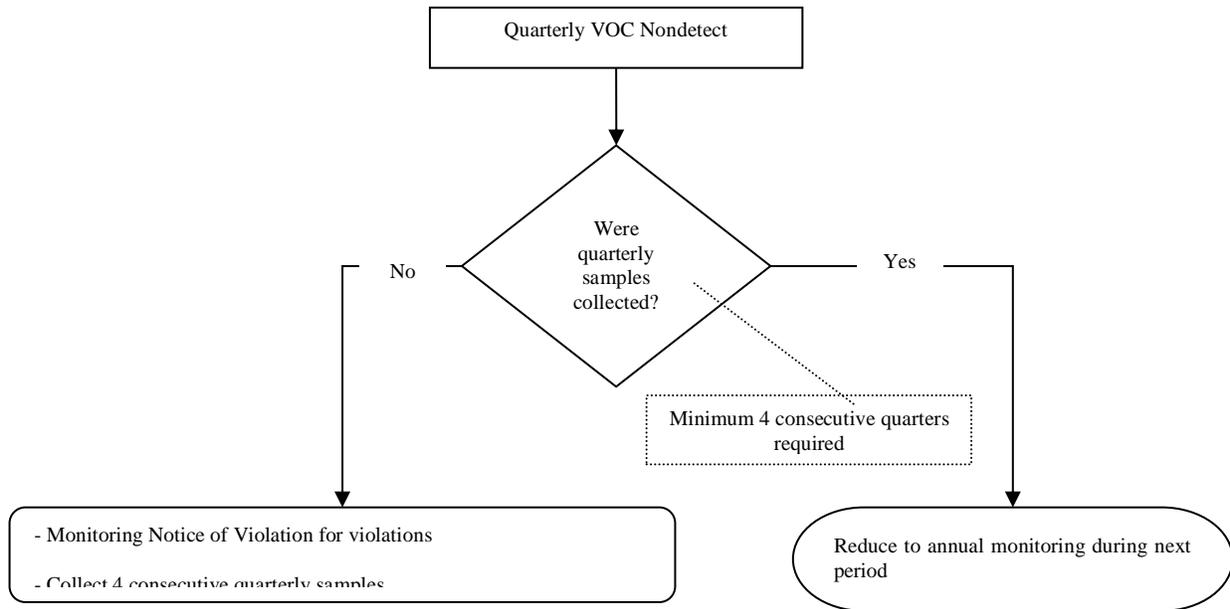
12.2.3. SOC Annual Flow Chart



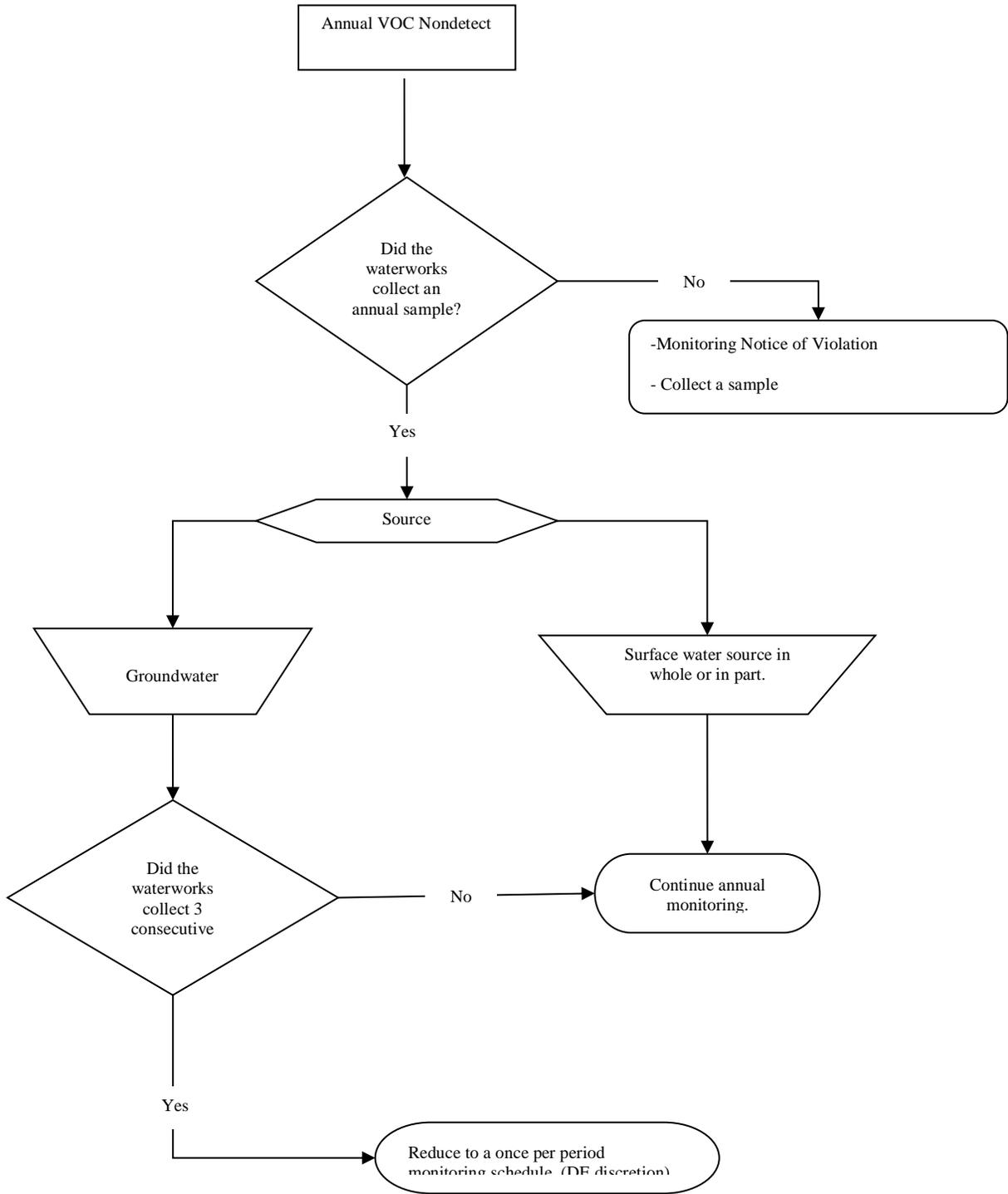
12.3. VOCs (Volatile Organic Chemicals)

- 12.3.1. VOC - Quarterly, Nondetect**
- 12.3.2. VOC - Annual, Nondetect**
- 12.3.3. VOC Detected**
- 12.3.4. Check for Vinyl Chloride**
- 12.3.5. Confirmation Sample Procedure**

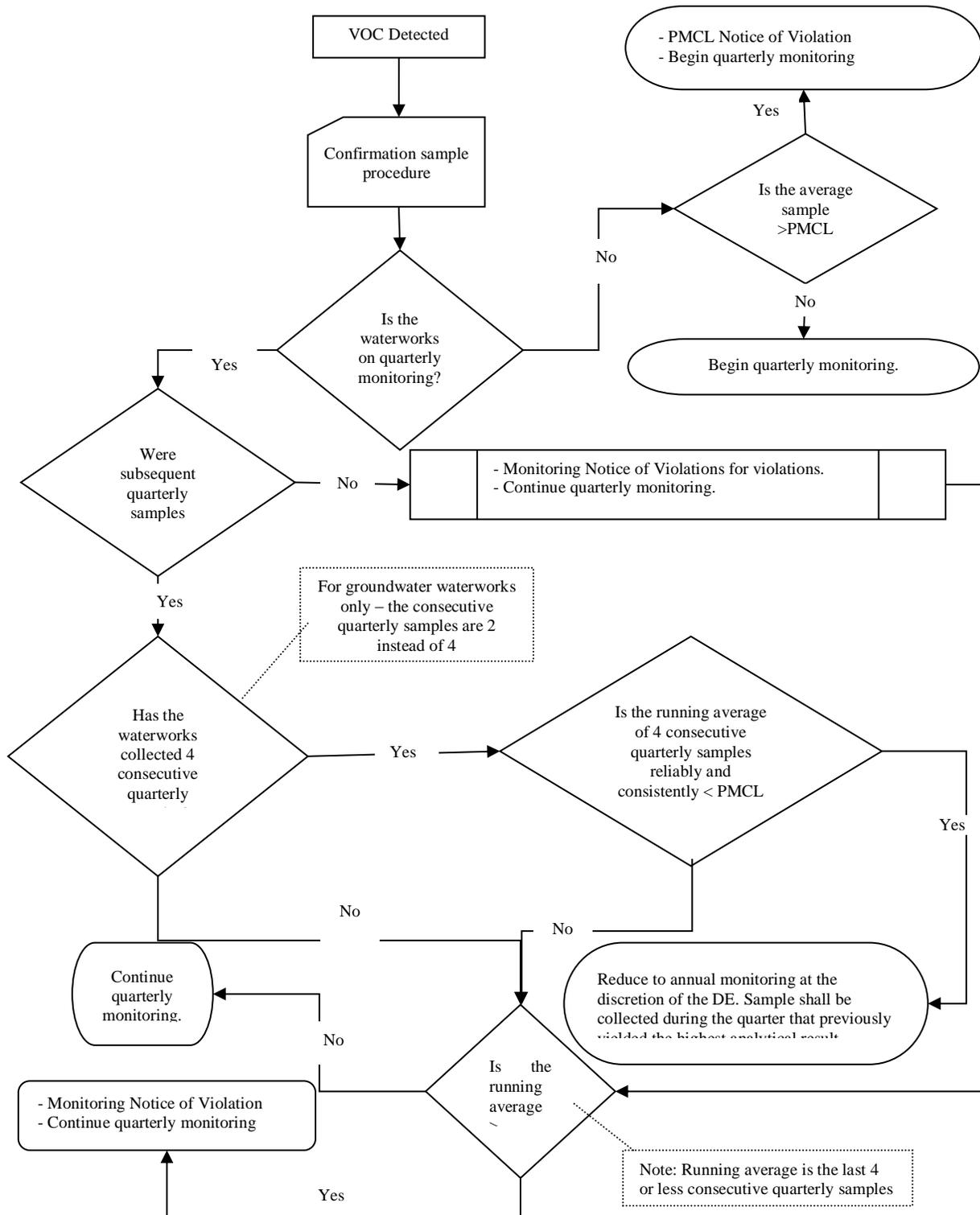
12.3.1. VOC - Quarterly, Non-detect Flow Chart



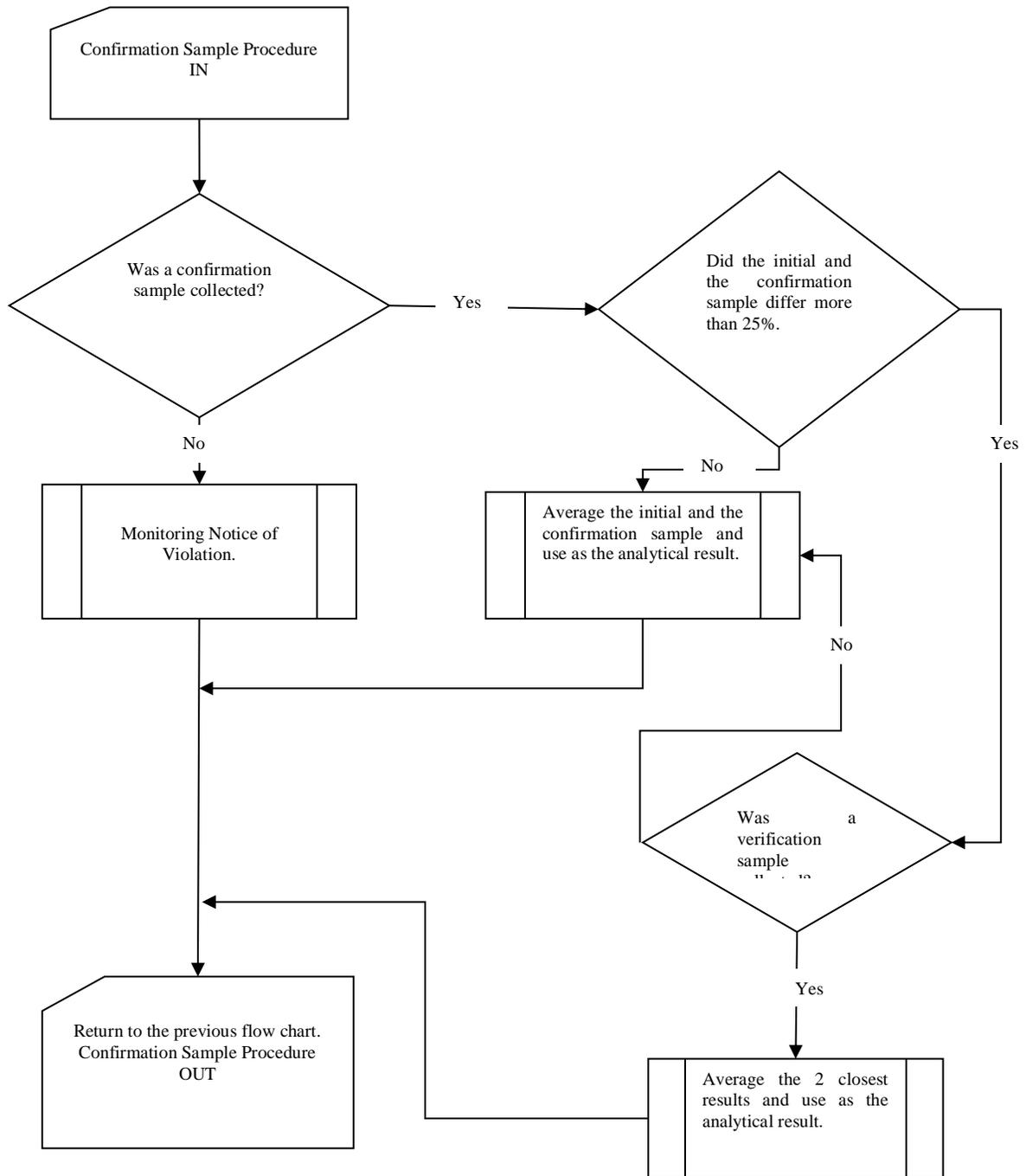
12.3.2. VOC - Annual, Non-detect Flow Chart



12.3.3. VOC Detected Flow Chart



12.3.5. Confirmation Sample Procedure Flow Chart

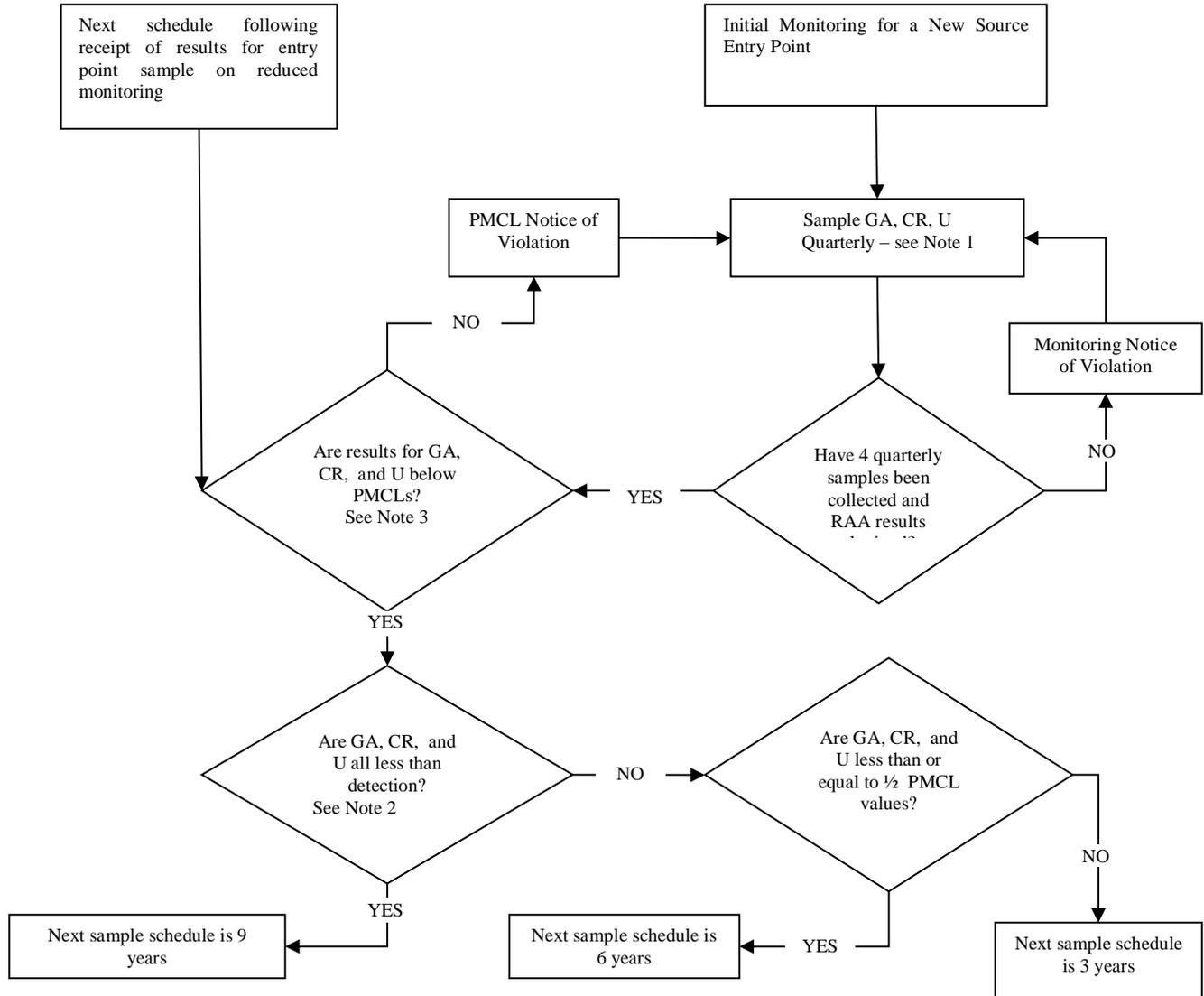


12.4. Radionuclides

12.4.1. Radionuclides Rule Routine Monitoring Requirements: Community Waterworks Only / Entry Point Sampling

12.4.2 New Source Startup Chemical and Radionuclides Entry Point Monitoring Requirements

12.4.1. Radionuclides Rule Routine Monitoring Requirements Community Waterworks Only - Entry Point Sampling Flowchart



Abbreviations: GA (Gross Alpha Activity) CR (Combined Radium Ra226 + Ra228) U (Uranium)
RAA (Running Annual Average)

1. When GA is ≤ 15 pCi/L, GA may be substituted for U. Divide uranium activity (pCi/L) by 0.67 to obtain Uranium mass ($\mu\text{g/L}$). When GA is ≤ 5 pCi/L, GA may be substituted for Ra226. DCLS has agreed to analyze for Ra226 when GA is ≥ 3 pCi/L.
2. Unless Ra226 and Uranium were measured directly and not obtained by GA substitution, "less than detection" for CR and U cannot be established. Detection limits are: Gross alpha particle activity (3 pCi/L), Radium 226 (1 pCi/L), Radium 228 (1 pCi/L), and Uranium ($1\mu\text{g/L}$).
3. If an individual radionuclide contaminant exceeds the PMCL for an entry point following initial four-quarter monitoring, only that contaminant must be placed on or continue with quarterly monitoring. When using DCLS, quarterly monitoring options are uranium or the radionuclides panel, since these are the service options available at this time. Otherwise, VDH has chosen to maintain schedules (3, 6, or 9 year) based on the most restrictive schedule for the group of radionuclide contaminants in order to reduce sample schedule complexity. The owner has the option to monitor each parameter on a schedule based on requirements established by the Waterworks Regulations. The ODW database is not set up to track such individual parameter schedules.

12.4.2. New Source Start Up Entry Point Monitoring Requirements

It is recommended that these samples be collected within 30 days of the startup of the new source.

Groundwater – Community:

IOCs:	One sample per period (3 years)
Nitrates + Nitrites (Combined):	Begin annual monitoring
Nitrites:	Collect period sample
VOCs:	Begin quarterly monitoring
SOCs:	If required, begin quarterly monitoring (based on waiver status)
Cyanide:	One sample per period (3 years)
Radionuclides:	Begin quarterly monitoring (4 qtrs)

Groundwater – Nontransient Noncommunity (NTNC):

IOCs:	One sample per period (3 years)
Nitrates + Nitrites (Combined):	Begin annual monitoring
Nitrites:	Collect period sample
VOCs:	Begin quarterly monitoring
SOCs:	If required, begin quarterly monitoring (based on waiver status)
Cyanide:	One sample per period (3 years)

Groundwater – Transient Noncommunity (TNC):

Nitrates + Nitrites:	Begin annual monitoring
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Surface Water Sources - Community:

IOCs:	Begin annual sampling
Nitrates + Nitrites (Combined):	Begin quarterly monitoring (4 qtrs)
Nitrites:	Collect period sample
VOCs:	Begin quarterly monitoring (4 qtrs)
SOCs:	If required, begin quarterly monitoring (based on waiver status)
Cyanide:	Begin annual sampling
Radionuclides:	Begin quarterly monitoring (4 qtrs)

Surface Water Sources – Nontransient Noncommunity (NTNC):

IOCs:	Begin annual sampling
Nitrates + Nitrites (Combined):	Begin quarterly monitoring (4 qtrs)
Nitrites:	Collect period sample
VOCs:	Begin quarterly monitoring (4 qtrs)
SOCs:	If required, begin quarterly monitoring (based on waiver status)
Cyanide:	Begin annual sampling

Surface Water Sources – Transient Noncommunity (TNC):

Nitrates + Nitrites (Combined):	Begin quarterly monitoring (4 qtrs)
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NOTE: These sampling requirements do not include the daily testing at the waterworks

13. Monitoring of Surface Water Sources

13.1. LT2 Rule Monitoring Requirements

The Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR or LT2 Rule) requires all public waterworks using surface water or groundwater under the direct influence (GUDI) of surface water to conduct two rounds of source water monitoring for each plant that treats a surface water or GUDI source. This monitoring includes *Cryptosporidium*, *E. coli*, and turbidity. The results of this monitoring are used to determine the level, if any, of additional *Cryptosporidium* treatment that must be provided in a process referred to as “binning” the waterworks, using a “microbial toolbox” of treatment options.

13.2. Rule Background

The Surface Water Treatment Rule (SWTR) was promulgated in 1989. The SWTR required filtration and disinfection treatment and performance standards of 3-log removal of *Giardia lamblia* and 4-log virus inactivation.

In 1998, the Interim Enhanced Surface Water Treatment Rule (IESWTR) was promulgated. The IESWTR added *Cryptosporidium* for WTPs serving >10,000 population, and required performance standards of 3-log removal of *Giardia lamblia*, 4-log virus inactivation, and 2-log removal of *Cryptosporidium*.

In 2002, the Long-Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR or LT1 Rule) was promulgated to address WTPs serving <10,000 population.

In 2006, the LT2 Rule was promulgated to reduce illness linked with the contaminant *Cryptosporidium* and other disease-causing microorganisms in drinking water. The LT2 Rule established *Cryptosporidium* concentration and source vulnerability and whether additional treatment was needed (if any), based on the two (2) rounds of source water monitoring collected six years apart.

13.3. Existing Water Sources (as of March 2014)

All waterworks and sources in existence as of March 2014 have now established their source water monitoring plans. The second round of source water monitoring must be completed between 2015 and 2019, depending upon the size or assigned schedule of the waterworks.

SCHEDULE	Waterworks Service Population (as of March 14, 2014)	2 nd Round Monitoring Plan Deadline	Begin 2 nd Round Source Water Monitoring
1	≥100,000	January 1, 2015	April 1, 2015
2	50,000-99,999	July 1, 2015	October 1, 2015
3	10,000-49,999	July 1, 2016	October 1, 2016
4	<10,000 monitor for <i>E. coli</i> ¹	July 1, 2017	October 1, 2017
4	<10,000 monitor for <i>Cryptosporidium</i> ²	January 1, 2019 ²	April 1, 2019

¹Applies only to waterworks that have filters.

²Applies to filtered waterworks that elect to monitor for *Cryptosporidium* instead of *E. coli*. Owners must notify ODW no later than July 1, 2017.

Note: Schedule 4 waterworks (serving < 10,000 population) must monitor for *Cryptosporidium* if either of the following conditions are determined following the second round of *E. coli* monitoring:

- For waterworks using lakes/reservoirs sources, the annual mean *E. coli* concentration > 10 *E. coli* /100 mL.

- For waterworks using free-flowing stream sources, the annual mean *E. coli* concentration > 50 *E. coli* /100 mL.

13.4. New Water Sources

Under the LT2 Rule, all waterworks that use surface water or GUDI sources are required to conduct source water monitoring, unless they provide 5.5-log *Cryptosporidium* inactivation. ODW field staff shall inform the waterworks of this option, and must obtain a written statement from the waterworks of its intent to provide treatment instead of performing source water monitoring, no later than the date established for submission of the monitoring plan.

All owners of waterworks serving $\geq 10,000$ persons will sample for *Cryptosporidium* at least once per month for 24 months. Owners of waterworks serving <10,000 persons required to monitor for *Cryptosporidium* have a choice of monitoring once per month for 24 months or twice a month for 12 months.

Owners of waterworks (serving <10,000 persons) with filtration will normally begin by conducting *E. coli* monitoring every two weeks for 12 months, for a total of 26 samples. If the waterworks fails to conduct the required source water monitoring, according to 12VAC5-590-420 B 3 a, the waterworks is required to conduct *Cryptosporidium* monitoring.

13.5. Source Water Monitoring Plans and Schedules

The LT2 Rule requires the submission of a Source Water Monitoring Plan consisting of a sampling schedule and sampling locations identified (Use notification letter provided in Attachment A.1).

For sources which did not previously conduct Round 1 monitoring, the waterworks shall conduct Round 1 monitoring starting on a schedule established by the ODW field office and the owner. The schedule must specify the calendar dates when the owner shall collect each required sample.

Round 1 monitoring of new sources shall begin **no later than six (6) months** after issuance/re-issuance of the operation permit for new waterworks/new sources on existing waterworks. The schedule is due **no later than three (3) months** prior to the required start date for monitoring (sampling).

Round 2 monitoring shall start 6 years after the first round of monitoring ends, and a bin determination has been made.

Monitoring Plan Review Procedure

Waterworks shall submit their monitoring plans in written (paper or electronic) format to the appropriate ODW field office for review. The ODW field office will review the proposed plan (use review sheet in Attachment B.1) and approve it (use approval letter template in Attachment A.2) no later than 30 days prior to the scheduled start of monitoring. If the ODW field office takes no action on the proposed plan, the waterworks must begin sampling according to the schedule submitted.

Sample Collection

The samples shall be collected within 2 days before or 2 days after the dates indicated in the sampling schedule (i.e., within a 5-day period around the schedule date). If a sample cannot be collected during this 5-day period due to conditions that pose a danger to the sample collector, the owner shall submit an explanation for the delayed sampling date. If an analytical result cannot be validated, a replacement sample can be collected not later than 21 days after receiving information about the invalid result.

13.6. Sampling Locations

The following guidelines are to be used in evaluating the sample location:

1. Each water plant must monitor separately, except where multiple plants draw water from the same influent pipeline or intake. In such cases, a representative sample for all of the plants may be used.
2. Samples are to be collected prior to any chemical treatment, unless the ODW field office makes a specific determination that:
 - a. Sampling prior to chemical treatment is not feasible; and
 - b. The chemical treatment will not have any adverse impact on analysis of the sample.
3. If a waterworks practices recycle of the filter backwash, all samples must be collected prior to the point of any filter backwash water addition.
4. Plants with multiple water sources which include multiple surface water sources and blended surface water and ground water sources must use the following criteria:
 - a. The use of multiple sources during monitoring must be consistent with routine operational practice.
 - b. Must use a sample tap where the sources are combined prior to treatment, if available.
 - c. If a combined sample tap is not available then samples must be collected at each source intake on the same day and must either:
 - i. Composite the samples into one sample prior to analysis. (This composite must be flow weighted based on the proportion of the source in the total plant flow at the time the sample was collected.),
 - or
 - ii. Analyze each sample and calculate a weighted average of the analysis results for each sampling date. The weighted average must be calculated by multiplying the analysis result for each source by the fraction the source contributed to total plant flow at the time the sample was collected and then summing these values.

13.7. Analytical Requirements

Laboratories utilized for the analytical work must either be certified or accredited for *Cryptosporidium* by DCLS. Laboratories performing *Cryptosporidium* analyses must use EPA Method 1622, EPA Method 1623, or EPA Method 1623.1. Laboratories performing *E. coli* analyses must be certified or accredited by DCLS. The certification must be for an *E. coli* enumeration method; presence/absence is not acceptable. Turbidity measurements can be performed by the waterworks.

13.8. Reporting Source Water Monitoring Results

The results must be reported no later than the tenth day of the month following the month in which the sample was collected (e.g., a January sample must be reported no later than February 10th).

Cryptosporidium

The complete laboratory report containing the *Cryptosporidium* results for all waterworks will be reported by the laboratory directly to the ODW Central Office. Analytical laboratories will note the field turbidity result(s) in the laboratory report for *Cryptosporidium*. Analytical laboratories will email their

Cryptosporidium analytical reports to: labadmin@vdh.virginia.gov with the subject of their email: "Cryptosporidium Results for VApwsid#".

ODW Central Office data management will receive the *Cryptosporidium* and turbidity results from the laboratory, enter them into SDWIS, send an email back to the laboratory confirming receipt, and will copy the appropriate ODW Field Office Data Manager with the results attached. The ODW Field Office Data Manager will forward the email with the *Cryptosporidium* and turbidity results to the appropriate field office staff.

Each Field Office shall create a folder for each waterworks conducting Source Water Monitoring to hold the *Cryptosporidium* paper result forms until the "binning" occurs. The results can then be moved to the correspondence folder with the letter summarizing the results. The District Engineer should review the results as they are received to ensure that the data meets EPA requirements. ODW does not need to comment on the individual results, unless it appears that they do not meet the EPA requirements or the owner's approved monitoring plan.

E. Coli

Analytical laboratories should submit *E. coli* results electronically using ODW's standard template for data submittals. ODW Central Office data management will upload data into SDWIS. A confirmation email will be sent back to the laboratory once results have been accepted. If field offices receive data, they must forward it to labadmin@vdh.virginia.gov. Each field office will keep track of the results and notify waterworks if/when their *E.coli* results exceed trigger levels and direct them to proceed with *Cryptosporidium* monitoring.

13.9. Evaluation on Monitoring Results

Once the ODW field office has received all of the results (whether *Cryptosporidium* or *E. coli*), it will then perform a "binning" calculation (use review checklists provided in Attachments B.2 and B.3 to evaluate the *Cryptosporidium* and *E. coli* sampling data, respectively). "Binning" is to be completed within 3 months of the completion of sampling for *Cryptosporidium* and within 1 month for *E. coli*. Refer to the table in 12VAC5-590-420 B 3 c for the listing of bin classification, type of filtration currently practiced, and the additional treatment required. A water treatment plant placed into Bin 2 or higher must provide the increased level of treatment within 3-5 years of the initial round Bin Classification Acceptance.

Round 1 Results

Once the waterworks owner submits the form accepting the bin classification, the ODW field office will send the letter provided in Attachment A.3. This letter formally establishes the bin classification. If the water treatment plant is placed into Bin 2 or higher, this letter also advises of the additional log "inactivation + removal" requirement for the plant.

If the water treatment plant is classified as Bin 2 or higher, the ODW field office will need to meet with the waterworks owner and their consultant to begin discussions about which microbial toolbox options will be appropriate for the particular waterworks. Refer to 12VAC5-590-420 B 3 d for further information on additional treatment requirements and removal credits, and the EPA's Guidance Manuals (Toolbox, UV Disinfection, Membrane Filtration, etc.) for more details on the various treatment technologies. These Guidance Manuals are found at [..\..\02-Committees\202-Rule Teams\MDBP & ESWT Rules\02-EPA Guidance Manuals.](#)

Round 2 Results

If the bin classification for a water treatment plant changes following the Round 2 source water monitoring, then the waterworks must provide the additional “inactivation + removal” requirement based on bin classification. The ODW field office staff must have an engineering conference with the waterworks within 6 months of the bin determination date. During this conference, a schedule of activities (i.e. prepare engineering report, submit plans and specs) and completion dates must be developed and agreed to by the waterworks and ODW. It is recommended that the schedule provides for the additional treatment to be installed and operational within 3-5 years (see 12VAC5-590-420 B 3 d).

13.10. Bin Classification for Filtered Waterworks

Using *E.coli* Data

Once all the data for a waterworks serving <10,000 persons is received, the ODW field office will calculate the annual mean *E. coli* concentration⁶. The annual mean will be compared to the following trigger levels:

1. For waterworks using lake or reservoir sources: the trigger level is an annual mean *E. coli* concentration of 10 *E. coli* /100 mL.
2. For waterworks using free-flowing stream sources: the trigger level is an annual mean *E. coli* concentration of 50 *E. coli* /100 mL.
3. GUDI waterworks need to use the trigger level for the surface water body closest to the water source. If there is no surface water body nearby, the trigger level for lake or reservoir sources is to be used.

If the annual mean *E. coli* concentration equals or is below the trigger level, the waterworks is classified as a “Bin 1” waterworks. If the annual mean *E. coli* concentration is above the trigger level, the waterworks must move to *Cryptosporidium* monitoring, or the system may elect to provide full *Cryptosporidium* treatment. Use the letter template provided in Attachment A.5 to advise the waterworks of the results of the annual mean *E. coli* calculation and bin classification.

Using *Cryptosporidium* Data

Once all the *Cryptosporidium* data (whether Round 1 or Round 2 source monitoring) is received and determined to be acceptable, the ODW field office will perform the bin classification (refer to 12VAC5-590 B 3 c.) Use the letter template provided in Attachment A.4 to advise the waterworks of the results of the annual mean *Cryptosporidium* calculation and bin classification.

E. coli and turbidity data collected during *Cryptosporidium* monitoring may be used by EPA for non-binning purposes. EPA has provided Excel workbooks to be used in the binning calculation. Each workbook includes instructions, a worksheet to use for data input (to be “personalized” for each individual water plant), and examples. Those workbooks are found at [\\.\.\02-Committees\202-Rule Teams\MDBP & ESWT Rules\09-LT2 Resources\LT2 Crypto Calculators](#). There are three separate versions, as follows:

- Version 1 - systems that collect 24 to 47 samples; to be used for Schedule 4 systems that collect 2 samples per month for only 12 months (according to EPA, the spreadsheet calculates correctly for this situation).
- Version 2 - systems that collect 48 or more samples, with an equal number of samples each month.
- Version 3 - systems that collect 48 or more samples, with an unequal distribution of samples.

⁶ Note - *E. coli* results will not be accepted for waterworks serving >10,000.

Choose the correct workbook for the waterworks being evaluated, and follow the instructions provided on the first sheet of the workbook. Note that the worksheets require entry of oocyst concentration, not oocyst count. The result reports will provide a count but may not provide concentration – so a calculation to convert to concentration (#oocyst/L) may be necessary. Cells are to be left blank if there was no sample.

If a water plant has only one raw water source, or if there are several water sources and the plant sampled from the combined raw water, enter the sample results directly into the appropriate spreadsheet. If the water treatment plant is served by multiple water sources and each water source was sampled individually, then a flow-weighted average result for each month’s sampling event(s) must be developed and entered into the spreadsheet.

A copy of the completed workbook (with the example worksheets deleted) should be renamed and saved to the ODW field office local server, in the district directory along with other LT2 materials for the waterworks. Do NOT over-write the files on ODWSHARE! The spreadsheet will automatically calculate the mean *Cryptosporidium* concentration and the appropriate bin into which the water treatment plant is to be placed.

13.11. Maintaining the Log Treatment Requirements

The ODW has adopted an “anti-backsliding” policy which requires waterworks to maintain the log treatment requirements mandated by the results of their Round 1 monitoring if Round 2 monitoring results in a lower bin classification. This policy is in agreement with EPA’s guidance (WSG 198 dated April 8, 2016), which maintains that there can be method-recovery and temporal-variability challenges and given that the Round 1 results may represent an underestimate of *Cryptosporidium* levels. Consequently, the potential to adversely impact public health from *Cryptosporidium* can still exist in the source water. Only on rare cases, where there are documented changes in the watershed or documented reduction in discharges or pollutant loadings to the watershed, will the ODW consider assigning a lower bin than determined in the Round 1 monitoring. If a system is placed into a higher bin at the end of Round 2, they must meet the additional log treatment requirements set by the higher bin.

Attachment A.6 provides a letter informing the waterworks owner of the mean oocyst concentration and the proposed bin classification (see the table in 12VAC5-590 420 B 3 c for the listing of oocyst concentration vs. bin classification). The letter will propose the bin classification and ask the owner to accept that classification, using the template provided in Attachment A.6, or provide justification for not accepting it.

The ODW field office will provide a deadline (i.e., six months after scheduled completion of Round 2 source water monitoring for *Cryptosporidium*) for the owners to submit the bin classification acceptance back. Once the statement of acceptance is received, ODW shall provide a letter of approval of the bin classification to the owner (Attachment A.3).

13.12. Time Accounting and Project Tracking

Time spent reviewing data submitted following an approved source water monitoring plan will be charged to time accounting under “Surveillance” in the TimeTrac data base. Time spent in preparing the final bin classification letter will be charged to “SDWA Reports”.

The “bin classification statement” form received back from a waterworks owner will be entered to PT Log as an SDWA Report.

Enter the date of the final “Bin Classification” letter to the owner (use template provided in Attachment A.3) into SDWIS, as well as the bin classification. (Refer to the SDWIS manual on how to enter Round 1 and Round 2 bin classification into SDWIS.) Round 2 bin classification should never be lower than Round 1 bin classification (Refer to section 13.10, Bin Classification for Filtered Waterworks).

14. DCLS Sample Kit Request Procedures

Requesting Bacteriological / Chemical / Radiological Sample Kits from DCLS:

14.1. Routine Kit Requests

Routine sample kit orders are prepared quarterly for every waterworks, approximately 45 days prior to the start of a calendar quarter. The data gathered only includes samples that are required to be taken in the upcoming quarter. Field Office electronically transmit this order to the Central Office. These orders are based on the monitoring schedules maintained in SDWIS (RTCR & Raw Water MPN) and R&R (Chemical/Radiological). ODW Staff is expected to maintain these schedules with guidance from the corresponding manuals:

- ODW SDWIS Manual referenced in WM 823
- R&R Program User's Guide referenced in WM 824

The monitoring schedules for all waterworks are posted on the ODW Website under the "Information for Laboratories" tab.

An electronic data file is also submitted to DCLS that only includes monitoring schedules that meet one or more of the following criteria:

- DCLS analytical services were used in the past 40 months
- Waterworks activated or reactivated in the past 12 months
- Waterworks has radiological monitoring schedules

14.2. Ad Hoc Kit Requests

The RTCR requires **three** repeat samples for every positive routine sample. [This is a change from four repeat samples required under the TCR.] Repeat and triggered source water sample locations have been defined in the waterworks BSSP and these samples are to be collected in a timely manner, typically within 24 hours after learning of the results.

Kits needed outside of the quarterly order event are ordered through the Ad Hoc Order feature of R&R. The most common example of an Ad-Hoc order is the required additional temporary routine water samples for the monitoring period following a coliform present analysis result of a distribution system sample. Ad Hoc Orders may also be submitted for other non-routine sample kits, for example, in the case of the two special bacteriological samples required by a seasonal waterworks as part of its start-up procedure. In all cases, these requests result in DCLS generating an invoice sent to the waterworks. The invoice must be paid prior to DCLS sending the kits.

14.3. Bacteriological repeat and triggered source water monitoring kit dispatch

Time sensitive repeat and triggered source water monitoring bacteriological sample containers are dispatched to waterworks by the Field Office staff. Sample collection input forms generated from the R&R Ad Hoc module, and DCLS-provided sample containers and labels are given to the waterworks representative. Because of the time sensitivity of these samples, DCLS will perform the analysis prior to payment and submit an invoice to the waterworks afterwards. Field Office staff should routinely take inventory of DCLS labels and sample container supplies. To replenish stock, staff should send a request to "LabAdmin" with the quantity of labels and bottles needed.

15. Evaluation and Distribution of Sample Results

ODW staff are required to review and evaluate all bacteriological, chemical, physical, and radiological analysis results. Where necessary, staff must inform waterworks when repeat and/or special samples will be required as well as providing required notices of violations for any exceedance of maximum contaminant levels.

15.1. Distribution of Bacteriological Analysis Results

It is not normally necessary for ODW to inform waterworks of bacteriological results unless a problem has been found and/or the laboratory has failed to provide a copy of the results to the owner.

15.2. Distribution of Chemical / Physical / Radiological Analysis Results

It is the policy of the ODW to inform waterworks in writing of the receipt and evaluation of all chemical, physical and radionuclides analysis results by generating and signing the Owner's Report generated by R&R.

Please refer to the various enforcement and public notification working memos when issuing a Notice of Violation for failure to collect samples and/or for issuing a Notice of Violation for exceeding maximum contaminant levels.

Revised Total Coliform Rule

Alternative Upstream/Downstream Repeat Site Selection Criteria

&

Ad Hoc Selection of Repeat Sample Site

Alternative Site

- Background – Repeat monitoring, is required subsequent to a total coliform-positive routine distribution system sample. Three samples are required with the approved monitoring sites listed in the Bacteriological Sample Site Plan (BSSP) as the ‘originating’ routine site plus two sites located within five service connections of the representative site; one upstream and one downstream. The terms “upstream” and “downstream” refer to the direction of water flow by the sample site or flow path. The purpose of repeat bacteriological monitoring is to identify a current pathway or entrance of contamination into the distribution system. Consequently, the use of repeat monitoring sites outside the default five service connection area may be useful to characterize a contamination pathway. Sites listed in the BSSP outside the five service connection area are known as alternative repeat monitoring sites.
- Situations for Use of an Alternative Site – There are two situations where the use of an alternative site may better determine a contamination pathway in lieu of the defined repeat monitoring sites criteria. First, when the representative site is at the end or within one service connection of the end of a distribution system pipe. Second, when there is knowledge of activities or conditions that fall outside the five service connection distance criteria which put the distribution system at risk for contamination.
- Situation 1 – ODW staff is to discourage selection of an end of line or within one service connection of an end of line tap as a routine sample site during review of a BSSP. Selection of a representative site is dependent on factors that will lead to targeting a general location. Subsequently, a tap must be found in the targeted area. A suitable tap, one that will not modify water quality during sample collection, must also have unrestricted accessibility. Consequently, the suitable tap may be at the end or within one service connection of the end of a distribution system pipe. Obviously, a suitable downstream repeat location tap is likely not available. A site further upstream, a site on a branch line also fed by the main supplying the representative site, or a site in the general area that does not exhibit sufficient chlorine residual, may be considered for an alternative site. In all cases, the alternative site must be in the same pressure zone as the originating site.
- Situation 2 – As stated for Situation 1, locating the representative site is the primary objective. Knowledge of activities or conditions in the area of the representative site may indicate a higher than normal risk for a potential contamination pathway but the activity or condition is not within the five service connection criteria location. Conditions of higher risk that should lead to this consideration of alternative sites are: nearby service connections with high risk water use protected by backflow prevention devices; water mains crossing under or parallel to large streams or rivers; areas where main breaks and pipe repairs are above the

Attachment A.1. Alternative Site Criteria Guidance

normal frequency compared to the rest of the system, or a location where past vandalism to waterworks equipment causes a concern for higher risk to the distribution system. Some activities near water mains may pose a potential risk to pipe integrity such as: moving live loads from trains, excessively loaded vehicles or a quarry operation that has blasting operations, just to give a few examples.

Ad Hoc Substitute Repeat Site

Waterworks operators, under normal circumstances, do not routinely check on the status of repeat sample sites, as a total coliform-positive sample result is not a routine event. However, the repeat site associated with a routine site may not be available due to unforeseen circumstances and require ad hoc actions by the operator. Some of these circumstances may be:

- Access is unavailable due to the absence of the home or building owner
- The building site is undergoing plumbing renovations
- The only acceptable tap/faucet is inoperable

In these circumstances, the operator will need to make immediate decisions to select a substitute repeat site so as not to delay sample collection. ODW staff is to be amenable to allow the use of the ad hoc site to meet the repeat monitoring requirement subsequent to the operator providing an explanation of the circumstances. In addition, the operator may not be able to find a substitute site within the five service connections. Consequently, the substitute site is subject to the guidelines for selecting an alternative site.

BACTERIOLOGICAL SAMPLE SITING PLAN (BSSP)
(For GW Waterworks Serving 1,000 or Fewer People)

Waterworks Name: _____
 PWSID: _____

[Note: If a waterworks provides 4-log virus inactivation treatment either voluntarily or as required by the Waterworks Regulations, triggered source water monitoring is not required for the sources being treated. Delete references below where applicable.]

Purpose: The purpose of this plan is to identify specific bacteriological sampling sites and monitoring requirements for routine, repeat, triggered and routine source water monitoring. ***(If applicable:*** In addition, this plan identifies disinfectant residual monitoring requirements (for compliance determination as well as) for distribution system quality control measures.)

Sampling Plan:

- The _____ waterworks is currently required to collect _____ routine water sample(s) for total coliform analysis each (month)(quarter). ***(If the waterworks has components that are not in operation year round, include the following, otherwise delete:*** This waterworks shuts down some components during the year, consequently, prior to opening the shutdown components, an approved Start-up Procedure must be completed.)
- The routine, repeat and triggered source water sampling sites are identified below and are shown on the attached waterworks piping map. The routine sites were chosen to be representative of the water quality throughout the distribution system.

Routine Sample Sites (911 Address or Location)		Repeat and Triggered Source Water Sample Sites (911 Address or Location)	
010		01U	
		01D	
		Source(s)	
020		02U	
		02D	
		Source(s)	
030		03U	
		03D	
		Source(s)	

- Routine bacteriological samples will be collected from each of the above routine sites on a rotating basis.
- Repeat and triggered source water samples will be collected when a routine total coliform-positive result occurs. Collection is required within 24 hours of notification. Any total coliform-positive routine, repeat or triggered source water sample will also be analyzed for *E. coli* in accordance with the *Waterworks Regulations*.

[Include No. 5 for waterworks that purchase groundwater. If groundwater is not purchased delete No. 5)

5. The wholesaler waterworks, _____, will be notified within 24-hours of the routine total coliform-positive distribution system sample so that the triggered source water sample(s) is(are) collected from the wholesaler's well(s) raw water sample tap, located prior to treatment.
6. Triggered source water samples will be collected from each groundwater source in service at the time of collection of the routine total coliform-positive sample. Triggered source water samples will be collected from the well ***[or spring, if applicable]*** raw water sample tap, located prior to treatment.
7. ***Choose either a. or b.***
 - a. ***[Repeat sampling instruction for waterworks with repeat sample sites. Delete if not applicable.]***

The routine sample sites are chosen to allow for the collection of required upstream and downstream repeat samples when necessary. Three repeat samples will be collected on the same day from:

 - (a) the total coliform-positive sample location; and
 - (b) a location within five service connections upstream of the total coliform-positive sample location; and ***[Alternate Option: if waterworks has a single untreated groundwater well and serves a population of 1000 or fewer people, the triggered source water sample can be counted as the upstream repeat sample.]***
 - (c) a location within five service connections downstream of the total coliform-positive sample location.
 - b. ***[Repeat sampling instructions for waterworks with only a single approved sample site. Delete if not applicable]***

The three repeat samples will be collected from the routine site over a three-day period (one sample per day) ***or*** the three repeat samples will be collected approximately 15 minutes apart from the routine site on the same day.
8. The waterworks will notify the appropriate ODW Field Office if any repeat sample is *E.coli-positive* ***or*** any repeat sample is total coliform-positive following a routine *E.coli-positive* sample. Notification is due by the end of the business day after the waterworks has been notified of the monitoring result.
9. Five additional source water samples will be collected from the same raw water source of any *E.coli-positive* triggered source water sample. Sampling will be within 24 hours of notification. These samples are to be collected approximately 15 minutes apart while the well pump is running. In addition, consumers will be notified within 24 hours of notification of the *E.coli-positive* triggered sample result. The ODW will be contacted for assistance in preparing the public notice text and the distribution requirements.
10. ***[Applies only to year-round transient noncommunity waterworks]*** For waterworks collecting routine samples on a quarterly frequency, a minimum of three routine samples are required in the month following a routine total coliform-positive result. All three samples may be collected on a single day if the samples are taken from different approved sites. Otherwise, the samples must be collected at regular time intervals throughout the month.

Attachment B.1. BSSP GW 1000 or Fewer People

[Comments 11 through 14 apply to waterworks that chlorinate/disinfect. Delete if not applicable]

- 11. Disinfectant residual will be measured at the same time and from the same location as each routine and repeat bacteriological sample.
- 12. All disinfectant residuals will be measured with testing equipment using approved methods.
- 13. Disinfectant residuals will be reported to the _____ Field Office by the 10th of the month following the month during which samples were taken. The disinfectant residual results will also be reported by the laboratory along with the bacteriological results.
- 14. *[Optional]* For quality control, the disinfectant residual will be monitored in the distribution system at a frequency of ____ days per week. These disinfectant residual results will be reported in the Monthly Operation Report.

[Comments 15 and 16 apply to waterworks that chlorinate/disinfect or have other applicable treatment processes as determined by VDH Office of Drinking Water. Delete if not applicable]

- 15. Separate from triggered source water sampling requirements, a raw water sample from each groundwater source will be collected every _____ (month)(quarter)(year) at a minimum from each groundwater source. These samples will be analyzed by a test method that provides a Most Probable Number (MPN) determination for both total coliform and *E.coli*.
- 16. Additional monitoring may be required based on the results of source water samples.

Owner/Representative Name: _____
Signature: _____
Title: _____
Date: _____

Attachment: System piping map

BACTERIOLOGICAL SAMPLE SITING PLAN (BSSP)
(For GW Waterworks Systems Serving More Than 1,000 People)

Waterworks Name: _____
 PWSID: _____
 Population Served: _____

[Note: If a waterworks provides 4-log virus inactivation treatment either voluntarily or as required by the Waterworks Regulations, triggered source water monitoring is not required for the sources being treated. Delete references below where applicable.]

Purpose: The purpose of this plan is to identify specific bacteriological sampling sites and monitoring requirements for routine, repeat, and triggered source water monitoring. ***[If applicable:*** In addition, this plan identifies disinfectant residual monitoring requirements (for compliance determination as well as) for distribution system quality control measures.]

Sampling Plan:

1. The _____ waterworks is currently required to collect _____ routine water samples for total coliform analysis each month. ***(If the waterworks has components that are not in operation year round, include the following, otherwise delete:*** This waterworks shuts down some components during the year, consequently, prior to opening the shutdown components, an approved Start-up Procedure will be completed.)
2. The routine, repeat and triggered source water sample sites are identified below and are shown on the attached system piping map. The routine sites were chosen to be representative of the water quality throughout the distribution system.

Routine Sample Site (911 Address or Site)		Repeat and Triggered Source Water Sample Sites (911 Address or Site)	
010		01U	
		01D	
		Sources	
020		02U	
		02D	
		Sources	
030		03U	
		03D	
		Sources	
040		04U	
		04D	
		Sources	
050		05U	
		05D	
		Sources	
060	<i>Add rows as needed</i>	06U	
		06D	
		Sources	

Attachment B.2. BSSP GW More Than 1000 People

3. Routine bacteriological samples will be collected from each of the above routine sites on a rotating basis. The samples will be collected at regular time intervals throughout the month. **[Optional for waterworks serving 4900 or fewer: All required samples may be collected on a single day if they are collected from different sites.]**
4. Repeat and triggered source water samples are required to be collected when a routine total coliform-positive result occurs. Collection is required within 24 hours of notification. Any total coliform-positive routine, repeat or triggered source water sample will also be analyzed for *E. coli* in accordance with the *Waterworks Regulations*.

[Include No. 5 for waterworks that purchase groundwater. If groundwater is not purchased delete No. 5)

5. The wholesaler waterworks, _____, will be notified within 24-hours of the routine total coliform-positive distribution system sample so that the triggered source water sample(s) is(are) collected from the wholesaler's well(s).
6. Triggered source water samples will be collected from each groundwater source in service at the time of collection of the routine total coliform-positive sample. Triggered source water samples will be collected from the well **[or spring, if applicable]** raw water sample tap, located prior to treatment.
7. The routine sample sites are chosen to allow for the collection of required upstream and downstream repeat samples when necessary. Three repeat samples will be collected on the same day from:
 - (a) the total coliform-positive sample location; and
 - (b) a location within 5 service connections upstream of the total coliform-positive sample location; and
 - (c) a location within 5 service connections downstream of the total coliform-positive sample location.
8. **[Only for waterworks with a population $\geq 33,001$. Delete for population $< 33,001$]** A minimum of one set of repeat samples is required for each routine total coliform-positive sample. If one or more repeat samples are total coliform-positive, an additional set(s) of repeat samples are due within 24 hours of notification unless the requirement for a Level 1 or 2 Assessment is generated. Additional sets of repeat samples will be collected until either total coliforms are not detected in one complete set of repeat samples or the requirement for a Level 1 or 2 Assessment is generated.
9. The waterworks will notify the appropriate ODW Field Office if any repeat sample is *E. coli* positive or any repeat sample is total coliform-positive following a routine *E. coli* positive sample. Notification is due by the end of the business day after the waterworks has been notified of the monitoring result.
10. Five additional source water samples will be collected from the same raw water source of any *E. coli* positive triggered source water sample. Sampling will be within 24 hours of notification. These samples are to be collected approximately 15 minutes apart while the well pump is running. In addition, (customers/employees/students) provided drinking water will be notified within 24 hours of notification of the *E. coli* positive triggered sample result. The ODW will be contacted for assistance in preparing the public notice text and the distribution requirements.

Attachment B.2. BSSP GW More Than 1000 People

[Comments 11 through 13 apply to waterworks that chlorinate/disinfect. Delete if not applicable]

11. Disinfectant residual will be measured at the same time and from the same site as each routine and repeat bacteriological sample.
12. All disinfectant residuals will be measured with testing equipment using approved methods.
13. Disinfectant residuals will be reported to the _____ Field Office by the 10th of the month following the month during which samples were taken. The disinfectant residual results will be reported by the laboratory along with the bacteriological results.
14. ***[Optional]*** For quality control, the free chlorine residual will be monitored in the distribution system at a frequency of ____ days per week. The chlorine residual results will be reported in the Monthly Operation Report.

[Comments 15 and 16 apply to waterworks that chlorinate/disinfect or have other applicable treatment processes as determined by VDH Office of Drinking Water. Delete if not applicable]

15. Separate from triggered source water sampling requirements, a raw water sample from each groundwater source will be collected every _____ (month)(quarter)(year) at a minimum from each groundwater source. These samples will be analyzed by a test method that provides a Most Probable Number (MPN) determination for both total coliform and *E.coli*.
16. Additional monitoring may be required based on the results of source water samples.

Owner/Representative Name:

Signature:

Title:

Date:

Attachment: System piping Map

BACTERIOLOGICAL SAMPLE SITING PLAN (BSSP)
(For Surface Water or GUDI Source Waterworks)

Waterworks Name: _____
 PWSID: _____
 Population Served: _____

Purpose: The purpose of this plan is to identify specific bacteriological sampling sites and monitoring requirements for routine and repeat source water monitoring. In addition this plan identifies disinfectant residual monitoring requirements for compliance determination as well as for distribution system quality control measures.

Sampling Plan:

1. The _____ waterworks is currently required to collect _____ water samples for total coliform analysis each month.
2. The routine and repeat sampling sites are identified below and are shown on the attached waterworks piping map. The routine sites were chosen to be representative of the water quality throughout the distribution system.

Routine Sample Site Locations (911 Address)		Repeat Sample Site Locations (911 Address)	
010		01U	
		01D	
020		02U	
		02D	
030		03U	
		03D	
040		04U	
		04D	
050		05U	
		05D	
060	<i>Add rows as needed</i>	06U	
		06D	

3. Routine bacteriological samples will be collected from each of the above routine sites on a rotating basis. Samples will be collected at regular intervals throughout the month.
4. Repeat samples are required to be collected when a routine total coliform-positive result occurs. Collection is required within 24 hours of notification. Any routine or repeat total coliform-positive sample must also be analyzed for *E. coli* in accordance with the *Waterworks Regulations*.
5. The routine sample sites are chosen to allow for the collection of required upstream and downstream repeat samples when necessary. Three repeat samples will be collected on the same day from:
 - a) the total coliform-positive sample location; and
 - b) a location within 5 service connections upstream of the total coliform-positive sample location; and

Attachment B.3. BSSP SW & GUDI

c) a location within 5 service connections downstream of the total coliform-positive sample location.

6. **[Only for waterworks population $\geq 33,001$. Delete for $< 33,001$]** A minimum of one set of repeat samples is required for each routine total coliform-positive sample. If one or more repeat samples are total coliform-positive, an additional set(s) of repeat samples are due within 24 hours of notification unless the requirement for a Level 1 or 2 Assessment is generated. Additional sets of repeat samples will be collected until either total coliforms are not detected in one complete set of repeat samples or the requirement for a Level 1 or 2 Assessment is generated.

7. The waterworks will notify the appropriate ODW field office if any repeat sample is *E. coli* positive or any repeat sample is total coliform-positive following a routine *E. coli* positive sample. Notification is due by the end of the business day after the waterworks has been notified of the monitoring result.

[Include Nos. 8 and 9 for waterworks that purchase groundwater. NOTE: Add triggered source water sample site in above table. If groundwater is not purchased delete Nos. 8 and 9]

8. The wholesaler waterworks, _____, will be notified within 24-hours of the routine total coliform-positive distribution system sample so that the triggered source water sample(s) is(are) collected from the wholesaler's well(s) raw water sample tap(s), located prior to treatment.

9. Five additional source water samples will be collected from the same groundwater source of any *E. coli* positive triggered source water sample. Sampling will be within 24 hours of notification. These samples are to be collected approximately 15 minutes apart while the well pump is running. In addition, consumers will be notified within 24 hours of the *E. coli* positive triggered sample result. The ODW will be contacted for assistance in preparing the public notice text and the distribution requirements.

10. The disinfectant residual will be measured at the same time and from the same location as each routine and repeat bacteriological sample.

11. All disinfectant residuals will be measured with testing equipment using approved methods.

12. Disinfectant residuals will be reported to the _____ Field Office by the 10th of the month following the month during which samples were taken. The disinfectant residual results will be reported by the laboratory along with the bacteriological results.

13. **[Optional]** For quality control, the free chlorine residual will be monitored in the distribution system at a frequency of _____ days per week. The chlorine residual results will be reported in the Monthly Operation Report.

Owner/Representative Name: _____
Signature: _____
Title: _____
Date: _____

Attachment: System piping map

BACTERIOLOGICAL SAMPLE SITING PLAN (BSSP)
(for Seasonal Waterworks)

Waterworks Name: _____

PWSID: _____

Population Served: _____

[Note: If a waterworks provides 4-log virus inactivation treatment either voluntarily or as required by the Waterworks Regulations, triggered source water monitoring is not required for the sources being treated. Delete references below where applicable.]

Purpose: The purpose of this plan is to identify specific bacteriological sampling sites and monitoring requirements for routine, repeat, triggered and routine source water monitoring. ***[If applicable:*** In addition, this plan identifies disinfectant residual monitoring requirements (for compliance determination as well as) for distribution system quality control measures.]

Sampling Plan:

1. The _____ waterworks is currently required to collect _____ routine water sample(s) for total coliform analysis each month that the waterworks is in operation. Prior to startup each season, the approved Seasonal Start-up Procedures must be completed.

2. The routine, repeat and triggered source water sampling sites are identified below and are shown on the attached waterworks piping map. The routine sites were chosen to be representative of the water quality throughout the distribution system.

Routine Sample Sites (911 Address or Location)		Repeat and Triggered Source Water Sample Sites (911 Address or Location)	
010		01U	
		01D	
		Source(s)	
020		02U	
		02D	
		Source(s)	
030		03U	
		03D	
		Source(s)	

3. Routine bacteriological samples will be collected from each of the above Routine Locations on a rotating basis.

4. Repeat and triggered source water samples will be collected when a routine total coliform-positive result occurs. Collection is required within 24 hours of notification. Any total coliform-positive routine, repeat or triggered source water sample will also be analyzed for *E. coli* in accordance with the *Waterworks Regulations*.

5. Triggered source water samples will be collected from each groundwater source in service at the time of collection of the routine total coliform-positive sample. Triggered source water samples will be collected from the well ***[or spring, if applicable]*** raw water sample tap, located prior to treatment.

6. *Choose either a. or b.*

a. [Repeat sampling instruction for waterworks with repeat sample sites. Delete if not applicable.]

The routine sample sites are chosen to allow for the collection of required upstream and downstream repeat samples when necessary. Three repeat samples will be collected on the same day from:

- (a) the total coliform-positive sample location; and
- (b) a location within five service connections upstream of the total coliform-positive sample location; and *[Alternate Option: if waterworks has a single untreated groundwater well and serves a population of ≤ 1000 , the triggered source water sample can be counted as the upstream repeat sample.]*
- (c) a location within five service connections downstream of the total coliform-positive sample location.

b. [Repeat sampling instructions for waterworks with only a single approved sample site. Delete if not applicable]

The three repeat samples will be collected from the routine site over a three-day period (one sample per day) or the three repeat samples will be collected approximately 15 minutes apart from the routine site on the same day.

7. The waterworks will notify the appropriate ODW Field Office if any repeat sample is *E. coli* positive or any repeat sample is total coliform-positive following a routine *E. coli* positive sample. Notification is due by the end of the business day after the waterworks has been notified of the monitoring result.

8. Five additional source water samples will be collected from the same raw water source of any *E. coli* positive triggered source water sample. Sampling will be within 24 hours of notification. These samples will be collected approximately 15 minutes apart while the well pump is running. In addition, consumers will be notified within 24 hours of the *E. coli* positive triggered sample result. The ODW will be contacted for assistance in preparing the public notice text and the distribution requirements.

[Comments 9 through 12 apply to waterworks that chlorinate/disinfect. Delete if not applicable]

9. Disinfectant residual will be measured at the same time and from the same location as each routine and repeat bacteriological sample.

10. All disinfectant residuals will be measured with testing equipment using approved methods.

11. The disinfectant residuals will be reported to the _____ Field Office by the 10th of the month following the month during which samples were taken. The disinfectant residual results will also be reported by the laboratory along with the bacteriological results.

12. *[Optional]* For quality control, the disinfectant residual will be monitored in the distribution system at a frequency of _____ days per week. These disinfectant residual results will be reported in the Monthly Operation Report.

Attachment B.4. BSSP TNC Seasonal Waterworks

[Comments 13 and 14 apply to waterworks that chlorinate/disinfect or have other applicable treatment processes as determined by VDH Office of Drinking Water. Delete if not applicable]

13. Separate from triggered source water sampling requirements, a raw water sample from each groundwater source will be collected every _____ (month)(quarter)(year) at a minimum from each groundwater source. These samples will be analyzed by a test method that provides a Most Probable Number (MPN) determination for both total coliform and *E.coli*.

14. Additional monitoring may be required based on the results of source water samples.

Owner/Representative Name:

Signature:

Title:

Date:

Attachment: System piping map

Attachment B.5. BSSP Table for Multiple Pressure Zones - Example

Example BSSP Table for Multiple Pressure Zones

The following tables are examples that can be used if the waterworks has more than one pressure zone. Cut and paste into BSSP template that will be used.

Routine Sample Site (911 Address or Site)		Repeat and Triggered Source Water Sample Sites (911 Address or Site)	
Downtown Zone			
010	<i>123 Main Street</i>	010U	
		010D	
		Source(s)	
020	<i>456 1st Street</i>	020U	
		020D	
		Source(s)	
030	<i>789 Cross Street</i>	030U	
		030D	
		Source(s)	
High Elevation Zone			
050	<i>1034 High Street</i>	050U	
		040D	
		Source(s)	
060	<i>4501 Ridgeline Way</i>	060U	
		060D	
		Source(s)	
070	<i>3241 Peak Drive</i>	070U	
		070D	
		Source(s)	

Routine Sample Site (911 Address or Site)		Repeat and Triggered Source Water Sample Sites (911 Address or Site)	
010	<i>123 Main Street (Downtown Zone)</i>	010U	
		010D	
		Source(s)	
020	<i>456 1st Street (Downtown Zone)</i>	020U	
		020D	
		Source(s)	
030	<i>789 Cross Street (Downtown Zone)</i>	030U	
		030D	
		Source(s)	
040	<i>1034 High Street (High Elevation Zone)</i>	040U	
		040D	
		Source(s)	
050	<i>4501 Ridgeline Way (High Elevation Zone)</i>	050U	
		040D	
		Source(s)	
060	<i>3241 Peak Drive (High Elevation Zone)</i>	060U	
		060D	
		Source(s)	

REVIEW SHEET FOR THE BACTERIOLOGICAL SAMPLE SITING PLAN (BSSP)

City/County: _____
Waterworks: _____
PWSID#: _____
Prepared By: _____
Date Received: _____
Reviewed By: _____

A. BACTERIOLOGICAL SAMPLE SITING PLAN

1. Waterworks population: _____
2. Required number of bacteriological samples: _____
3. Frequency of monitoring: _____
4. Source of water (Surface, GUDI, Well, Spring): _____
5. Wholesale waterworks? { } Yes { } No
If yes, name of consecutive waterworks _____
6. Consecutive waterworks? { } Yes { } No
If yes, name of wholesale waterworks _____
7. Year round operated waterworks with some components shutdown during the year? { } Yes { } No
Start-up Procedure approval date: _____

Seasonal Waterworks: { } N/A

8. Seasonal waterworks dates of operation: _____
9. Start-up Procedure approval date: _____

Routine Sample Sites:

10. Required number of routine sample sites: _____
11. Is the number of routine sample sites provided adequate? { } Yes { } No
12. Does the waterworks have multiple pressure zones? { } Yes { } No

Attachment C.1. BSSP Review Sheet

If yes, are samples collected from each pressure zone? Yes No

13. Do routine sample sites provide representative monitoring of the distribution system? Yes No

Repeat Sample Sites:

14. Are repeat sample sites located within 5 connections upstream and downstream of each routine site?

Yes No

If no, have alternative repeat locations been approved? Yes No

15. Are all repeat sites in the same pressure zone as the routine sample site? Yes No

16. Map showing sample sites provided? Yes No

Comments: _____

B. TRIGGERED AND ROUTINE SOURCE WATER MONITORING PLAN N/A

1. All groundwater sources identified on plan (Including purchased GW sources)? Yes No

2. Is this a single untreated groundwater source serving 1,000 or Fewer People? Yes No

If yes, will the triggered source water sample be counted as the upstream repeat sample? Yes No

3. Map showing location of groundwater sources provided? Yes No

4. Additional source water monitoring requirements identified (MPNs)? Yes No

5. Public notification requirements identified for triggered *E. coli*-positive sample? Yes No

Comments: _____

C. DISINFECTANT RESIDUAL MONITORING PLAN N/A

1. Disinfectant residual monitoring and reporting requirements identified for compliance purposes.

Yes No

2. Disinfectant residual monitoring and reporting requirements identified for quality control purposes.

Yes No

3. Approved methods for measuring disinfectant residuals identified. Yes No

Comments: _____

ATTACHMENT C.2. BSSP APPROVAL LETTER

INSTRUCTIONS: Complete / select items shown with *italics*, and convert to regular font. Print on VDH letterhead. Pages are 1" top, bottom, and side margins.

SUBJECT: County/City
Waterworks: Waterworks Name
PWSID No: PWSID

Date

Waterworks Owner
Address 1
Address 2
City, State, Zip

Dear Waterworks Owner:

The Bacteriological Sample Siting Plan (BSSP) dated date for the subject waterworks, as prepared by name, has been reviewed by this Office.

This letter is to advise that the plan satisfies the requirements of the *Waterworks Regulations* and is therefore approved. A copy of the approved plan is enclosed.

The enclosed plan refers to the use of SITE ID NUMBERS to identify approved sampling locations. Please use the Site ID number on the bacteriological form submitted with each sample. Identify repeat sample locations by changing the last digit in the number to a U for samples collected upstream of the original sample location, a D for samples collected downstream of the original sample location, and an R for the repeat sample at the original sample location. For example:

Original sample	code number = 010
Repeat sample at same site	code number = 01R
Sample collected upstream	code number = 01U
Sample collected downstream	code number = 01D
Source water sample	code number = RW

Using these code numbers will help you keep track of the required bacteriological samples in accordance with the *Waterworks Regulations*.

If we may be of any assistance to you in implementing the BSSP, please contact (name), District Engineer at (phone, email).

Sincerely,

Engineering Field Director
Field office name

Enclosure: Approved BSSP

Cc: Name, (Health Director/Environmental Health Manager), Name of LHD
ODW-Central Office

Distribution System Evaluation Checklist

Page 1 of 2

System Name: _____
Checklist Completed by: _____ Date: _____

- A. Do you have disinfectant residual or temperature data for the monitoring location where you experienced the OEL exceedance? Yes No

If NO, proceed to item B. If YES, answer the following questions for the period in which an OEL exceedance occurred:

Yes No

- Was the water temperature higher than normal for that time of the year at that location?
- Was the disinfectant residual lower than normal for that time of the year at that location?
- Was the disinfectant residual higher than normal for that time of the year at that location?

- B. Do you have maintenance records available for the time period just prior to the OEL exceedance? Yes No

If NO, proceed to item C. If YES, answer the following questions:

Yes No

- Did any line breaks or replacements occur in the vicinity of the exceedance?
- Were any storage tanks or reservoirs taken off-line and cleaned?
- Did flushing or other hydraulic disturbances (e.g., fires) occur in the vicinity of the exceedance?
- Were any valves operated in the vicinity of the OEL exceedances?

- C. If your system is metered, do you have access to historical records showing water use at individual service connections? Yes No

If NO, proceed to item D. If YES, was overall water use in your system unusually low, indicating higher than normal water age? Yes No

- D. Do you have high-volume customers in your system (e.g., an industrial processing plant)? Yes No

If NO, proceed to item E. If YES, was there a change in water use by a high-volume customer? Yes No

- E. Is there a finished water storage facility hydraulically upstream from the monitoring location where you experienced the OEL exceedance? Yes No

If NO, proceed to item F. If YES, review storage facility operations and water quality data to answer the following questions for the period in which the OEL exceedance occurred:

Yes No

- Was a disinfectant residual detected in the stored water or at the tank outlet?
- Do you know of any mixing problems with the tank or reservoir?
- Does the facility operate in "last in-first out" mode?
- Was the tank or reservoir drawn down more than usual prior to OEL exceedance, indicating a possible discharge of stagnant water?
- Was there a change in water level fluctuations that would have resulted in increased water age within the tank or reservoir?

Distribution System Evaluation Checklist

F. Does your system practice booster chlorination? Yes No
If NO, proceed to item G. If YES, was there an increase in booster chlorination feed rates? Yes No

G. Did you have customer complaints in the vicinity of the OEL exceedance? Yes No
If NO, proceed to item H. If YES, explain.

H. Did concern about complying with a rule other than Stage 2 DBPR, such as the Lead and Copper rule, the TCR, or any other rule constrain your options to reduce the DBP levels at this site? For example, are you limited by the need to maintain a detectable disinfectant residual in your ability to control DBP levels in the distribution system? Yes No
If NO, proceed to item I. If YES, explain below and consult EPA's *Simultaneous Compliance Guidance Manual* for alternative compliance approaches.

I. **Conclusion**

Did the distribution system cause or contribute to the OEL exceedance(s)? Yes No
 Possibly

If NO, proceed to evaluations of treatment systems and source water. If YES or POSSIBLY, explain below.

I. GENERAL INFORMATION

A. Facility Information

Facility Name: _____ PWSID: _____
 Facility Address: _____
 City: _____ State: _____ Zip: _____

B. Report Prepared by:

(Print): _____ Date prepared: _____
 (Signature): _____
 Contact Telephone Number: _____

II. MONITORING RESULTS

A. Provide the Compliance Monitoring Site(s) where the OEL was Exceeded.

Note: The site name or number should correspond to a site in your Stage 2 DBPR compliance monitoring plan.

B. Monitoring Results for the Site(s) Identified in II.A (include duplicate pages if there was more than one exceedance)

1. Check TTHM or HAA5 to indicate which result caused the OEL exceedance. TTHM HAA5

2. Enter your results for TTHM or HAA5 (whichever you checked above).

	Quarter			Operational Evaluation Value
	Results from Two Quarters Ago	Prior Quarter's Results	Current Quarter	
	A	B	C	
				$D = (A+B+(2*C))/4$
Date sample was collected				
TTHM (mg/L)				
HAA5 (mg/L)				

Note: The operational evaluation value is calculated by summing the two previous quarters of TTHM or HAA5 values plus twice the current quarter value, divided by four. If the value exceeds 0.080 mg/L for TTHM or 0.060 mg/L for HAA5, an OEL exceedance has occurred.

C. Has an OEL exceedance occurred at this location in the past? Yes No

If NO, proceed to item D. If YES, when did exceedance occur?

Was the cause determined for the previous exceedance(s)? Yes No

Are the previous evaluations/determinations applicable to the current OEL exceedance? Yes No

III. OPERATIONAL EVALUATION FINDINGS

A. Did the State allow you to limit the scope of the operational evaluation? Yes No

If NO, proceed to item B. If YES, attach written correspondence from the State.

B. Did the **distribution system** cause or contribute to your OEL exceedance(s)? Yes No
 Possibly

If NO, proceed to item C. If YES or POSSIBLY, explain (attach additional pages if necessary):

C. Did the **treatment** system cause or contribute to your OEL exceedance(s)? Yes No
 Possibly

If NO, proceed to item D. If YES or POSSIBLY, explain (attach additional pages if necessary):

D. Did **source water quality** cause or contribute to your OEL exceedance(s)? Yes No
 Possibly

If NO, proceed to item E. If YES or POSSIBLY, explain (attach additional pages if necessary):

E. Attach all supporting operational or other data that support the determination of the cause(s) of your OEL exceedance(s).

F. If you are unable to determine the cause(s) of the OEL exceedance(s), list the steps that you can use to better identify the cause(s) in the future (attach additional pages if necessary):

G. List steps that could be considered to minimize future OEL exceedances (attach additional pages if necessary)

H. Total **Number of Pages** Submitted, Including Attachments and Checklists: _____

OPERATIONAL EVALUATION REPORT REVIEW SHEET

City / County _____

Waterworks _____

PWSID # _____

Consecutive waterworks Yes No

Reviewed By: _____

	Date
OEL Exceeded Letter	
Report Received	
Modifications Requested	
Revisions Received	
Approved	

I. GENERAL INFORMATION		COMMENT
Report submitted within 90 days of OEL exceedance?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Did waterworks request to limit scope?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Was request to limit scope approved by ODW?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> NA
II. MONITORING RESULTS		
Which contaminants exceeded the OEL?	<input type="checkbox"/> TTHM <input type="checkbox"/> HAA5	
All sites where OELs were exceeded listed in report?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Previous OEL exceedances at these sites discussed?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> NA
III. REPORT DISCUSSION		
Distribution System addressed?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> NA
Storage Tank operations/capacity	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Flushing	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Source Water addressed?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> NA
Sources	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Raw water quality	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Treatment Processes addressed?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> NA
Treatment	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Finished water quality	<input type="checkbox"/> Yes <input type="checkbox"/> No	
IV. FUTURE PLANNING		
Plan to minimize future OEL exceedances presented?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
V. ATTACHMENTS		
Any attachments provided?	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Refer to the EPA Operational Evaluation Guidance Manual for further information.

Source Water Evaluation Checklist

NO DATA AVAILABLE

System Name: _____

Checklist Completed by: _____ Date: _____

A. Do you have source water temperature data? Yes No

If NO, proceed to item B. If YES, was the source water temperature high? Yes No

If NO, proceed to item B. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes No

- Was the raw water storage time longer than usual?
- Did you place another water source on-line?
- Were river/reservoir flow rates lower than usual? If yes, indicate the location of lower flow rates and the anticipated impact on the OEL exceedance.
- Did point or non-point sources in the watershed contribute to the OEL exceedance?

B. Do you have data that characterizes organic matter in your source water (e.g., TOC, DOC, SUVA, color, THM formation potential)? Yes No

If NO, proceed to item C. If YES, were these values higher than normal? Yes No

If NO, proceed to item C. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes No

- Did heavy rainfall or snowmelt occur in the watershed?
- Did you place another water source on-line?
- Did lake or reservoir turnover occur?
- Did point or non-point sources in the watershed contribute to the OEL exceedance?
- Did an algal bloom occur in the source water?
- If algal blooms were present, were appropriate algae control measures employed (e.g. addition of copper sulfate)?
- Did a taste and odor incident occur?

C. Do you have source water bromide data? Yes No

If NO, proceed to item D. If YES, were the bromide levels higher or lower than normal? Yes No

If NO, proceed to item D. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes No

- Has saltwater intrusion occurred?
- Are you experiencing a long-term drought?
- Did heavy rainfall or snowmelt occur in the watershed?
- Did you place another water source on-line?
- Are you aware of any industrial spills in the watershed?

D. Do you have source water turbidity or particle count data? Yes No

If NO, proceed to item E. If YES, were the turbidity values or particle counts higher than normal? Yes No

If NO, proceed to item E. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes No

- Did lake or reservoir turnover occur?
- Did heavy rainfall or snowmelt occur in the watershed?
- Did logging, fires, or landslides occur in the watershed?
- Were river/reservoir flow rates higher than normal?

E. Do you have source water pH or alkalinity data? Yes No

If NO, proceed to item F. If YES, was the pH or alkalinity different from normal values? Yes No

If NO, proceed to item F. If YES, answer the following questions for the time period prior to the OEL exceedance.

Yes No

- Was there an algal bloom in the source water?
- If algal blooms were present, were algae control measures employed?
- Did heavy rainfall or snowmelt occur in the watershed?
- Has the PWS experienced diurnal pH changes in source water?

F. Conclusion

Did source water quality factors contribute to your OEL exceedance? Yes No
 Possibly

If YES or POSSIBLY, explain below.

Treatment Process Evaluation Checklist

NO DATA AVAILABLE

Facility Name: _____

Checklist Completed by: _____ Date: _____

A. Review finished water data for the time period prior to the OEL exceedance(s) and compare to historical finished water data using the following questions:

- Were DBP precursors (TOC, DOC, SUVA, bromide, etc.) higher than normal? Yes No
- Was finished water pH higher or lower than normal? Yes No
- Was the finished water temperature higher than normal? Yes No
- Was finished water turbidity higher than normal? Yes No
- Was the disinfectant concentration leaving the plant(s) higher than normal? Yes No
- Were finished water TTHM/HAA5 levels higher than normal? Yes No
- Were operational and water quality data available to the system operator for effective decision making? Yes No

B. Does the treatment process include predisinfection? Yes No

If NO, proceed to item C. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes | No | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Was disinfected raw water stored for an unusually long time? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were treatment plant flows lower than normal? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were treatment plant flows equally distributed among different trains? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were water temperatures high or warmer than usual? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were chlorine feed rates outside the normal range? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was a disinfectant residual present in the treatment train following predisinfection? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were online instruments utilized for process control? |
| <input type="checkbox"/> | <input type="checkbox"/> | Did you switch to free chlorine as the oxidant? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there a recent change (or addition) of pre-oxidant? |
| <input type="checkbox"/> | <input type="checkbox"/> | Did you change the location of the predisinfection application? |

C. Does your treatment process include presedimentation? Yes No

If NO, proceed to item D. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes | No | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Were flows low? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were flows high? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were online instruments utilized for process control? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was sludge removed from the presedimentation basin? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was sludge allowed to accumulate for an excessively long time? |
| <input type="checkbox"/> | <input type="checkbox"/> | Do you add a coagulant to your presedimentation basin? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there a problem with the coagulant feed? |

D. Does your treatment process include coagulation and/or flocculation? Yes No

If NO, proceed to item E. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes | No | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Were there any feed pump failures or were feed pumps operating at improper feed rates? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were chemical feed systems controlled by flow pacing? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were there changes in coagulation practices or the feed point? |
| <input type="checkbox"/> | <input type="checkbox"/> | Did you change the type or manufacturer of the coagulant? |
| <input type="checkbox"/> | <input type="checkbox"/> | Do you suspect that the coagulant in use at the time of the OEL exceedance did not meet industry standards? |
| <input type="checkbox"/> | <input type="checkbox"/> | Did the pH or alkalinity change at the point of coagulant addition? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were there broken or plugged mixers? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were flow rates above the design rate or was there short-circuiting? |

E. Does your treatment process include sedimentation or clarification? Yes No

If NO, proceed to item F. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes | No | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Were there changes in plant flow rate that may have resulted in a decrease in settling time or carry-over of process solids? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were settled water turbidities higher than normal? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there any disruption in the sludge blanket that may have resulted in carryover to the point of disinfection? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there any maintenance in the basin that may have stirred sludge from the bottom of the basin and caused it to carry over to the point of disinfectant addition? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was sludge allowed to accumulate for an excessively long time or was there a malfunction in the sludge removal equipment? |

F. Does your treatment process include filtration? Yes No

If NO, proceed to item G. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes | No | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Was there an increase in individual or combined filter effluent turbidity or particle counts? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there an increase in turbidity or particle loading onto the filters? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there an increase in flow onto the filters or malfunction of the rate of flow controllers? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were any filters taken off-line for an extended period of time that caused the other filters to operate near maximum design capacity and creating the conditions for possible breakthrough? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were any filters operated beyond their normal filter run time? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were there any unusual spikes in individual filter effluent turbidity (which may indicate particulate or colloidal TOC breakthrough) in the days leading to the excursion? |
| <input type="checkbox"/> | <input type="checkbox"/> | Were all filters run in a filter-to-waste mode during initial filter ripening? |
| <input type="checkbox"/> | <input type="checkbox"/> | If GAC filters are used, is it possible the adsorptive capacity of the GAC bed was reached before reactivation occurred (leave blank if not applicable)? |
| <input type="checkbox"/> | <input type="checkbox"/> | If biological filtration is used, were there any process upsets that may have resulted in the breakthrough of TOC (leave blank if not applicable)? |

G. Does your treatment process include primary disinfection by injecting chlorine prior to a clearwell? Yes No

If NO, proceed to item H. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes | No | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Was there a sudden increase in the amount of chlorine fed or an increase in the chlorine residual? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there an increase in clearwell holding time? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was the plant shut down or were plant flows low? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there an increase in clearwell water temperature? |
| <input type="checkbox"/> | <input type="checkbox"/> | Did you switch to free chlorine recently as the primary disinfectant? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was the inactivation of <i>Giardia</i> and/or viruses exceptionally high? |
| <input type="checkbox"/> | <input type="checkbox"/> | Was there a change in the mixing strategy (i.e. mixers not used, adjustment of tank level)? |

H. Does your plant recycle spent filter backwash or other streams? Yes No

If NO, proceed to item I. If YES, answer the following questions for the period in which an OEL exceedance occurred:

- | Yes | No | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Did a change in the recycle stream quality contribute to increased DBP precursor loading that was not addressed by treatment plant processes? |
| <input type="checkbox"/> | <input type="checkbox"/> | Did a recycle event result in flows in excess of typical or design flows? |

I. Do you inject a disinfectant after your clearwell to maintain a distribution system residual? Yes No

If NO, proceed to item J. If YES, answer the following questions for the period in which an OEL exceedance occurred:

Yes No

- Was there a sudden increase in the amount of chlorine fed?
- Was there a switch from chloramines to free chlorine for a burnout period?
- If using chloramines, was the chlorine to ammonia ratio in the proper range?
- Was there a problem with either chlorine or ammonia mixing?

J. Did concern about complying with a rule other than Stage 2 DBPR, such as the Lead and Copper rule, the LT2ESWTR, or any other rule constrain your options to reduce the DBP levels at this site? For example, are you limited by other treatment targets/requirements in your ability to control precursors in coagulation/flocculation? Yes No

If NO, proceed to item K. If YES, explain below and consult EPA's *Simultaneous Compliance Guidance Manual* for alternative compliance approaches.

K. Conclusion

Did treatment factors and/or variations in the plant performance contribute to the OEL exceedance(s)? Yes No
 Possibly

If YES or POSSIBLY, explain below.

Sample Letter for reporting results for compliance with TTHM/HAA5 MCLs and OELs

Date

SUBJECT: CITY/COUNTY NAME
Waterworks: Waterworks Name
PWSID: #####

Administrative Contact
Waterworks Name
Address
City, State, Zip

Dear *Administrative Contact*:

We have received the results of total trihalomethane (TTHM) and haloacetic acid (HAA5) analyses that were performed on water samples recently collected from the subject waterworks. Enclosed are the compliance summary sheet for the previous four quarters. (*Report generated in R&R*) and your next chemical sampling due dates (*also an R&R report*).

The TTHM maximum contaminant level is 0.080 mg/l and the HAA5 maximum contaminant level is 0.060 mg/l. Compliance with the TTHM and HAA5 maximum contaminant levels is based on the four quarter locational running annual average(s) (LRAA). The operational evaluation level (OEL) is also calculated on a quarterly basis and compared to the maximum contaminant levels as an early warning sign.

(Option 1, MCLs and OELs not exceeded)

Based on the results, the waterworks is in compliance with the TTHM and HAA5 maximum contaminant levels. In addition the waterworks has not exceeded a TTHM or HAA5 operational evaluation level.

(Option 2, MCLs not exceeded, OEL(s) exceeded)

Based on the results, the waterworks is in compliance with the TTHM and HAA5 maximum contaminant levels. However, the operational evaluation level for TTHM and/or HAA5 exceeds 0.080 mg/L and/or 0.060 mg/L.

The Stage 2 D/DBP Rule now requires that you conduct an operational evaluation and submit a **written report to this office for approval within 90 days**. The operational evaluation must include an examination of system treatment and distribution operational practices that may contribute to TTHM and HAA5 formation including: storage tank operations, excess storage capacity, distribution system flushing, sources of supply and source water quality, and treatment process and finished water quality. Operational evaluation forms are enclosed for your use. (*Another option is to email the forms*). Requests to limit the scope of the report must be approved in writing by this office prior to submission.

(Option 3, MCL(s) exceeded, OEL(s) exceeded)

Based on the results, the waterworks has exceeded the TTHM and HAA5 (*modify as necessary if only one MCL is exceeded*) maximum contaminant levels. A Notice of Violation will be sent under separate cover. In addition, the operational evaluation level for TTHM and/or HAA5 exceeds 0.080 mg/L and/or 0.060 mg/L.

The Stage 2 D/DBP Rule now requires that you conduct an operational evaluation and submit a **written report to this office for approval within 90 days**. The operational evaluation must include an examination of system treatment and distribution operational practices that may contribute to TTHM and HAA5 formation including: storage tank operations, excess storage capacity, distribution system flushing, sources of supply and source water quality, and treatment process and finished water quality (*Consecutive waterworks may limit the scope to those facilities that they have*). Operational evaluation forms are enclosed for your use. (*Another option is to email the forms*). Requests to limit the scope of the report must be approved in writing by this office prior to submission.

(Modify text as necessary if eligible for reduced / increased monitoring. Provide a complete, revised Sampling Plan as an attachment. Example:

“ Based on the results you qualify for (reduced)(increased) monitoring. Please refer to the attached Sampling Plan, sign and return the revision to this office. If you have any objections to this revised Sampling Plan, please contact this office immediately.”)

If you have any questions or require assistance, please do not hesitate to contact this office.

Sincerely,

Title

(Attachment)

cc: _____ County Health Department-ATTN: Dr. _____
VDH, ODW - Central Office {if the plan is being amended.}

Sample Letter for Reporting TOC Results

Date

SUBJECT: CITY/COUNTY NAME
Waterworks: Waterworks Name
PWSID: #####

Waterworks Owner
Address
City, State, Zip

Dear *Waterworks Owner*:

We have evaluated the results of the Total Organic Carbon (TOC) and alkalinity analyses performed on water sample Nos. _____ and _____ collected during the quarter ending _____ by _____.

Compliance with the disinfection byproduct precursors (DBPP) treatment technique is determined quarterly and is verified by the running annual average of the TOC Removal Ratio is equal to or greater than 1. The average TOC Removal Ratio for the subject waterworks for the past four quarters is _____. Therefore, this waterworks is in compliance with the treatment technique for control of disinfection byproduct precursors.

Compliance with the disinfection byproduct precursors (DBPP) treatment technique is verified by the four quarter running annual average of the TOC Removal Ratio when the ratio is equal to or greater than 1 or when any one of the following six alternative compliance criteria is met.

- Source water TOC < 2.0 mg/L calculated quarterly as a running annual average
- Treated water TOC < 2.0 mg/L calculated quarterly as a running annual average
- Raw water SUVA < or = 2.0 L/mg-m calculated quarterly as a running annual average
- Treated water SUVA < or = 2.0 L/mg-m calculated quarterly as a running annual average
- Raw water TOC < 4.0 mg/L; Raw water alkalinity > 60 mg/L (as CaCO₃); TTHM < 40 µg/L; HAA5 < 30 µg/L each calculated quarterly as a running annual average
- TTHM < 40 µg/L and HAA5 < 30 µg/L each calculated quarterly as a running annual average (this applies to plants that use only chlorine for disinfection)

The average TOC Removal Ratio for the subject waterworks for the past four quarters is _____. However, [the average source water TOC for the past four quarters is _____ mg/L.] [the average treated water TOC for the past four quarters is _____ mg/L.] [the average raw water SUVA for the past four quarters is _____ L/mg-m.] [the average raw water TOC for the past four quarters is _____ mg/L, the average raw water alkalinity for the past four quarters is _____ mg/L, the average distribution system trihalomethanes (TTHM) concentration at this waterworks over the past four quarters is _____ mg/L, and the average haloacetic acid (HAA5) concentration over the past four quarters is _____ mg/L.] [the average trihalomethanes (TTHM) concentration at this waterworks over the past four quarters is _____ mg/L, and the average haloacetic acid (HAA5) concentration at this waterworks over the past four quarters is _____ mg/L.] Therefore, this waterworks is in compliance with the treatment technique for control of disinfection byproduct precursors.

If you have any questions concerning this letter, please do not hesitate to contact this office.

Sincerely,

Title

___/

cc: _____ County Health Department-ATTN: Dr. _____

**COVER LETTER REQUESTING ADDITIONAL SITE(S)
{for systems that did not perform an IDSE}**

Date

SUBJECT: CITY/COUNTY NAME
Waterworks: Waterworks Name
PWSID: #####

Waterworks Owner
Address
City, State, Zip

Dear Waterworks Owner:

The Stage 2 Disinfectants and Disinfection Byproducts rule requires that you submit a revised Monitoring Plan for *{Waterworks Name}* Waterworks. Our records indicate that your current Stage 1 monitoring plan has __ site(s) and your Stage 2 plan will need to have __ sites. This means __ new sites will need to be identified. As a Schedule *{1, 2, 3, 4, 4 with cryptosporidium monitoring}* system, you must start sampling under this new plan beginning *{select one: April 2012, October 2012, October 2013, October 2013, October 2014}*.

We are proposing to draft a plan for your use. To help us, please provide __ sampling site(s) that meets the following description: *{Additional sites should be chosen using an IDSE style approach. Refer to WM 895 for details. Customize for each waterworks as needed.}*

- *{Describe the justification and then the general location where the owner needs to provide an address}*
- *{E.g. High TTHM site – site north of Main Street.}*

Please respond no later than *{select one: October 1, 2011, April 1, 2012, April 1, 2013, April 1, 2013, April 1, 2014}* so we can prepare your draft plan before the initial sampling date.

If you prefer to draft your own plan, please note the need for additional sites. Please use locations as described above or provide justification if different locations are being used.

If you have any questions, please call me at xxx-xxxx.

Sincerely,

District Engineer

STAGE 2 REVISED MONITORING PLAN - REVIEW SHEET

City/County _____
 Waterworks _____

PWSID# _____
 Reviewed By: _____

I. GENERAL INFORMATION	COMMENTS
Population Served? _____ Source Water <input type="checkbox"/> GW <input type="checkbox"/> SW	<input type="checkbox"/> Reduced: # site = ____ Frequency = ____ <input type="checkbox"/> Routine: # site = ____ Frequency = ____ <input type="checkbox"/> Increased: # site = ____ Frequency = ____
Revision Due to:	

II. NON-TTHM/HAA5 CONTENT	COMMENTS
Disinfectant residuals-same as before? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	
Precursors (TOC) -same as before? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	
Bromate/chlorite-same as before? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	
If no, justified? (explain) <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> n/a	

III. TTHM/HAA5 CONTENT	COMMENTS
Any changes since last plan approved	
Monitoring Dates & Locations Listed	
Compliance Calculations Referenced	
Peak Month? _____ Included in plan? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Frequency adequate & equally spaced?	
Location and Justification (alternating highest remaining TTHM – HAA5) <input type="checkbox"/> Yes <input type="checkbox"/> No Site 1- Site 2- Site 3- Site 4-	
Non-highest sites included? <input type="checkbox"/> Yes <input type="checkbox"/> No Justified? <input type="checkbox"/> Yes <input type="checkbox"/> No	

General comments & discussion:

DETERMINATION:

Monitoring Plan IS IS NOT acceptable. Date Review Completed: _____

STAGE 2 MONITORING PLAN APPROVAL LETTER

INSTRUCTIONS: Complete / select items shown with *italics*, and convert to regular font. Print on VDH letterhead. Pages are 1" top, bottom, and side margins.

Date

SUBJECT: CITY/COUNTY NAME
Waterworks: Waterworks Name
PWSID: #####

Waterworks Owner
Address
City, State, Zip

Dear Waterworks Owner:

We have reviewed the proposed Stage 2 Disinfectants and Disinfection Byproducts monitoring plan for the subject waterworks dated (*date*). This letter is to advise that the plan meets the requirements of the *Waterworks Regulations* and is therefore approved. A copy of the plan stamped "approved" is enclosed.

Your waterworks is now under (*routine/increased/reduced*) monitoring for disinfection byproducts. Your next (*triennial/annual/quarterly*) samples for disinfection byproducts are due to be collected in (*month, year*).

If you have any questions, please contact (*name*), District Engineer, at (*phone #*) or (*email*).

Sincerely,

Engineering Field Director
Field Office Name

ABC:xyz

Enclosure

pc: Local Health Department
VDH, ODW- Central Office

This file contains a generic D/DBP Monitoring Plan template for Surface Water and GUDI Systems. The template contains sections for all Stage 1 D/DBP and Stage 2 D/DBP items. Delete those items that are not applicable, or if they are documented somewhere else. (Instructional text shown in blue italic shall be deleted from final document!)

DISINFECTANTS / DISINFECTION BYPRODUCTS MONITORING PLAN

Waterworks Name: _____
PWSID #: _____
Source Type: _____
Population Served: _____

DISINFECTANT RESIDUALS *{exclude if already included with BSSR/TSWMP}*

1. The disinfectant residual will be measured at the same time and from the same location as each routine bacteriological sample, as identified in the current Bacteriological Sample Siting Report.
2. *{For waterworks using chlorine dioxide}* The chlorine dioxide residual will be routinely monitored once per day at the entry point(s) into the distribution system. If a routine result exceeds the MRDL (0.8 mg/l), special sampling and reporting will be done in accordance with the *Waterworks Regulations*.
3. Compliance will be calculated in accordance with the *Waterworks Regulations*.
4. The disinfectant residual will be reported to the *{insert field office}* Field Office by the 10th of the month following the month during which samples were taken. The disinfection residual results will be reported by the laboratory along with the bacteriological results or on the Monthly Operating Report.
5. *{Optional}* For quality control, the (free) chlorine / chlorine dioxide *{pick one}* residual will be monitored in the distribution system at a frequency of *{insert #}* days per week. The (free) chlorine / chlorine dioxide *{pick one}* residual results will be reported in the Monthly Operation Report.

CONTROL OF DISINFECTION BY-PRODUCTS PRECURSORS

1. For routine monitoring, TOC and alkalinity (source water only) parameters will be monitored from the following locations on a monthly *{or greater frequency if the owner chooses}* basis. *{one entry for each source}*

{SWTP with combined filter monitoring location:}

	Code No.	Source/Treatment Plant	Sample Tap Location
Source Water	RW001		
Treated Water	UP001		

{SWTP with individual filter sample locations:}

	Code No.	Source/Treatment Plant	Sample Tap Location
Source Water	RW001		
Treated Water	UP001	Filter No. 1	
Treated Water	UP002	Filter No. 2	

2. For reduced monitoring, parameters will be monitored on a quarterly basis.
3. Paired samples will be taken at a time representative of normal operating conditions and influent (raw) water quality.
4. Compliance will be calculated in accordance with the *Waterworks Regulations*.
5. The sample results will be reported to the *{insert field office}* Field Office by the 10th of the month following the month during which samples were taken.

DISINFECTION BYPRODUCTS- TTHM and HAA5

1. **Use Template #1 for GW < 500.**
Use Template #2 for GW 500-9,999.
Use Template #3 for GW 10,000-99,999.
Insert Template #4 for SW < 500.
Insert Template #5 for SW 500-3,300.
Insert Template #6 for SW 3,300+.
2. Compliance calculations for the Location Running Annual Average and the Operational Evaluation will be made in accordance with the *Waterworks Regulations*.
3. The location, date, and result of each sample taken will be reported to the *{field office}* Field Office by the 10th of the month following the month that the samples were collected.
4. Analyses shall be made by a certified laboratory.
5. If a waterworks qualifies for reduced monitoring, this plan shall be amended to include the locations and time of such monitoring.

DISINFECTION BYPRODUCTS – BROMATE / CHLORITE *{pick one}*

{For each SWTP/GUDI that uses ozone}

1. For routine monitoring, bromate will be monitored at the Entry Point on a monthly basis. Bromate monitoring may be reduced to quarterly, if the Regulations criteria is met.
2. Analyses shall be made by a certified laboratory

{For waterworks using chlorine dioxide}

1. The chlorite residual will be routinely monitored once per day at the **entry point(s)** into the distribution system. If a routine result exceeds the MCL (1.0 mg/l), special sampling and reporting will be done in accordance with the *Waterworks Regulations*. There is no reduced monitoring allowed for entry point sampling.
2. The chlorite residual will be routinely monitored once per month at the three locations noted below in the **distribution system**. If a routine result exceeds the MCL (1.0 mg/l), special sampling and reporting will be done in accordance with the *Waterworks Regulations*. For reduced monitoring, the *Waterworks Regulations* will be followed.
3. Analyses shall be made by a certified laboratory

Site Closest to 1 st Customer	
Site Representing Average Residence Time	
Site Representing Maximum Residence Time	

{For either ozone or chlorine dioxide users, add:}

4. Compliance will be calculated in accordance with the *Waterworks Regulations*.
5. The sample results will be reported to the *{insert field office}* Field Office by the 10th of the month following the month during which samples were taken.

Signature:

Name: _____

Title: _____

Date: _____

TEMPLATE 1: GROUNDWATER SYSTEM, POPULATION < 500

1. For routine monitoring, annual disinfection byproduct samples will be taken at the location(s) listed below. The individual/dual *{pick one}* TTHM and HAA5 samples will be taken during normal operations in *{month(s) of highest DBP formation}*.

{Pick individual - if high TTHM and HAA5 sites are different}

Site ID	Site Location / Address	Comments
		Individual - TTHM only
		Individual - HAA5 only

{Pick dual – if high TTHM and HAA5 site are the same}

Site ID	Site Location / Address	Comments
		Dual TTHM and HAA5

TEMPLATE 2: GROUNDWATER SYSTEM, POPULATION = 500-9,999

1. For routine monitoring, annual disinfection byproduct samples will be taken at the locations listed below. The dual TTHM and HAA5 samples will be taken at the same time during normal operations in *{month of highest DBP formation}*.

Site ID	Site Location / Address	Comments

TEMPLATE 3: GROUNDWATER SYSTEM, POPULATION = 10,000-99,999

1. For routine monitoring, quarterly disinfection byproduct samples will be taken at the locations listed below. The dual TTHM and HAA5 samples will be taken at the same time during normal operations in {January, April, July and October} / {February, May, August and November} / {March, June, September and December} *{pick group with month of highest DBP formation}*.

Site ID	Site Location / Address	Comments

TEMPLATE 4: SURFACE WATER SYSTEM, POPULATION < 500

1. For routine monitoring, annual disinfection byproduct samples will be taken at the location(s) listed below. The individual/dual *{pick one}* TTHM and HAA5 samples will be taken at the same time during normal operations in *{month of highest DBP formation}*.

{Pick individual - if high TTHM and HAA5 sites are different}

Site ID	Site Location / Address	Comments
		Individual - TTHM only
		Individual - HAA5 only

{Pick dual – if high TTHM and HAA5 site are the same}

Site ID	Site Location / Address	Comments
		Dual TTHM and HAA5

There is no reduced sampling for surface water systems serving < 500 people.

TEMPLATE 5: SURFACE WATER SYSTEM, POPULATION = 500-3,300

1. For routine monitoring, quarterly disinfection byproduct samples will be taken at the location(s) listed below. The individual/dual *{pick one}* TTHM and HAA5 samples will be taken at the same time during normal operations in {January, April, July and October } {February, May, August and November} {March, June, September and December}. *{pick group with month of highest DBP formation}*.

{Pick individual - if high TTHM and HAA5 sites are different}

Site ID	Site Location / Address	Comments
		Individual - TTHM only
		Individual - HAA5 only

{Pick dual – if high TTHM and HAA5 site are the same}

Site ID	Site Location / Address	Comments
		Dual TTHM and HAA5

TEMPLATE 6: SURFACE WATER SYSTEM, POPULATION = 3,301 +

1. For routine monitoring, quarterly disinfection byproduct samples will be taken at the locations listed below. The dual TTHM and HAA5 samples will be taken at the same time during normal operations in {January, April, July and October} / {February, May, August and November} / {March, June, September and December} *{pick group with month of highest DBP formation}*.

Site ID	Site Location / Address	Comments

Add rows as needed

Consumer Notification of Lead Tap Monitoring Results

Template for Community Water Systems

Example Letter to Community Water System Customers That Were Monitored

Dear (Consumer's Name),

[Insert name of your water system] appreciates your participation in the lead and copper tap monitoring program. This letter is to report the lead and copper results from the sample collected at your residence, [insert address of customer] on [date]. The reported lead result for your residence is [redacted] parts per billion (ppb). The 90th percentile lead concentration for our waterworks is [redacted] ppb. The reported copper result for your residence is [redacted] mg/L. The 90th percentile copper concentration for our waterworks is [redacted] mg/L.

What Does This Mean?

Under the authority of the Safe Drinking Water Act, the Environmental Protection Agency (EPA) set the Action Level for lead in drinking water at 15 ppb. This means utilities must ensure that water from the customer's tap does not exceed this level in at least 90 percent of the homes sampled (90th percentile value). The Action Level is the concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

Because lead may pose serious health risks, the EPA also set a Maximum Contaminant Level Goal (MCLG) for lead of zero. The MCLG is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Some individual homes may have high lead concentrations while the 90th percentile value for the entire waterworks is below the Action Level. These individual site lead levels may be due to conditions unique to the individual home, such as the presence of lead solder or brass faucets, fittings and valves that may contain lead. Our waterworks strives to keep the corrosivity of our water as low as possible (corrosive water can cause lead to leach from plumbing materials that contain lead). Additionally, there are actions you can take to reduce your exposure. We strongly urge you to review the enclosed Fact Sheet and take the steps listed to reduce your exposure to lead in drinking water.

If you have any questions please contact [System Contact] at [System Phone Number].

Sincerely

(System Info Signature Block)

LEAD IN DRINKING WATER

Important Information on How to Protect Your Health

Lead is a common metal that has been in many consumer products but is now known to be harmful to human health if ingested or inhaled. It can be found in lead-based paint, air, soil, household dust, food, some types of pottery, and drinking water. Lead is rarely found in natural sources of water such as rivers, lakes, wells or springs.

What Are The Health Effects of Lead?

When people come in contact with lead, it may enter their bodies and accumulate over time, resulting in damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Lead in water can be a special problem for infants, whose diets may be mostly liquids, such as baby formulas or concentrated juices mixed with water. Smaller bodies can absorb lead more rapidly than bigger ones, so amounts of lead that won't hurt an adult can be very harmful to a child and scientists have linked the effects of lead on the brain with lowered IQ in children. During pregnancy, the child receives lead from the mother's bones, which may affect brain development. Adults who drink this water over many years could develop kidney problems or high blood pressure.

What Are The Sources of Lead?

The primary sources of lead exposure for most children are deteriorating lead-based paint, lead-contaminated dust, and lead-contaminated residential soil. Exposure to lead is a significant health concern, especially for young children and infants whose growing bodies tend to absorb more lead than the average adult. If you are concerned about lead exposure, parents should ask their health care providers about testing children for high levels of lead in the blood.

What Can I Do To Reduce Exposure to Lead in Drinking Water?

Lead may work its way into drinking water after the water entered the distribution system and is on its way to consumers taps. This usually happens through the corrosion of materials containing lead in household plumbing. These materials include brass faucets, lead solder on copper pipes, lead pipes, or lead service lines connecting the water main to the inside plumbing. Lead pipes are no longer installed for service lines or in household plumbing and lead solder has been outlawed in Virginia since 1985.

There are several steps you can take to reduce your exposure to lead in drinking water. These include:

- 1. Run your water to flush out lead.** If water hasn't been used for several hours, allow the water to run at the tap for 15-30 seconds or until it becomes cold or reaches a steady temperature before using it for drinking or cooking. This flushes lead-containing water from the pipes. The water you run from drinking water taps does not have to be wasted. You can use this water for cleaning purposes or for watering plants. You may want to keep a container of drinking water in your refrigerator, so you don't have to run water every time you need it.

2. **Use cold water for cooking and preparing baby formula.** Do not cook with or drink water from the hot water tap as lead dissolves more easily into hot water. Do not use water from the hot water tap to make baby formula.
3. **Do not boil water to remove lead.** Boiling water will not reduce lead.
4. **Look for alternative sources or treatment of water.** You may want to consider purchasing bottled water or a water filter. Read the package to be sure the filter is approved to reduce lead or contact the National Sanitation Foundation at 800-NSF-8010 or www.nsf.org for information on performance standards for water filters. If you choose to install a lead removal filter, be sure to maintain and replace a filter device in accordance with the manufacturer's instructions to protect water quality.
6. **Get your child tested.** Contact your local health department or healthcare provider to find out how you can get your child tested for lead if you are concerned about exposure.
7. **Identify if your plumbing fixtures contain lead.** New brass faucets, fittings, and valves, including those advertised as "lead-free," may contribute lead to drinking water. The law currently allows end-use brass fixtures, such as faucets, with up to 8% lead to be labeled as "lead free." Visit the National Sanitation Foundation Web site at www.nsf.org to learn more about lead-containing plumbing fixtures.

For More Information

Call us at [\[insert your water system's phone number\]](#). For more information on reducing lead exposure around your home and the health effects of lead, visit EPA's web site at www.epa.gov/lead, call the National Lead Information Center at 800-424-LEAD, or contact your health care provider.

Consumer Notification Completion Report – Community Waterworks

Lead and Copper Results Delivery Certification

PWS Name: _____ PWSID: _____
Population: _____

DELIVERY METHOD – Community Waterworks

Waterworks serving a population greater than 3,300 people:

The occupants of each lead and copper sampling location were notified by U.S. Mail on _____ (date).

Waterworks serving a population of 3,300 or fewer people (choose either delivery method):

The occupants of each lead sampling location were notified by U.S. Mail on _____ (date).

The occupants of each lead sampling location were notified by hand/direct delivery on _____ (date).

I certify that each residence from where lead and copper tap water samples were collected has been informed of their lead and copper monitoring results along with the following information: MCLGs, ALs and their definitions, a fact sheet on the health effects of lead which includes steps to reduce exposure to lead in drinking water, and contact information for the water utility. I further certify that notification was completed within 30 days after our system learned of the results from the Office of Drinking Water, and that if the residence is a rental property, both the occupant(s) and rental property owner were notified.

Signature: _____ Print Name: _____

Job Title: _____ Phone: _____ Date: _____

___ **Complete this form.**

___ **Attach a copy of the residence notification to this form.**

___ **Within three months from the end of the monitoring period, mail this form to:**

District Engineer
VDH - Office of Drinking Water
_____ Field Office

_____ VA _____

Consumer Notification of Lead Tap Monitoring Results

Template for NTNC Water Systems

Example Notice to NTNC Water System Customers

Dear (Consumer's Name),

As you may know, **[Insert name of your facility]** is also a public water system because we are responsible for providing you with water at this location and ensuring that the drinking water we provide to you meets state and federal standards. We recently collected a drinking water samples for lead and copper. The results of this testing are as follows:

Sample Location	Sample Date	Copper Concentration mg/L	Lead Concentration ppb

The 90th percentile lead concentration for our waterworks is **[redacted]** ppb. The 90th percentile copper concentration for our waterworks is **[redacted]** mg/L.

What Does This Mean?

Under the authority of the Safe Drinking Water Act, the Environmental Protection Agency (EPA) set the Action Level for lead in drinking water at 15 ppb. This means utilities must ensure that water from the customer's tap does not exceed this level in at least 90 percent of the homes sampled (90th percentile value). The Action Level is the concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

Because lead may pose serious health risks, the EPA also set a Maximum Contaminant Level Goal (MCLG) for lead of zero. The MCLG is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

What Are The Health Effects of Lead?

When people come in contact with lead, it may enter their bodies and accumulate over time, resulting in damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Lead in water can be a special problem for infants, whose diets may be mostly liquids, such as baby formulas or concentrated juices mixed with water. Smaller bodies can absorb lead more rapidly than bigger ones, so amounts of lead that won't hurt an adult can be very harmful to a child and scientists have linked the effects of lead on the brain with lowered IQ in children. During pregnancy, the child receives lead from the mother's bones, which may affect brain development. Adults who drink this water over many years could develop kidney problems or high blood pressure.

What Are The Sources of Lead?

The primary sources of lead exposure for most children are deteriorating lead-based paint, lead-contaminated dust, and lead-contaminated residential soil. Exposure to lead is a significant health

concern, especially for young children and infants whose growing bodies tend to absorb more lead than the average adult. If you are concerned about lead exposure, parents should ask their health care providers about testing children for high levels of lead in the blood.

What Can I Do To Reduce Exposure to Lead in Drinking Water?

Lead may work its way into drinking water after the water entered the distribution system and is on its way to consumers taps. This usually happens through the corrosion of materials containing lead in household plumbing. These materials include brass faucets, lead solder on copper pipes, lead pipes, or lead service lines connecting the water main to the inside plumbing. Lead pipes are no longer installed for service lines or in household plumbing and lead solder has been outlawed in Virginia since 1985.

There are several steps you can take to reduce your exposure to lead in drinking water. These include:

- 1. Run your water to flush out lead.** If water hasn't been used for several hours, allow the water to run at the tap for 15-30 seconds or until it becomes cold or reaches a steady temperature before using it for drinking or cooking. This flushes lead-containing water from the pipes.
- 2. Use cold water for cooking and preparing baby formula.** Do not cook with or drink water from the hot water tap as lead dissolves more easily into hot water. Do not use water from the hot water tap to make baby formula.
- 3. Do not boil water to remove lead.** Boiling water will not reduce lead.
- 4. Look for alternative sources or treatment of water.** You may want to consider purchasing bottled water or a water filter. Read the package to be sure the filter is approved to reduce lead or contact the National Sanitation Foundation at 800-NSF-8010 or www.nsf.org for information on performance standards for water filters. If you choose to install a lead removal filter, be sure to maintain and replace a filter device in accordance with the manufacturer's instructions to protect water quality.
- 6. Get your child tested.** Contact your local health department or healthcare provider to find out how you can get your child tested for lead if you are concerned about exposure.
- 7. Identify if your plumbing fixtures contain lead.** New brass faucets, fittings, and valves, including those advertised as "lead-free," may contribute lead to drinking water. The law currently allows end-use brass fixtures, such as faucets, with up to 8% lead to be labeled as "lead free." Visit the National Sanitation Foundation Web site at www.nsf.org to learn more about lead-containing plumbing fixtures.

For More Information

Call us at [\[insert your water system's phone number\]](#). For more information on reducing lead exposure around your home and the health effects of lead, visit EPA's web site at www.epa.gov/lead, call the National Lead Information Center at 800-424-LEAD, or contact your health care provider.

Consumer Notification Completion Report – NTNC Waterworks

Lead and Copper Results Delivery Certification

PWS Name: _____ PWSID: _____
Population: _____

DELIVERY METHOD – Non Transient Non Community Waterworks

Either of the following is acceptable consumer notification:

- The lead and copper results were posted on _____ (date) within the facility in which the samples were collected.
- All persons served within the facility in which the samples were collected were notified on _____ (date). Notification was made by: _____.

I certify that persons served at the location from where lead and copper tap water samples were collected have been informed of the lead and copper monitoring results along with the following information: MCLGs, ALs and their definitions, a fact sheet on the health effects of lead which includes steps to reduce exposure to lead in drinking water, and contact information for the water utility. I further certify that notification was completed within 30 days after our system learned of the results from the Office of Drinking Water.

Signature: _____ Print Name: _____
Job Title: _____ Phone: _____ Date: _____

- ___ **Complete this form.**
- ___ **Attach a copy of the residence notification to this form.**
- ___ **Within three months from the end of the monitoring period, mail this form to:**

District Engineer
VDH - Office of Drinking Water
_____ Field Office

_____ VA _____

Example Letter 1 – Lead and Copper 90th Percentile Concentrations Below Action Levels

SUBJECT: County/City
Water – Waterworks Name

Date

Waterworks Owner

Address 1

Address 2

City, State, Zip

Dear Waterworks Owner:

We are in receipt of the lead and copper "first draw" tap sample results for the subject public waterworks located in Insert County County. These results were submitted in accordance with Lead and Copper Rule monitoring requirements of the Virginia *Waterworks Regulations* for the Insert LCR Monitoring Period such as June through September 2008 monitoring period. A total of Insert number samples sample results was received.

With these results, your waterworks has now completed the describe the specific monitoring period – initial, reduced, etc. as defined in the Regulations. The results of this most recent monitoring are summarized in the table below.

Insert name of waterworks Waterworks: Lead & Copper Results

Monitoring Period	Lead 90 th Percentile (Action Level: 0.015 mg/L)	Copper 90 th Percentile (Action Level: 1.3 mg/L)
<u>Insert LCR monitoring period</u>	<u>Insert lead 90th percentile</u> - Passed	<u>Insert copper 90th percentile</u> - Passed

Since the above summarized results indicate lead and copper concentrations below the established Action Levels, your waterworks describe next LCR monitoring such as “now proceeds to the second round of initial monitoring”, “can remain in reduced monitoring” etc. Your next required monitoring will be to collect insert number of required samples samples during the describe the next required monitoring period monitoring period. Please note that all lead and copper "first draw" tap samples must be collected from the same sampling locations that were used during previous monitoring periods and are approved site locations. If you find it necessary to change any tap sample location, the new location should be of the same tier and category as the initial location and written justification must be submitted to this office.

Recent revisions to EPA’s Lead and Copper rule (Federal Register 40 CFR 141.85) indicate that you are now required to notify the occupants of each participating residence of the lead and copper results for that location. In addition, you must provide an explanation of the health effects of lead, list steps consumers can take to reduce exposure to lead in drinking water, and water

utility contact information. The notification must also provide the maximum contaminant level goal, the action level for lead, and the definitions for these two terms.

Notification to the participating residences must be made by direct mail or hand delivery as soon as practical but no later than 30 days from the date of this letter. This notification must be made to the customers at the sample taps including customers who do not receive water bills. To assist you in meeting this new notification requirement, enclosed is a sample results notification letter and a fact sheet that meets the EPA mandatory requirements.

After notification has been completed, you must complete the enclosed "Lead and Copper Results Delivery Certification" form and return it to us along with a sample of the residence notification. The Certification form and sample copy of the residence notification must be submitted to us within 3 months from the end of the monitoring period or no later than insert the date that is three months from the end of the monitoring period.

This office remains available to provide assistance to you in complying with the above listed requirements of the Lead and Copper Rule. Should you have any questions, please do not hesitate to contact this office.

Sincerely,

District Engineer

Cc: Local Health Department, attn: Health Director
ODW-(Central) (Field Office)

Example Letter 1 – Lead and Copper 90th Percentile Concentrations Below Action Levels

SUBJECT: County/City
Water – Waterworks Name

Date

Waterworks Owner

Address 1

Address 2

City, State, Zip

Dear Waterworks Owner:

We are in receipt of the lead and copper "first draw" tap sample results for the subject public waterworks located in Insert County County. These results were submitted in accordance with Lead and Copper Rule monitoring requirements of the Virginia Waterworks Regulations for the Insert LCR Monitoring Period such as June through September 2008 monitoring period. A total of Insert number samples sample results was received.

With these results, your waterworks has now completed the describe the specific monitoring period – initial, reduced, etc. as defined in the Regulations. The results of this most recent monitoring are summarized in the table below.

Insert name of waterworks Waterworks: Lead & Copper Results

Monitoring Period	Lead 90 th Percentile (Action Level: 0.015 mg/L)	Copper 90 th Percentile (Action Level: 1.3 mg/L)
<u>Insert LCR monitoring period</u>	<u>Insert lead 90th percentile</u> - Passed	<u>Insert copper 90th percentile</u> - Passed

Since the above summarized results indicate lead and copper concentrations below the established Action Levels, your waterworks describe next LCR monitoring such as "now proceeds to the second round of initial monitoring", "can remain in reduced monitoring" etc. Your next required monitoring will be to collect insert number of required samples samples during the describe the next required monitoring period monitoring period. Please note that all lead and copper "first draw" tap samples must be collected from the same sampling locations that were used during previous monitoring periods and are approved site locations. If you find it necessary to change any tap sample location, the new location should be of the same tier and category as the initial location and written justification must be submitted to this office.

~~Recent revisions to EPA's Lead and Copper rule (Federal Register 40-CFR-141.85) indicate that y~~You are ~~now~~ required to notify the occupants of each building that was sampled of the lead and copper results for that building. In addition, you must provide an explanation of the health effects of lead, list steps consumers can take to reduce exposure to lead in drinking water, and water utility contact information. The notification must also provide the maximum contaminant level goal, the action level for lead, and the definitions for these two terms.

Notification to the consumers must be made by direct mail, hand delivery, or posting in public areas as soon as practical but no later than 30 days from the date of this letter. To assist you in meeting this ~~new notification~~ requirement, enclosed is a sample results notification letter and a fact sheet that meets the EPA mandatory requirements.

After notification has been completed, you must complete the enclosed "Lead and Copper Results Delivery Certification" form and return it to us along with a sample of the consumer notification. The Certification form and sample copy of the consumer notification must be submitted to us within 3 months from the end of the monitoring period or no later than insert the date that is three months from the end of the monitoring period.

This office remains available to provide assistance to you in complying with the above listed requirements of the Lead and Copper Rule. Should you have any questions, please do not hesitate to contact this office.

Sincerely,

District Engineer

Cc: Local Health Department, attn: Health Director
ODW-(Central) (Field Office)

Attachment A

**Consumer Notice of Tap Water Results
Non Transient Non Community Water Systems**

Dear (Consumer's Name),

As you may know, _____ *{Insert name of your facility}* is also a public water system because we are responsible for providing you with water at this location and ensuring that the drinking water we provide to you meets state and federal standards. We recently collected drinking water samples for lead and copper. The results of this testing are as follows:

Sample Location	Sample Date	Copper Concentration mg/L	Lead Concentration ppb

The 90th percentile lead concentration for our waterworks is _____ ppb. The 90th percentile copper concentration for our waterworks is _____ mg/L.

What Does This Mean?

Under the authority of the Safe Drinking Water Act, the Environmental Protection Agency (EPA) set the Action Level for lead in drinking water at 15 ppb. This means utilities must ensure that water from the customer's tap does not exceed this level in at least 90 percent of the homes sampled (90th percentile value). The Action Level is the concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

Because lead may pose serious health risks, the EPA also set a Maximum Contaminant Level Goal (MCLG) for lead of zero. The MCLG is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

What Are The Health Effects of Lead?

When people come in contact with lead, it may enter their bodies and accumulate over time, resulting in damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Lead in water can be a special problem for infants, whose diets may be mostly liquids, such as baby formulas or concentrated juices mixed with water. Smaller bodies can absorb lead more rapidly than bigger ones, so amounts of lead that won't hurt an adult can be very harmful to a child and scientists have linked the effects of lead on the brain with lowered IQ in children. During pregnancy, the child receives lead from the mother's bones, which may affect brain development. Adults who drink this water over many years could develop kidney problems or high blood pressure.

What Are The Sources of Lead?

The primary sources of lead exposure for most children are deteriorating lead-based paint, lead-contaminated dust, and lead-contaminated residential soil. Exposure to lead is a significant health concern, especially for young children and infants whose growing bodies tend to absorb more lead than the average adult. If you are concerned about lead exposure, parents should ask their health care providers about testing children for high levels of lead in the blood.

What Can I Do To Reduce Exposure to Lead in Drinking Water?

Lead may work its way into drinking water after the water entered the distribution system and is on its way to consumers taps. This usually happens through the corrosion of materials containing lead in household plumbing. These materials include brass faucets, lead solder on copper pipes, lead pipes, or lead service lines connecting the water main to the inside plumbing. Lead pipes are no longer installed for service lines or in household plumbing and lead solder has been outlawed in Virginia since 1985.

There are several steps you can take to reduce your exposure to lead in drinking water. These include:

- 1. Run your water to flush out lead.** If water hasn't been used for several hours, allow the water to run at the tap for 15-30 seconds or until it becomes cold or reaches a steady temperature before using it for drinking or cooking. This flushes lead-containing water from the pipes.
- 2. Use cold water for cooking and preparing baby formula.** Do not cook with or drink water from the hot water tap as lead dissolves more easily into hot water. Do not use water from the hot water tap to make baby formula.
- 3. Do not boil water to remove lead.** Boiling water will not reduce lead.
- 4. Look for alternative sources or treatment of water.** You may want to consider purchasing bottled water or a water filter. Read the package to be sure the filter is approved to reduce lead or contact the National Sanitation Foundation at 800-NSF-8010 or www.nsf.org for information on performance standards for water filters. If you choose to install a lead removal filter, be sure to maintain and replace a filter device in accordance with the manufacturer's instructions to protect water quality.
- 5. Get your child tested.** Contact your local health department or healthcare provider to find out how you can get your child tested for lead if you are concerned about exposure.
- 6. Identify if your plumbing fixtures contain lead.** New brass faucets, fittings, and valves, including those advertised as "lead-free," may contribute lead to drinking water. The law currently allows end-use brass fixtures, such as faucets, with up to 8% lead to be labeled as "lead free." Visit the National Sanitation Foundation Web site at www.nsf.org to learn more about lead-containing plumbing fixtures.

For More Information

Call us at _____ *[insert your water system's phone number]*. For more information on reducing lead exposure around your home and the health effects of lead, visit EPA's web site at www.epa.gov/lead, call the National Lead Information Center at 800-424-LEAD, or contact your health care provider.

Lead and Copper Results Delivery Certification Nontransient Noncommunity Waterworks

PWS Name: _____ PWSID: _____
Population: _____

DELIVERY METHOD – Non Transient Non Community Waterworks

Either of the following is acceptable consumer notification:

- The lead and copper results were posted on _____ (date) within the facility in which the samples were collected.
- All persons served within the facility in which the samples were collected were notified on _____ (date).
Notification was made by _____.

I certify that persons served at the locations where lead and copper tap water samples were collected have been informed of the lead and copper monitoring results along with the following information: MCLGs, ALs and their definitions, a fact sheet on the health effects of lead which includes steps to reduce exposure to lead in drinking water, and contact information for the water utility. I further certify that notification was completed within 30 days after our system learned of the results from the Office of Drinking Water.

Signature: _____ Print Name: _____

Job Title: _____ Phone: _____ Date: _____

Within three months from the end of the monitoring period:

- Complete this form
- Attach a copy of the consumer notification to this form
- Mail to:

VDH - Office of Drinking Water
() Field Office
(Address)

Example Letter 2– Lead or Copper 90th Percentile Concentrations Above Action Levels

SUBJECT: County/City
Water – Waterworks Name

Date

Waterworks Owner

Address 1

Address 2

City, State, Zip

Dear Waterworks Owner:

We are in receipt of the lead and copper "first draw" tap sample results for the subject public waterworks located in Insert County County. These results were submitted in accordance with Lead and Copper Rule monitoring requirements of the Virginia *Waterworks Regulations* for the Insert LCR Monitoring Period such as June through September 2008 monitoring period. A total of Insert number samples sample results was received.

With these results, your waterworks has now completed the describe the specific monitoring period – initial, reduced, etc. as defined in the Regulations. The results of this most recent monitoring are summarized in the table below.

Insert name of waterworks Waterworks: Lead & Copper Results

Monitoring Period	Lead 90 th Percentile (Action Level: 0.015 mg/L)	Copper 90 th Percentile (Action Level: 1.3 mg/L)
<u>Insert LCR monitoring period</u>	<u>Insert lead 90th percentile</u> - Failed	<u>Insert copper 90th percentile</u> - Failed

Since the above summarized results indicate lead and/or copper concentrations above the established Action Levels, your waterworks must initiate the following actions:

1. Recent revisions to EPA's Lead and Copper rule (Federal Register 40 CFR 141.85) indicate that you are now required to notify the occupants of each participating residence of the lead and copper results for that location. In addition, you must provide an explanation of the health effects of lead, list steps consumers can take to reduce exposure to lead in drinking water, and water utility contact information. The notification must also provide the maximum contaminant level goal, the action level for lead, and the definitions for these two terms.

Notification to the participating residences must be made by direct mail or hand delivery as soon as practical but no later than 30 days from the date of this letter. This notification must be made to the customers at the sample taps including customers who do not receive water bills. To assist you in meeting this new notification requirement, enclosed is a sample results notification letter and a fact sheet that meets the EPA mandatory requirements.

After notification has been completed, you must complete the enclosed “Lead and Copper Results Delivery Certification” form and return it to us along with a sample of the residence notification. The Certification form and sample copy of the residence notification must be submitted to us within 3 months from the end of the monitoring period or no later than insert the date that is three months from the end of the monitoring period.

2. You are required to collect samples for Water Quality Parameter (WQP) analyses when an Action Level is exceeded. These samples must be collected from representative locations within your distribution system and from each entry point into your distribution system. The following WQP monitoring is required for your waterworks:

- Required Parameters: pH, Alkalinity, Calcium, Conductivity, Temperature, and Orthophosphate (if used as a corrosion inhibitor)
- Distribution System - Two (2) sets of samples from one location (utilize the bacteriological sampling locations)
- Each Entry Point - Two (2) sets of samples

WQP monitoring must be completed within six months from the beginning of the current lead and copper monitoring period or no later than insert date – six months from the beginning of the current monitoring period and all tests must be performed utilizing approved methods. *Personnel from this office will assist you in the in the collection of these samples.*

3. You are required to collect samples for source water lead and or copper analysis when an Action Level is exceeded. These samples must be collected from each entry point serving your waterworks. Lead and or copper source water monitoring must be completed within six months from the end of the current lead and copper monitoring period or no later than insert date – six months from the end of the current monitoring period and all tests must be performed utilizing approved methods. *Personnel from this office will assist you in the in the collection of these samples.*

4. Include if the lead Action Level is exceeded You are required to complete the Lead and Copper Rule mandated public education treatment technique when the lead Action Level is exceeded. Initial aspects of public education must be completed no later than 60 days from the end of the current monitoring period or by insert date – 60 days from the end of the current monitoring period. The Lead and Copper Rule requires that specific language be included in the public education program and mandates various types of distribution including distribution of written materials, issuance of a press release, and other requirements. In addition, portions of the required public education must be repeated no less than once per 12 months and repeated notification must be completed in regular water bills or as a separate mailing no less than once per quarter. We have enclosed a package which will assist you with this required treatment technique.

After distribution of the public education materials has been completed, you must complete the enclosed “Public Education Delivery Certification” form and return it to us along with a sample of the residence notification. The Certification form and a copy of the distributed materials must be submitted to this office within 10 days after notification has been completed.

5. You are required to install and operate optimum corrosion control treatment when the lead and/or copper Action Level has been exceeded.

Case 1 – Within six months from the end of the current monitoring period or no later than [insert date – six months from the end of the current monitoring period] you must submit a written corrosion control treatment recommendation to this office.

Case 2 – In order to assist you with the installation of corrosion control treatment personnel from this office will complete a Corrosion Control Treatment Desktop Evaluation. This evaluation will utilize water quality parameters from your waterworks and recommend a corrosion control treatment strategy for your specific situation.

Corrosion control treatment must be installed as soon as possible. {note that we should encourage a waterworks that has exceeded an Action Level to install treatment as soon as possible. The regulatory requirement is for treatment to be installed no later than two years from the date the commissioner designates the optimal corrosion control treatment}.

6. Because an Action Level was exceeded, you are no longer eligible for reduced monitoring. You should initiate corrosion control treatment and continue to conduct lead and copper tap sampling on a six month frequency. Your next required monitoring will be to collect **insert number of required samples) samples during the describe the next required monitoring period** monitoring period. Please note that all lead and copper "first draw" tap samples must be collected from the same sampling locations that were used during previous monitoring periods and are approved site locations. If you find it necessary to change any tap sample location, the new location should be of the same tier and category as the initial location and written justification must be submitted to this office.

This office remains available to provide assistance to you in complying with the above listed requirements of the Lead and Copper Rule. Should you have any questions, please do not hesitate to contact insert name of Field Office contact person at insert contact telephone number.

Sincerely,

District Engineer

Cc: Local Health Department, attn: Health Director
ODW-(Central) (Field Office)

Note that this lead or copper AL exceedance example letter does not contain any reference to lead service line replacement. There has never been a situation in Virginia where the lead service line replacement treatment technique has been required. If you should have a waterworks exceed the lead Action Level that has lead service lines you would need to include the LSL replacement requirement into the letter.

**Example Letter 4– District Medical Director Notification Regarding Public Education
Version 2**

Subject: (insert county) County
Subject: (insert waterworks name)

Date

District Medical Director

Address 1

Address 2

City, State, Zip

Dear Dr. Medical Director:

Under the Lead and Copper Rule, the Virginia Department of Health Office of Drinking Water is responsible for adopting and enforcing EPA drinking water regulations.

Under the authority of the Safe Drinking Water Act, the EPA set the Action Level for lead in drinking water at 15 parts per billion. This means utilities must ensure that water from the customer’s tap does not exceed this level in at least 90 percent of the homes sampled (90th percentile value). Exceeding an Action Level is not a violation, but it does trigger treatment or other requirements which the waterworks must follow. One of the requirements when a waterworks exceeds the lead Action Level is Public Education.

The Public Education program alerts consumers to the potential public health impacts of elevated lead in drinking water and provides information on ways to reduce exposure. Owners of community waterworks that are triggered into Public Education to provide a copy of the Public Education materials to the local health department and to request assistance from the local health department in distributing the materials to organizations that serve “at-risk” populations (pregnant women and children). These include, but are not limited to, WIC programs, Head Start programs, and pediatricians. Additionally, the regulations require that the local health department be contacted directly by telephone or in person.

Monitoring results received from the *(insert name of waterworks)* waterworks, located in *(insert county)* County indicate a 90th percentile lead concentration of *(insert 90th percentile lead concentration)* ppb which exceeds the 15 ppb Action Level. The *(insert name of waterworks)* waterworks must begin steps to reduce the concentration of lead at consumer’s taps and initiate the above described Public Education program.

You can expect to be contacted by the *(insert name of waterworks)* waterworks within the next 60 days to request your assistance in providing notification to organizations that may serve “at risk” populations. I am attaching a fact sheet regarding this Public Education and the ODW recommendations for organization notification for your information.

If you have any questions please contact me at *insert contact phone number*.

Sincerely:

Insert District Engineer Name

Cc
Environmental Health Supervisor

Lead and Copper Rule – Short Term Revisions Public Education Fact Sheet

Why is this necessary?

The purpose of Public Education is to ensure that consumers at waterworks that have exceeded the established lead Action Level are made aware of the potential public health risks associated with elevated lead levels in drinking water. Waterworks owners are required to send a special mailing with an informational notice to all bill paying customers. The notice includes health risk information and suggests ways consumers can reduce their exposure to elevated lead in drinking water. In addition, the owner is required to contact the local health department and request assistance in identifying organizations that are likely to serve “at-risk” consumers (pregnant women and children). This additional outreach is an effort to make contact with consumers at the waterworks that do not receive a water bill.

What is the process?

The Office of Drinking Water (ODW) receives results of lead and copper monitoring from both the state laboratory and from private laboratories. ODW staff will review the monitoring results and determine if the lead Action Level has been exceeded. The waterworks owners are then notified via a letter of the monitoring results and any additional actions that are necessary. If the lead Action Level is exceeded the notification letter will indicate that Public Education must be initiated including contact with the local health department. The ODW will send a copy of this letter to the local health department.

The waterworks owners Public Education program will include sending a copy of the written notice to the local health department. In addition the owner must contact the local health department either in person or by telephone and request assistance in identifying organizations that may be regularly visited by pregnant women and children. These organizations may include WIC Programs, Head State Programs, Pediatricians, Obstetricians, and Gynecologists. If the local health department provides a list of these organizations, the waterworks owner is required to send the informational notice to the identified organizations.

What information will be provided?

The local health department will receive the informational notice and a cover letter from the waterworks owner. Examples of the Public Education informational notices and letters are posted on the ODW web site. These can be accessed at the following link:

<http://www.vdh.state.va.us/DrinkingWater/news.htm>

Who can I contact for more information?

Contact the respective ODW District Engineer for your Planning District for more information.

Organization Notification Recommendations

The extent of LHD lead Public Education notification to organizations can be determined on a case-by-case basis by the ODW District Engineer, the District Medical Director, and the District Environmental Health Supervisor. Below are recommended notifications for large and small waterworks that exceed the lead Action Level based upon monitoring at consumers taps.

Note that the LHD can provide the Public Education notification directly to the selected organizations or provide a list of the organizations to the waterworks owner. If the LHD provides a list, the waterworks owner is required to provide the Public Education notification to every organization included on the list.

Large Community Waterworks (serving a population greater than 3,300 persons)

The waterworks owner or the LHD should provide notification of the lead Action Level exceedance to the following organizations that may serve “at-risk” customers of the waterworks. Note that the organization itself may not be connected to the waterworks, but is likely to provide services to consumers/users of the waterworks.

- WIC Programs
- Head Start Programs
- Pediatricians
- Obstetricians / Gynecologists

Small Community Waterworks (serving a population less than or equal to 3,300 persons)

Notification by the waterworks owner or the LHD to organizations is probably not necessary. These waterworks are required to provide the Public Education notice to the various organizations that serve “at-risk” populations that are connected to the waterworks. Additionally, for the smaller waterworks, it is likely that every consumer/user will receive the Public Education notification as bill paying customers and be aware of the potential for elevated lead levels.

Note that the District Medical Director may decide that some organization notifications are necessary for waterworks serving less than or equal to 3,300 persons.

**Public Education Templates and Delivery
Requirements**

Community Waterworks Serving > 3,300 Population

Public Education – Community Waterworks Serving > 3,300 Population

Required Public Education Delivery for Large Community Waterworks (> 3,300 customers)	
Delivery Requirement	Timing of Delivery
Deliver public education written materials to all bill paying customers	<p>Within 60 days after the end of the lead and copper monitoring period in which the lead Action Level was exceeded</p> <p>Delivery must be repeated once every 12 months</p>
<p>Deliver public education written materials to the following organizations that are located <u>within your service area</u>, along with a cover letter encouraging distribution to all potentially affected customers or users:</p> <ol style="list-style-type: none"> 1. Public and private schools or school boards 2. Public and private pre schools 3. Women Infants and Children (WIC) and Head Start programs 4. Public and private hospitals and medical clinics 5. Obstetricians-Gynecologists and Midwives 6. Pediatricians 7. Family planning clinics 8. Local welfare agencies 9. Licensed childcare centers 	<p>Within 60 days after the end of the lead and copper monitoring period in which the lead Action Level was exceeded</p> <p>Delivery must be repeated once every 12 months</p>
<p>Deliver public education written materials to the City or County Local Health Department. Contact with the local health agency <u>must be either by telephone or in person</u>. The LHD may provide the waterworks with a list of additional organizations serving target populations. If the LHD provides such a list, deliver the public education materials to all organizations on the list <u>even if they are not located within the system's service area</u>.</p>	<p>Within 60 days after the end of the lead and copper monitoring period in which the lead Action Level was exceeded</p> <p>Delivery must be repeated once every 12 months</p>
Provide information on or in each water bill or in a separate mailing no less than quarterly.	Each billing cycle for as long as the system exceeds the lead action level – but no less than quarterly
Post material on the water system's Web site (for systems serving >100,000 individuals)	Within 60 days after the end of the lead and copper monitoring period in which the lead Action Level was exceeded. Posting must remain as long as the lead AL is exceeded.

<p>Submit press release to newspaper, television, and radio stations</p>	<p>Within 60 days after the end of the lead and copper monitoring period in which the lead Action Level was exceeded</p> <p>Delivery must be repeated <u>twice</u> every 12 months</p>
<p>Implement at least three of the additional Public Education activities from the following :</p> <ul style="list-style-type: none">• Public Service Announcements• Paid advertisements• Public Area Information Displays• E-mails to customers• Public Meetings• Household Deliveries• Targeted Individual customer Contact• Direct material distribution to all multi-family homes or institutions• Other approved methods	<p>Within 60 days after the end of the lead and copper monitoring period in which the lead Action Level was exceeded</p> <p>Delivery must be repeated once every 12 months</p>

Community Waterworks Public Education Written Material Template

Note that the PE written material must include all of the listed topic areas. The owner can insert his own language, subject to approval by the District Engineer, **except for the language in blue text**. This is mandatory language and must be included exactly as written

IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER

[Insert name of water system] found elevated levels of lead in drinking water in some homes/buildings. Lead can cause serious health problems, especially for pregnant women and children 6 years and younger. Please read this notice closely to see what you can do to reduce lead in your drinking water.

This notice is brought to you by **[insert the name of your water system]**. State Water System ID# **[insert your water system's ID number]** Date **[Insert the date distributed]**

Health Effects of Lead

Lead can cause serious health problems if too much enters your body from drinking water or other sources. It can cause damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Scientists have linked the effects of lead on the brain with lowered IQ in children. Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults. Lead is stored in the bones and it can be released later in life. During pregnancy, the child receives lead from the mother's bones, which may affect brain development.

Sources of Lead

Lead is a common metal found in the environment. Drinking water is one possible source of lead exposure. The main sources of lead exposure are lead-based paint and lead-contaminated dust or soil, and some plumbing materials. In addition, lead can be found in certain types of pottery, pewter, brass fixtures, food, and cosmetics. Other sources include exposure in the work place and exposure from certain hobbies (lead can be carried on clothing or shoes).

New brass faucets, fittings, and valves, including those advertised as "lead-free," may contribute lead to drinking water. The law currently allows end-use brass fixtures, such as faucets, with up to 8 percent lead to be labeled as "lead free." However, plumbing fixtures labeled National Sanitation Foundation (NSF) certified may only have up to 2 percent lead. Consumers should be aware of this when choosing fixtures and take appropriate precautions.

[Insert utility specific information describing your community's source water – e.g. "The source of water from XX Reservoir does not contain lead" or "Community XX does not have any lead in its source water or water mains in the street."] When water is in contact with pipes [or service lines] or plumbing that contains lead for several hours, the lead may enter drinking water. Homes built before 1986 are more likely to have plumbing containing lead. New homes may also have lead; even "lead-free" plumbing may contain some lead. EPA estimates that 10 to 20 percent of a person's potential exposure to lead may come from drinking water. Infants who consume mostly formula mixed with lead-containing water can receive 40 to 60 percent of their exposure to lead from drinking water.

Don't forget about other sources of lead such as lead paint, lead dust, and lead in soil. Wash your children's hands and toys often as they can come into contact with dirt and dust containing lead.

Steps You Can Take To Reduce Your Exposure to Lead in Your Water

- 1. *Run your water to flush out lead.*** Run water for 15-30 seconds or until it becomes cold or reaches a steady temperature before using it for drinking or cooking, if it hasn't been used for several hours. This flushes lead-containing water from the pipes.
- 2. *Use cold water for cooking and preparing baby formula.*** Do not cook with or drink water from the hot water tap; lead dissolves more easily into hot water. Do not use water from the hot water tap to make baby formula.
- 3. *Do not boil water to remove lead.*** Boiling water will not reduce lead.
- 4. *Look for alternative sources or treatment of water.*** You may want to consider purchasing bottled water or a water filter. Read the package to be sure the filter is approved to reduce lead or contact NSF International at 800-NSF-8010 or www.nsf.org for information on performance standards for water filters. Be sure to maintain and replace a filter device in accordance with the manufacturer's instructions to protect water quality.
- 5. *Test your water for lead.*** Call us at [\[insert phone number for your water system\]](#) to find out how to get your water tested for lead. [\[Include information on your water system's testing program. For example, do you provide free testing? Are there labs in your area that are certified to do lead in water testing?\]](#)
- 6. *Get your child tested.*** Contact your local health department or healthcare provider to find out how you can get your child tested for lead if you are concerned about exposure.
- 7. *Identify if your plumbing fixtures contain lead.*** New brass faucets, fittings, and valves, including those advertised as "lead-free," may contribute lead to drinking water. The law currently allows end-use brass fixtures, such as faucets, with up to 8% lead to be labeled as "lead free." Visit the National Sanitation Foundation Web site at www.nsf.org to learn more about lead-containing plumbing fixtures.

What Happened? What is Being Done?

[\[Insert information about how and when the exceedance was discovered in your community and provide information on the source\(s\) of lead in the drinking water, if known.\]](#)

[\[Insert information about what your system is doing to reduce lead levels in homes in your community.\]](#)

[\[Insert information about the history of lead levels in tap water samples in your community. For example, have they declined substantially over time? Have they been low and risen recently? Is there a known reason for any lead level changes?\]](#)

For More Information

Call us at [\[Insert Number\]](#) or (if applicable) visit our Web site at [\[insert Web site Here\]](#). For more information on reducing lead exposure around your home/building and the health effects of lead, visit EPA's Web site at www.epa.gov/lead or contact your health care provider.

Water Bill Language Insert Template

The following paragraph includes language that meets the LCR STR PE requirements and must be included in water bill notification in the event of a lead action level exceedance. Please note, the following statement may be placed directly on the water bill itself or included as an insert. A separate mailing may also be utilized. This alert must be included with every billing cycle or no less than quarterly for as long as the Action level is exceeded.

IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER

[Insert name of your water system] found high levels of lead in drinking water in some homes. Lead can cause serious health problems. For more information, please call *[insert name and phone number of water system]* or visit *[insert your Web site]*.

Web Site Announcement Template

Large community water systems (serving greater than 100,000 people) are **required** to provide a Public Education notice on their Web site. The following language can serve as an announcement on the Web site.

IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER

[Insert name of your water system] found elevated levels of lead in drinking water in some homes/buildings in our community. Lead can cause serious health problems, especially for pregnant women and children 6 years and younger. Please read the following notice *[insert link to Public Education Notice]* closely to see what you can do to reduce lead in your drinking water and to learn what *[Insert name of your water system]* is doing to address this problem.

Call us at *[insert your water system phone number]* for more information

Date *[Insert the date posted]*

Press Release Template

The LCR STR **requires** community waterworks serving > 3,300 persons to provide two press releases per year during a lead exceedance. The following template contains information that is consistent with the LCR STR requirements. Providing local information, quotes from a local water system and/or public health official, and information about actions your system is taking to address the exceedance can help the media to accurately convey information about the exceedance and your system's action steps.

PRESS RELEASE DRINKING WATER NOTICE IMPORTANT INFORMATION ABOUT LEAD IN [INSERT NAME OF YOUR COMMUNITY] DRINKING WATER

Recent drinking water quality monitoring conducted by *[insert name of water system/community]* has found elevated levels of lead in drinking water in some homes/buildings in *[insert name of community or area served by your water system]*. Although the primary sources of lead exposure are lead-based paint and lead-contaminated dust or soil, the U.S. Environmental Protection Agency estimates that 10 to 20 percent of a person's potential exposure to lead may come from drinking water.

[Insert name of community] is concerned about the health of their residents because lead can cause serious health problems if too much enters your body from drinking water or other sources, especially for pregnant women and children 6 years and younger. It can cause damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. Scientists have linked the effects of lead on the brain with lowered IQ in children. Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults. Lead is stored in the bones and it can be released later in life. During pregnancy, the child receives lead from the mother's bones, which may affect brain development.

[Insert information about what happened and what is being done? You may wish to include information about the exceedance and the history of lead levels in tap water samples in your community. For example, have they declined substantially over time? Have they been low and risen recently? Is there a known reason for any lead level changes? Explain the steps being taken to reduce lead levels, such as corrosion control treatment and/or lead service line replacement.]

There are steps you can take to reduce your exposure to lead in your water:

Run your water to flush out lead. Run water for 15-30 seconds or until it becomes cold or reaches a steady temperature before using it for drinking or cooking, if it hasn't been used for several hours. This flushes lead-containing water from the pipes.

Use cold water for cooking and preparing baby formula.

Do not boil water to remove lead. Boiling water will not reduce lead.

Look for alternative drinking water sources or treatment of water. You may want to consider purchasing bottled water or a water filter.

Test your water for lead. Call us at *[insert phone number for your water system]* to find out how to get your water tested for lead.

Get your child tested. Contact your local health department or healthcare provider to find out how you can get your child tested for lead if you are concerned about exposure.

Identify if your plumbing fixtures contain lead.

There are several actions that *[insert name of water system of community]* are taking to address this lead in drinking water concern. *[Insert a quote from a water system official letting the public know what actions the system is taking to address the lead action level exceedance or insert a list of action steps.]*

Call *[insert name of your water system]* at *[insert number]* or (if applicable) visit *[insert name of your water system] Web site at [insert Web site Here]* to find out how to get your water tested for lead or for more information on steps *[insert name of your water system]* is taking to address the lead action level exceedance. For more information on reducing lead exposure around your home/building and the health effects of lead, visit EPA's Web site at www.epa.gov/lead or contact your health care provider.

Public Service Announcement Template

The LCR STR **does not require** water systems to produce Public Service Announcements. However, Public Service Announcements are one of the additional activities that large and small water systems can produce to meet the additional PE requirements. You should include the following information, which is consistent with the PE requirements under the LCR STR in any PSA.

IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER

[Insert name of water system] found elevated levels of lead in drinking water in some homes/buildings in our community. Lead can cause serious health problems, especially for pregnant women and children 6 years and younger.

Lead is a common metal found in the environment. Drinking water is one possible source of lead exposure. The main sources of lead exposure are lead-based paint and lead-contaminated dust or soil. The following are some of the steps you can take to reduce your exposure to lead in your drinking water:

Run your water for 15 – 30 seconds to flush out lead.

Use cold water for cooking and preparing baby formula.

Do not boil water to remove lead as boiling does not reduce lead levels.

Look for alternative drinking water sources or treatment of water. You may want to consider purchasing bottled water or a water filter.

Test your Water for Lead. Call us at *[insert phone number for your water system]* to find out how to get your water tested.

Get your child tested. Contact your local health department or healthcare provider to find out how you can get your child tested for lead if you are concerned about exposure.

Identify if your plumbing fixtures contain lead.

Call *[insert name of your water system]* at *[insert number]* or (if applicable) visit our Web site at *[insert Web site Here]* to find out how to get your water tested for lead or for more information. For more information on reducing lead exposure around your home/building and the health effects of lead, visit EPA's Web site at www.epa.gov/lead or contact your health care provider.

Local Health Department Notification Template

SUBJECT: County/City
Water – Waterworks Name

Date

District Medical Director

Address 1

Address 2

City, State, Zip

Dear Dr. Medical Director:

The waterworks name waterworks routinely monitors drinking water at consumer's taps for lead and copper. This monitoring is conducted in accordance with the Environmental Protection Agency's (EPA) Lead and Copper Rule and the Commonwealth of Virginia *Waterworks Regulations*.

Under the authority of the Safe Drinking Water Act, the EPA set the Action Level for lead in drinking water at 15 ppb. This means utilities must ensure that water from the customer's tap does not exceed this level in at least 90 percent of the homes sampled (90th percentile value). The Action Level is the concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

The most recent results of our lead and copper monitoring indicate that the lead Action Level has been exceeded. The results of this most recent monitoring are summarized in the table below.

Insert name of waterworks Waterworks: Lead & Copper Results

Monitoring Period	Lead 90 th Percentile (Action Level: 0.015 mg/L)	Copper 90 th Percentile (Action Level: 1.3 mg/L)
<u>Insert LCR monitoring period</u>	<u>Insert lead 90th percentile</u> - Failed	<u>Insert copper 90th percentile</u> - Failed

Because the lead Action Level has been exceeded we are required to initiate a public education program that will alert our customers to the potential public health impacts of elevated lead in drinking water and provide information on ways to reduce exposure. A copy of the public education materials that are being sent to our customers is attached for your information.

We are requesting your assistance in distributing the public education materials to organizations that may serve "at-risk" customers of our waterworks. Such organizations may include WIC programs, Head Start programs, pediatricians, and others that may serve pregnant women and children.

If you have any questions please contact me at insert contact phone number.

Sincerely:

Insert Waterworks owner's Name

Public Education Completion Report –
Community Waterworks Serving > 3,300 Population

Public Education Delivery Certification

PWS Name: _____ PWSID: _____
Population: _____

DELIVERY METHOD – Community Waterworks Serving > 3,300 Population

- Written Public Education material regarding lead in drinking water was delivered to each bill paying customer on _____(date). This delivery was completed by:
- Inclusion in the regular water bill mailing
 - Separate direct mailing to each bill paying customer
- Written Public Education material regarding lead in drinking water was delivered to the following organizations that are served by the waterworks on _____(date). A list of all organizations that were provided with the public education materials is attached.
- Public and private schools or school boards
 - Public and private pre schools
 - Women Infants and Children (WIC) and Head Start programs
 - Public and private hospitals and medical clinics
 - Obstetricians- Gynecologists and Midwives
 - Pediatricians
 - Family planning clinics
 - Local welfare agencies
 - Licensed childcare centers
- Written Public Education material regarding lead in drinking water was delivered to the _____ Local Health Department on _____(date). The health department was also contacted:
- By personal visit on _____(date).
 - By telephone on _____(date).
- Written Public Education material regarding lead in drinking water was delivered to all community based organizations indicated by the local health department on _____(date).
- A press release was provided to newspapers, television stations, and radio stations on _____(date).

- The written Public Education material regarding lead in drinking water was posted on the waterworks web site on _____(date). This web posting will remain for as long as the lead Action Level is exceeded. [required for waterworks serving > 100,000 population].
- The following additional Public Education activities were initiated on _____(date). At least three of the following must be completed.
 - Public Service Announcements
 - Paid advertisements
 - Public area informational displays
 - E-mails to customers
 - Public meetings
 - Household deliveries
 - Targeted individual customer contacts
 - Direct material distribution to all multi-family homes and institutions
 - Other activities as approved by the state _____

I certify that all of the required Public Education delivery activities have been completed as indicated above. I further certify that an informational notice regarding lead in drinking water will be provided to each billing customer either with the normal water bills or as a separate mailing. This notification will be provided with each billing cycle but no less than once each calendar quarter for as long as the lead Action Level is exceeded.

Signature: _____ Print Name: _____

Job Title: _____ Phone: _____ Date: _____

- ___ Complete this form.**
- ___ Attach a copy of the Public Education written materials**
- ___ Attach a copy of the Press Release delivered to newspaper, radio, and television stations**
- ___ Attach A list of all contacted organizations serving ‘at risk’ populations**
- ___ Within 10 days after Public Education delivery has been completed, mail this form and attachments to:**

District Engineer
 VDH - Office of Drinking Water
 _____ Field Office

 _____ VA _____

**Public Education Templates and Delivery
Requirements**

Community Waterworks Serving \leq 3,300 Population

Public Education – Community Waterworks Serving 3,300 or Fewer Population

Required Public Education Delivery for Small/Medium Community Waterworks (< 3,301 customers)	
Delivery Requirement	Timing of Delivery
Deliver written materials to all bill paying customers	<p>Within 60 days after the end of the lead and copper monitoring period in which the lead Action Level was exceeded</p> <p>Delivery must be repeated once every 12 months</p>
<p>Deliver public education written materials to the following facilities and organizations <u>that are served by the waterworks</u> and that are most likely to be visited regularly by pregnant women and children.</p> <ol style="list-style-type: none"> 1. Public and private schools or school boards 2. Public and private pre schools 3. Women Infants and Children (WIC) and Head Start programs 4. Public and private hospitals and medical clinics 5. Obstetricians-Gynecologists and Midwives 6. Pediatricians 7. Family planning clinics 8. Local welfare agencies 9. Licensed childcare centers 	<p>Within 60 days after the end of the lead and copper monitoring period in which the lead Action Level was exceeded</p> <p>Delivery must be repeated once every 12 months</p>
Deliver public education written materials to the City or County Local Health Department. Contact with the local health agency <u>must be either by telephone or in person.</u> The LHD may provide the waterworks with a list of additional organizations serving target populations. If the LHD provides such a list, deliver the public education materials to all organizations on the list that are <u>located within the system's service area.</u>	<p>Within 60 days after the end of the lead and copper monitoring period in which the lead Action Level was exceeded</p> <p>Delivery must be repeated once every 12 months</p>
Provide information on or in each water bill or in a separate mailing no less than quarterly.	Each billing cycle for as long as the system exceeds the lead action level – but no less than quarterly
Submit press release to newspaper, television, and radio stations. This requirement can be waived if the waterworks provides the written material to <u>each household</u> served.	<p>Within 60 days after the end of the lead and copper monitoring period in which the lead Action Level was exceeded</p> <p>Delivery must be repeated <u>twice</u> every 12 months</p>

<p>Implement <u>at least one</u> of the additional Public Education activities from the following :</p> <ul style="list-style-type: none">• Public Service Announcements• Paid advertisements• Public Area Information Displays• E-mails to customers• Public Meetings• Household Deliveries• Targeted Individual customer Contact• Direct material distribution to all multi-family homes or institutions• Other approved methods	<p>Within 60 days after the end of the lead and copper monitoring period in which the lead Action Level was exceeded</p> <p>Delivery must be repeated once every 12 months</p>
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Community Waterworks Public Education Written Material Template

Note that the PE written material must include all of the listed topic areas. The owner can insert his own language, subject to approval by the District Engineer, **except for the language in blue text**. This is mandatory language and must be included exactly as written

IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER

[Insert name of water system] found elevated levels of lead in drinking water in some homes/buildings. Lead can cause serious health problems, especially for pregnant women and children 6 years and younger. Please read this notice closely to see what you can do to reduce lead in your drinking water.

This notice is brought to you by *[insert the name of your water system]*. State Water System ID# *[insert your water system's ID number]* Date *[Insert the date distributed]*

Health Effects of Lead

Lead can cause serious health problems if too much enters your body from drinking water or other sources. It can cause damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Scientists have linked the effects of lead on the brain with lowered IQ in children. Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults. Lead is stored in the bones and it can be released later in life. During pregnancy, the child receives lead from the mother's bones, which may affect brain development.

Sources of Lead

Lead is a common metal found in the environment. Drinking water is one possible source of lead exposure. The main sources of lead exposure are lead-based paint and lead-contaminated dust or soil, and some plumbing materials. In addition, lead can be found in certain types of pottery, pewter, brass fixtures, food, and cosmetics. Other sources include exposure in the work place and exposure from certain hobbies (lead can be carried on clothing or shoes).

New brass faucets, fittings, and valves, including those advertised as "lead-free," may contribute lead to drinking water. The law currently allows end-use brass fixtures, such as faucets, with up to 8 percent lead to be labeled as "lead free." However, plumbing fixtures labeled National Sanitation Foundation (NSF) certified may only have up to 2 percent lead. Consumers should be aware of this when choosing fixtures and take appropriate precautions.

[Insert utility specific information describing your community's source water – e.g. "The source of water from XX Reservoir does not contain lead" or "Community X does not have any lead in its source water or water mains in the street."] When water is in contact with pipes [or service lines] or plumbing that contains lead for several hours, the lead may enter drinking water. Homes built before 1986 are more likely to have plumbing containing lead. New homes may also have lead; even "lead-free" plumbing may contain some lead. EPA estimates that 10 to 20 percent of a person's potential exposure to lead may come from drinking water. Infants who consume mostly formula mixed with lead-containing water can receive 40 to 60 percent of their exposure to lead from drinking water.

Don't forget about other sources of lead such as lead paint, lead dust, and lead in soil. Wash your children's hands and toys often as they can come into contact with dirt and dust containing lead.

Steps You Can Take To Reduce Your Exposure to Lead in Your Water

1. **Run your water to flush out lead.** Run water for 15-30 seconds or until it becomes cold or reaches a steady temperature before using it for drinking or cooking, if it hasn't been used for several hours. This flushes lead-containing water from the pipes.
2. **Use cold water for cooking and preparing baby formula.** Do not cook with or drink water from the hot water tap; lead dissolves more easily into hot water. Do not use water from the hot water tap to make baby formula.
3. **Do not boil water to remove lead.** Boiling water will not reduce lead.
4. **Look for alternative sources or treatment of water.** You may want to consider purchasing bottled water or a water filter. Read the package to be sure the filter is approved to reduce lead or contact NSF International at 800-NSF-8010 or www.nsf.org for information on performance standards for water filters. Be sure to maintain and replace a filter device in accordance with the manufacturer's instructions to protect water quality.
5. **Test your water for lead.** Call us at [\[insert phone number for your water system\]](#) to find out how to get your water tested for lead. [\[Include information on your water system's testing program. For example, do you provide free testing? Are there labs in your area that are certified to do lead in water testing?\]](#)
6. **Get your child tested.** Contact your local health department or healthcare provider to find out how you can get your child tested for lead if you are concerned about exposure.
7. **Identify if your plumbing fixtures contain lead.** New brass faucets, fittings, and valves, including those advertised as "lead-free," may contribute lead to drinking water. The law currently allows end-use brass fixtures, such as faucets, with up to 8% lead to be labeled as "lead free." Visit the National Sanitation Foundation Web site at www.nsf.org to learn more about lead-containing plumbing fixtures.

What Happened? What is Being Done?

[\[Insert information about how and when the exceedance was discovered in your community and provide information on the source\(s\) of lead in the drinking water, if known.\]](#)

[\[Insert information about what your system is doing to reduce lead levels in homes in your community.\]](#)

[\[Insert information about the history of lead levels in tap water samples in your community. For example, have they declined substantially over time? Have they been low and risen recently? Is there a known reason for any lead level changes?\]](#)

For More Information

Call us at [*Insert Number*] or (if applicable) visit our Web site at [*insert Web site Here*]. For more information on reducing lead exposure around your home/building and the health effects of lead, visit EPA's Web site at www.epa.gov/lead or contact your health care provider.

Water Bill Language Insert Template

The following paragraph includes language that meets the LCR STR PE requirements and must be included in water bill notification in the event of a lead action level exceedance. Please note, the following statement may be placed directly on the water bill itself or included as an insert. A separate mailing may also be utilized. This alert must be included with every billing cycle or no less than quarterly for as long as the Action level is exceeded.

IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER

[Insert name of your water system] found high levels of lead in drinking water in some homes. Lead can cause serious health problems. For more information, please call *[insert name and phone number of water system]* or visit *[insert your Web site]*.

Press Release Template

The LCR STR **requires** community waterworks serving $\leq 3,300$ persons to provide two press releases per year during a lead action level exceedance. *This requirement can be waived if the waterworks provides the PE written material to each household served.* The following template contains information that is consistent with the LCR STR requirements. Providing local information, quotes from a local water system and/or public health official, and information about actions your system is taking to address the exceedance can help the media to accurately convey information about the exceedance and your system's action steps.

PRESS RELEASE DRINKING WATER NOTICE IMPORTANT INFORMATION ABOUT LEAD IN [INSERT NAME OF YOUR COMMUNITY] DRINKING WATER

Recent drinking water quality monitoring conducted by *[insert name of water system/community]* has found elevated levels of lead in drinking water in some homes/buildings in *[insert name of community or area served by your water system]*. Although the primary sources of lead exposure are lead-based paint and lead-contaminated dust or soil, the U.S. Environmental Protection Agency estimates that 10 to 20 percent of a person's potential exposure to lead may come from drinking water.

[Insert name of community] is concerned about the health of their residents because lead can cause serious health problems if too much enters your body from drinking water or other sources, especially for pregnant women and children 6 years and younger. It can cause damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. Scientists have linked the effects of lead on the brain with lowered IQ in children. Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults. Lead is stored in the bones and it can be released later in life. During pregnancy, the child receives lead from the mother's bones, which may affect brain development.

[Insert information about what happened and what is being done? You may wish to include information about the exceedance and the history of lead levels in tap water samples in your community. For example, have they declined substantially over time? Have they been low and risen recently? Is there a known reason for any lead level changes? Explain the steps being taken to reduce lead levels, such as corrosion control treatment and/or lead service line replacement.]

There are steps you can take to reduce your exposure to lead in your water:

Run your water to flush out lead. Run water for 15-30 seconds or until it becomes cold or reaches a steady temperature before using it for drinking or cooking, if it hasn't been used for several hours. This flushes lead-containing water from the pipes.

Use cold water for cooking and preparing baby formula.

Do not boil water to remove lead. Boiling water will not reduce lead.

Look for alternative drinking water sources or treatment of water. You may want to consider purchasing bottled water or a water filter.

Test your water for lead. Call us at *[insert phone number for your water system]* to find out how to get your water tested for lead.

Get your child tested. Contact your local health department or healthcare provider to find out how you can get your child tested for lead if you are concerned about exposure.

Identify if your plumbing fixtures contain lead.

There are several actions that *[insert name of water system of community]* are taking to address this lead in drinking water concern. *[Insert a quote from a water system official letting the public know what actions the system is taking to address the lead action level exceedance or insert a list of action steps.]*

Call *[insert name of your water system]* at *[insert number]* or (if applicable) visit *[insert name of your water system] Web site at [insert Web site Here]* to find out how to get your water tested for lead or for more information on steps *[insert name of your water system]* is taking to address the lead action level exceedance. For more information on reducing lead exposure around your home/building and the health effects of lead, visit EPA's Web site at www.epa.gov/lead or contact your health care provider.

Public Service Announcement Template

The LCR STR **does not require** water systems to produce Public Service Announcements. However, Public Service Announcements are one of the additional activities that large and small water systems can produce to meet the additional PE requirements. You should include the following information, which is consistent with the PE requirements under the LCR STR in any PSA.

IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER

[Insert name of water system] found elevated levels of lead in drinking water in some homes/buildings in our community. Lead can cause serious health problems, especially for pregnant women and children 6 years and younger.

Lead is a common metal found in the environment. Drinking water is one possible source of lead exposure. The main sources of lead exposure are lead-based paint and lead-contaminated dust or soil. The following are some of the steps you can take to reduce your exposure to lead in your drinking water:

Run your water for 15 – 30 seconds to flush out lead.

Use cold water for cooking and preparing baby formula.

Do not boil water to remove lead as boiling does not reduce lead levels.

Look for alternative drinking water sources or treatment of water. You may want to consider purchasing bottled water or a water filter.

Test your Water for Lead. Call us at *[insert phone number for your water system]* to find out how to get your water tested.

Get your child tested. Contact your local health department or healthcare provider to find out how you can get your child tested for lead if you are concerned about exposure.

Identify if your plumbing fixtures contain lead.

Call *[insert name of your water system]* at *[insert number]* or (if applicable) visit our Web site at *[insert Web site Here]* to find out how to get your water tested for lead or for more information. For more information on reducing lead exposure around your home/building and the health effects of lead, visit EPA's Web site at www.epa.gov/lead or contact your health care provider.

Local Health Department Notification Template

SUBJECT: County/City
Water – Waterworks Name

Date

District Medical Director

Address 1

Address 2

City, State, Zip

Dear Dr. Medical Director:

The *waterworks name* waterworks routinely monitors drinking water at consumer's taps for lead and copper. This monitoring is conducted in accordance with the Environmental Protection Agency's (EPA) Lead and Copper Rule and the Commonwealth of Virginia *Waterworks Regulations*.

Under the authority of the Safe Drinking Water Act, the EPA set the Action Level for lead in drinking water at 15 ppb. This means utilities must ensure that water from the customer's tap does not exceed this level in at least 90 percent of the homes sampled (90th percentile value). The Action Level is the concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

The most recent results of our lead and copper monitoring indicate that the lead Action Level has been exceeded. The results of this most recent monitoring are summarized in the table below.

Insert name of waterworks Waterworks: Lead & Copper Results

Monitoring Period	Lead 90 th Percentile (Action Level: 0.015 mg/L)	Copper 90 th Percentile (Action Level: 1.3 mg/L)
<u>Insert LCR monitoring period</u>	<u>Insert lead 90th percentile</u> - Failed	<u>Insert copper 90th percentile</u> - Failed

Because the lead Action Level has been exceeded we are required to initiate a public education program that will alert our customers to the potential public health impacts of elevated lead in drinking water and provide information on ways to reduce exposure. A copy of the public education materials that are being sent to our customers is attached for your information.

We are requesting your assistance in distributing the public education materials to organizations that may serve "at-risk" customers of our waterworks. Such organizations may include WIC programs, Head Start programs, pediatricians, and others that may serve pregnant women and children.

If you have any questions please contact me at insert contact phone number.

Sincerely:

Insert Waterworks owner's Name

Public Education Completion Report –
Community Waterworks Serving 3,300 or Fewer Population

Public Education Delivery Certification

PWS Name: _____ PWSID: _____
Population: _____

DELIVERY METHOD – Community Waterworks Serving 3,300 or Fewer Population

- Written Public Education material regarding lead in drinking water was delivered to each bill paying customer on _____(date). This delivery was completed by:
- Inclusion in the regular water bill mailing
 - Separate direct mailing to each bill paying customer
 - Direct hand delivery
- Written Public Education material regarding lead in drinking water was delivered to the following organizations that are served by the waterworks on _____(date). A list of all organizations that were provided with the public education materials is attached.
- Public and private schools or school boards
 - Public and private pre schools
 - Women Infants and Children (WIC) and Head Start programs
 - Public and private hospitals and medical clinics
 - Obstetricians- Gynecologists and Midwives
 - Pediatricians
 - Family planning clinics
 - Local welfare agencies
 - Licensed childcare centers
- Written Public Education material regarding lead in drinking water was delivered to the _____ Local Health Department on _____(date). The health department was also contacted:
- By personal visit on _____(date).
 - By telephone on _____(date).
- Written Public Education material regarding lead in drinking water was delivered to all community based organizations that are served by the waterworks indicated by the local health department on _____(date).

A press release was provided to newspapers, television stations, and radio stations on _____(date). [not required if the waterworks delivered the written materials to each household served]

The following additional Public Education activities were initiated on _____ (date). At least one of the following must be completed.

- Public Service Announcements
- Paid advertisements
- Public area informational displays
- E-mails to customers
- Public meetings
- Household deliveries
- Targeted individual customer contacts
- Direct material distribution to all multi-family homes and institutions
- Other activities as approved by the state _____

I certify that all of the required Public Education delivery activities have been completed as indicated above. I further certify that an informational notice regarding lead in drinking water will be provided to each billing customer either with the normal water bills or as a separate mailing. This notification will be provided with each billing cycle but no less than once each calendar quarter for as long as the lead Action Level is exceeded.

Signature: _____ Print Name: _____

Job Title: _____ Phone: _____ Date: _____

__ Complete this form

__ Attach a copy of the Public Education written materials

__ Attach a copy of the Press Release delivered to newspaper, radio, and television stations

__ Attach A list of all contacted organizations serving ‘at risk’ populations

__ Within 10 days after Public Education delivery has been completed, mail this form and attachments to:

District Engineer
VDH - Office of Drinking Water
_____ Field Office

_____ VA _____

**Public Education Templates and Delivery
Requirements**

Non Transient Non Community Waterworks

Public Education – Non Transient Non Community Waterworks

Required Public Education Delivery for Non Transient Non Community	
Delivery Requirement	Timing of Delivery
Post informational posters containing required written materials in a public place or common area in <u>each</u> of the buildings served by the waterworks	Within 60 days after the end of the lead and copper monitoring period in which the lead Action Level was exceeded Delivery must be repeated once every 12 months
Distribute the written materials to each person served by the waterworks	Within 60 days after the end of the lead and copper monitoring period in which the lead Action Level was exceeded Delivery must be repeated once every 12 months

Note that posting of the Public Education written materials **and** distribution to each person served by the waterworks is required.

NTNC Waterworks Public Education Written Material Template

Note that the PE written material must include all of the listed topic areas. The owner can insert his own language, subject to approval by the District Engineer, **except for the language in blue text**. This is mandatory language and must be included exactly as written

IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER

[Insert name of water system] found elevated levels of lead in drinking water in some homes/buildings. Lead can cause serious health problems, especially for pregnant women and children 6 years and younger. Please read this notice closely to see what you can do to reduce lead in your drinking water.

This notice is brought to you by **[insert the name of your water system]**. State Water System ID# **[insert your water system's ID number]**

Date **[Insert the date distributed]**

Health Effects of Lead

Lead can cause serious health problems if too much enters your body from drinking water or other sources. It can cause damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Scientists have linked the effects of lead on the brain with lowered IQ in children. Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults. Lead is stored in the bones and it can be released later in life. During pregnancy, the child receives lead from the mother's bones, which may affect brain development.

Sources of Lead

Lead is a common metal found in the environment. Drinking water is one possible source of lead exposure. The main sources of lead exposure are lead-based paint and lead-contaminated dust or soil, and some plumbing materials. In addition, lead can be found in certain types of pottery, pewter, brass fixtures, food, and cosmetics. Other sources include exposure in the work place and exposure from certain hobbies (lead can be carried on clothing or shoes).

New brass faucets, fittings, and valves, including those advertised as "lead-free," may contribute lead to drinking water. The law currently allows end-use brass fixtures, such as faucets, with up to 8 percent lead to be labeled as "lead free." However, plumbing fixtures labeled National Sanitation Foundation (NSF) certified may only have up to 2 percent lead. Consumers should be aware of this when choosing fixtures and take appropriate precautions.

EPA estimates that 10 to 20 percent of a person's potential exposure to lead may come from drinking water. Infants who consume mostly formula mixed with lead-containing water can receive 40 to 60 percent of their exposure to lead from drinking water.

Don't forget about other sources of lead such as lead paint, lead dust, and lead in soil. Wash your children's hands and toys often as they can come into contact with dirt and dust containing lead.

Steps You Can Take To Reduce Exposure To Lead In Your Water

1. ***Run your water to flush out lead.*** Run water for 15-30 seconds or until it becomes cold or reaches a steady temperature before using it for drinking or cooking, if it hasn't been used for several hours. This flushes lead-containing water from the pipes.
2. ***Use cold water for cooking and preparing baby formula.*** Do not cook with or drink water from the hot water tap; lead dissolves more easily into hot water. Do not use water from the hot water tap to make baby formula.
3. ***Do not boil water to remove lead.*** Boiling water will not reduce lead.
4. ***Look for alternative sources or treatment of water.*** You may want to consider purchasing bottled water or a water filter. Read the package to be sure the filter is approved to reduce lead or contact NSF International at 800-NSF-8010 or www.nsf.org for information on performance standards for water filters. Be sure to maintain and replace a filter device in accordance with the manufacturer's instructions to protect water quality.
5. ***Get your child tested.*** Contact your local health department or healthcare provider to find out how you can get your child tested for lead if you are concerned about exposure.

What Happened? What is Being Done?

[Insert information about how and when the exceedance was discovered in your community and provide information on the source(s) of lead in the drinking water, if known.]

[Insert information about what your system is doing to reduce lead levels in homes in your community.]

[Insert information about the history of lead levels in tap water samples in your community. For example, have they declined substantially over time? Have they been low and risen recently? Is there a known reason for any lead level changes?]

For More Information

Call us at [\[Insert Number\]](tel:[Insert Number]) or (if applicable) visit our Web site at [\[insert Web site Here\]](http://[insert Web site Here]). For more information on reducing lead exposure around your home/building and the health effects of lead, visit EPA's Web site at www.epa.gov/lead or contact your health care provider.

Public Education Completion Report –
Non Transient Non Community Waterworks

Public Education Delivery Certification

PWS Name: _____ PWSID: _____
Population: _____

DELIVERY METHOD – Non Transient Non Community Waterworks

Written Public Education material regarding lead in drinking water was posted in a public place or common area in each building served by the waterworks on _____ (date).

and

Written Public Education material regarding lead in drinking water was provided to each person served by the waterworks on _____ (date). This notification was made by:

- Regular Mail
- Hand/direct delivery
- Email
- Other: _____

I certify that the attached Public Education written material was delivered in the manner and dates indicated above and a good faith effort was made to deliver the materials to each consumer served by the waterworks. I further certify that notification was completed within 60 days after the end of the lead and copper monitoring period in which the lead Action Level was exceeded.

Signature: _____ Print Name: _____

Job Title: _____ Phone: _____ Date: _____

___ Complete this form.

___ Attach a copy of the Public Education materials that were distributed.

___ Within 10 days after distribution has been completed, mail this certification form to:

District Engineer
VDH - Office of Drinking Water
_____ Field Office

_____ VA _____

**GUDI Determination Review Sheet
(Initial Source Water and GUDI Re-evaluations)**

Date: _____

Waterworks Name: _____

PWSID: _____

City / County: _____

Source Name: _____

Determined By: _____

Reviewed By: _____

STEP 1 of the evaluation procedure consists of reviewing the source history, construction and location.

Step 1: Source History		Yes / No
a.	Has this source been directly associated with a biological waterborne disease outbreak?	
b.	Has this source been directly impacted by a chemical contamination incident from the surface?	
c.	Do surveys, reports or studies demonstrate a connection ¹ between the source and surface water?	

¹This connection must be *DIRECT* and afford little or no natural filtration through a soil horizon, as determined by empirical data. These connections might include: sinkholes, sinking creeks, troughs, drainage features, high porosity soils (sands and gravels), fracture zones, or other geologic features that have a high transmissivity. Evaluate these features and consider the well or spring construction and protection.

Step 1 Summary:

- If the answer to 1a, 1b, or 1c is **YES – STOP** – the source is GUDI.
- If the answers to 1a, 1b, and 1c are **NO** proceed to Step 2

STEP 2 consists of evaluating the results of bacteriological monitoring – a minimum 20 sample series of source water microbiological samples. Results must include both Total Coliform MPN's and *E. coli* MPN's.

Step 2: Total Coliform and <i>E. coli</i> Sampling		Yes / No
a.	Do the results indicate 3 or more samples with Total Coliform greater than 100/100mL?	
b.	Do the results indicate 3 or more samples with <i>E. coli</i> equal to or greater than 5/100mL?	
c.	Do the results indicate <i>E. coli</i> to be present in 5 or more samples?	

NOTE: if the Total Coliform geometric mean is greater than 100 /100 mL, the source must be evaluated under Step 3 to make a GUDI determination. If the source is NOT determined to be GUDI after the Step 3, evaluation the requirements of Section 7.6.4.b will apply.

Step 2 Summary:

- If the answer to Step 2a, 2b, or 2c, is **YES** proceed to Step 3.
- If the answer to Step 2a, 2b, and 2c is **NO - STOP** – the source is a groundwater source, and is not GUDI.

GUDI Determination Review Sheet

STEP 3 consists of evaluating the results of additional water quality monitoring conducted in accordance with an approved monitoring plan. The monitoring must include source water Microscopic Particulate Analysis (MPA) and physical parameter monitoring (turbidity, water temperature, pH and/or conductivity) of the source water and, if applicable, of a nearby surface water source. A minimum of four MPA tests must be conducted: two each during wet and dry conditions within a 12 month period. The MPA tests must be at least 60 days apart.

Step 3: Additional Water Quality Monitoring		Yes / No
a.	Do the source water physical parameter monitoring results (turbidity, pH, temperature and/or conductivity) indicate a high correlation to the physical parameter monitoring results of a nearby surface water source taking into account significant rainfall or other meteorological events?	
b.	Does the source water physical parameter monitoring results (turbidity, pH, temperature and/or conductivity) fluctuate during or following a rainfall or other meteorological event?	
c.	Does any single sample MPA result indicate a score of equal to or greater than 20?	
d.	Do any two MPA sample results indicate a score of equal to or greater than 15?	
e.	Do ALL MPA sample results indicate a score of equal to or less than 9?	

Step 3 Summary:

- If the answer to Step 3a, 3b, 3c, or 3d, is **YES - STOP** – the source is GUDI
- If the answer to Step 3a and 3b is **NO** and the answer to Step 3e is **YES – STOP** - the source is a groundwater source, and is not GUDI.
- If the answer to Step 3e is **NO**, the District Engineer must evaluate all of the water quality monitoring data, well construction, geology, and any other relevant factors. Proceed to one of the following actions with concurrence of the Field Director:
 - 1) Consider the source to be “at risk” and continue to monitor. The District Engineer will establish the monitoring parameters and monitoring frequency.
 - 2) Declare the source to be a groundwater source (NOT GUDI). Note that even with this action source water monitoring continues.

CONCLUSION:

- Based upon the criteria established in STEP _____, question _____ this source is determined to be GUDI. Filtration and disinfection treatment must be installed within 18 months and the waterworks owner must initiate the interim requirements.
- Based upon the criteria established in STEP _____, question _____ this source is determined to be a groundwater source and is NOT GUDI.
 - Disinfection treatment alone is sufficient. Source water monitoring must continue.
 - Disinfection treatment is not required.
- This source is determined to be “at risk” for surface water influence. Source water monitoring must continue as directed by the District Engineer.

District Engineer

Field Director

Attach all relevant water quality results.

GUDI Determination - Step 3 Monitoring Plan Worksheet

Waterworks Name:		PWSID:	
Date prepared:		Prepared by:	
Sources being evaluated, and distance to nearest surface water source:			

<input type="checkbox"/> Source water MPN for Total Coliform and <i>E. coli</i>	
Frequency:	
Duration:	
Locations:	
Laboratory:	
Special instructions:	
<ul style="list-style-type: none"> • Use only laboratories state-certified to perform Total Coliform and <i>E. coli</i> analysis • Report results as densities (Most Probable Number) rather than present /absent 	

<input type="checkbox"/> Temperature	
Frequency:	
Duration:	
Locations:	
Special instructions:	
<ul style="list-style-type: none"> • An alcohol-filled thermometer or electric probe may be used. • Use an instrument capable of reading $\pm 0.5^{\circ}$ F increments. • Use the same instrument for all readings. 	

<input type="checkbox"/> Conductivity	
Frequency:	
Duration:	
Locations:	
Special instructions:	
Calibrate the instrument per manufacturer's recommendations, or submit to a State-certified laboratory.	

<input type="checkbox"/> Turbidity	
Frequency:	
Duration:	
Locations:	
Special instructions:	
<ul style="list-style-type: none"> • Use an instrument capable of reading 0.1 NTU increments. • Standardize and calibrate instrument per manufacturer's recommendations. 	

<input type="checkbox"/> Specific Ions	
Frequency:	
Duration:	
Locations:	
Special instructions:	

<input type="checkbox"/> Rainfall	
Duration:	
Locations:	Identify sources of rainfall gauging. May need to use more than one rainfall location if utilizing existing gauges not in close proximity to the groundwater source (i.e. compare rainfall data from two wastewater treatment plants, each located greater than 10 miles from the source)
Special instructions:	

<input type="checkbox"/> Other Parameters (specify)	
Frequency:	
Duration:	
Locations:	
Special instructions:	

<input type="checkbox"/> Microscopic Particulate Analysis	
Frequency:	
Duration:	
Locations:	
Laboratory:	
Special instructions:	
<ul style="list-style-type: none"> • Collect samples during both dry periods and wet periods. • Wet period sample shall be taken between 12-48 hours following a significant rainfall event. • Collect samples from the source prior to any treatment. • Sample shall be analyzed by an EPA certified lab per USEPA “Consensus Method for Determining Groundwater Under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA)” • All MPA analyses must include both <i>Giardia lamblia</i>, and <i>Cryptosporidium</i>. • Lab shall submit results per the Consensus Method’s risk rating protocol. 	

<input type="checkbox"/> Reporting Requirements (specify)	
<ul style="list-style-type: none"> • Laboratories should report results directly to ODW Field Office 	

NOTIFICATION LETTER - "NOT GUDI"

SUBJECT:
Waterworks:
PWSID No.:

Date

Waterworks Owner
Address 1
Address 2
City, State, Zip

Dear *Waterworks Owner*(*SDWIS Administrative Contact*):

This notice is to inform you that in accordance with the Commonwealth of Virginia *Waterworks Regulations* 12 VAC 5-590-430 the following determinations have been made for the *Waterworks Name* waterworks.

***Source name* has been determined to be a groundwater source and is NOT under the direct influence of surface water.**

You must continue to conduct periodic source water (prior to any treatment) monitoring of the *source name*. One sample is to be collected each *source water monitoring frequency* (*year, quarter, month, week*). All samples must be analyzed for Total Coliform and *E. coli* by an approved laboratory and by a test method that yields a most probable number (MPN) result. Depending upon the results of this source water monitoring, a re-evaluation of the source for direct surface water influence may be necessary in the future.

Please feel free to call me at *phone number* should you have any concerns or additional questions.

Sincerely,

District Engineer
Field Office Name Field Office

Cc: VDH-ODW-Central Office

NOTIFICATION LETTER-SOURCE WATER MONITORING REQUIRED

SUBJECT:
Waterworks:
PWSID No.:

Date

Waterworks Owner
Address 1
Address 2
City, State, Zip

Dear *Waterworks Owner*(*SDWIS Administrative Contact*):

The results of routine source water bacteriological monitoring from the *source name* over the past *monitoring time frame* have indicated the presence of Total Coliform and / or *E. coli*. A summary of these monitoring results are attached.

In accordance the *Waterworks Regulations* 12VAC5-590-425 E and 12 VAC 5-590-430, we request that *waterworks name* begin a more aggressive source water monitoring program to better assess the potential of surface water influence of this groundwater source.

The source water monitoring program must include one sample per week (collected prior to any treatment) from the *source name*. All samples must be analyzed for Total Coliform and *E. coli* by an approved laboratory and by a test method that yields a most probable number (MPN) result. A minimum of 20 samples are required, however additional samples may be necessary. Sample collection may be adjusted within the week to collect samples immediately following rainfall events, as practical.

Please notify me if you wish to use the state laboratory (DCLS) for this monitoring so that sample container distribution and scheduling can be coordinated. Feel free to call me at *phone number* should you have any concerns or additional questions.

Sincerely,

District Engineer
Field Office Name Field Office

Attachments: *itemize*
CC: VDH-ODW-Central Office

GUDI NOTIFICATION - SAMPLE LETTER

SUBJECT:
Waterworks:
PWSID:

Date

Waterworks Owner name
Address 1
Address 2
City, State, Zip

Dear *Waterworks Owner (SDWIS Administrative Contact)*:

This notice is to inform you that our records and laboratory testing results indicate that *GUDI source name* is under the direct influence of surface water pursuant to 12 VAC 5-590-430 of the *Virginia Waterworks Regulations*. Attached is a summary of the source water sample results for *GUDI source name*. A water source is determined to be under the influence of surface water if *insert GUDI determination criteria*.

We request that you install filtration and disinfection treatment within 18 months of this notice receipt (or by *letter date plus 18 months*), in accordance with 12 VAC 5-590-420 of the *Waterworks Regulations*. Additional options that you might wish to pursue are: 1) permanent disconnection of the surface influenced source, 2) development of new sources, or 3) the connection to a regional waterworks.

Effective upon receipt of this notice, please initiate the attached interim requirements until filtration is installed and operational, or an acceptable alternative to continued use of the source is approved.

(Note: If the waterworks has an existing operation permit, then send the letter with the attached interim action requirements. If the waterworks has no permit, issue a temporary operation permit that lists the interim action requirements as conditions of the permit.)

Please notify this office by *letter date plus 10 days* of your intentions with regard to discontinuing use of this GUDI source, or the installation of acceptable filtration and disinfection treatment. If you must continue use of this GUDI source we will coordinate the requirements and issuance of a Boil Water Notice with you. If you dispute the Office's determination that your groundwater source is under the direct influence of surface water, you have the right to an informal fact finding proceeding (IFFP), pursuant to *VA Code § 2.2-4019*, to present evidence and argument to refute this conclusion. Please contact this Office within 30 days of the date of this letter if you wish us to schedule an IFFP.

If you have any questions, please contact me at *phone number* or *name of District Engineer* at *phone number of District Engineer*.

Sincerely,

Directors Name, PE, Engineering Field Director
Field Office Name Field Office

Attachments: *itemize*
cc: *Local Health Department, ATTN – District Medical Director*
VDH – ODW- Central Office

GUDI NOTIFICATION - SAMPLE LETTER

Letter Attachment INTERIM ACTION REQUIREMENTS

Under the Commonwealth of Virginia *Waterworks Regulations* 12 VAC 5-590-420 the following interim requirements must be followed by a waterworks owner utilizing unfiltered surface water sources or groundwater sources that have been determined to be under the direct influence of surface water (GUDI) during the period before filtration is installed.

1. The owner shall discontinue use of the *GUDI source name* until such time as acceptable filtration and disinfection treatment is installed and is in operation.
2. If the *GUDI source name* must remain in service because discontinuing use of the source is not a viable option, the waterworks owner shall comply with the following requirements:
 - a. Provide continuous chlorine disinfection treatment to achieve a 4-log inactivation of virus, and conduct daily chlorine residual monitoring.
 - b. Issue a boil water notice through the public notification procedure in 12 VAC 5-590-540 until such time as the required filtration and disinfection treatment is installed.
 - c. Increase the bacteriological sampling frequency in the distribution system. [*Select one as appropriate: 1) for waterworks that collect routine distribution system bacteriological samples at a monthly frequency-* The waterworks shall collect twice the number of samples required for that population each month. *2) for waterworks that collect routine bacteriological samples at a quarterly frequency-*, The waterworks shall increase the sampling frequency to monthly.]

GUDI STEP 3 ACTION REQUIRED- SAMPLE LETTER

SUBJECT: *County / City*
Waterworks: *Waterworks Name*
PWSID: *Waterworks PWSID*

Date

Waterworks Owner name
Address 1
Address 2
City, State, Zip

Dear *Waterworks Owner (SDWIS Administrative Contact)*:

The results of routine source water bacteriological monitoring from the source name over the past monitoring time frame have indicated elevated levels of Total Coliform and / or *E. coli*. These results suggest that source name may be at risk being directly influenced by surface water. In accordance the *Waterworks Regulations* 12 VAC 5-590-360 we request that waterworks name initiate additional source water monitoring to allow for a groundwater under direct influence of surface water (GUDI) determination pursuant to 12 VAC 5-590-430 of the *Virginia Waterworks Regulations* to be made.

Staff may wish to provide options available to the waterworks: Site-specific conditions will dictate viable options. Adapt and expand on all viable options as necessary.

Option 1-

Attached is a summary of the source water bacteriological sample results for source name and ODW's review. Based upon our data evaluation, additional water quality testing, referred to as *Step 3*, is necessary to determine if source name is under the direct influence of surface water and if additional treatment is necessary to protect public health.

Attached is a supplement that describes the additional water quality testing requirements and how the results will be evaluated. A *Step 3 Monitoring Plan* must be developed specifically for source name that contains the specific parameters to be monitored, the monitoring frequency, and the reporting of all monitoring results to ODW. A draft *Step 3 Monitoring Plan* for source name is attached for your information and review.

Option 2-

Attached is a summary of the source water bacteriological sample results for source name and ODW's data evaluation review. Based on our data evaluation, additional action is required as this source may be subject to Surface Water Treatment Rule filtration and disinfection requirements. The identified options for your waterworks are as follows:

1. Assume that the source is GUDI and proceed with installing filtration and disinfection treatment,
 2. Permanently disconnect this well or spring and develop a replacement source or connect to a regional waterworks,
 3. Correct any deficiencies that may be the cause of the contamination, or
 4. Conduct additional water quality monitoring to complete the GUDI determination, referred to as *Step 3 Sampling*. A *Step 3 Monitoring Plan* must be developed specifically for source name that contains the specific parameters to be monitored, the monitoring frequency, and the reporting of all monitoring results to ODW.
-

GUDI STEP 3 ACTION REQUIRED- SAMPLE LETTER

If source name is to remain in service during the interim period until the Step 3 water quality data is gathered and a GUDI determination is made, we request that you initiate the following interim requirements, effective upon receipt of this notice:

1. Provide disinfection treatment to achieve a 4-log inactivation of virus. Until disinfection is designed, constructed and operational, public notice with continuous boil water advisory is required.
2. Conduct daily chlorine residual monitoring.
3. Increase the frequency of routine bacteriological monitoring of the finished water to twice the number of samples required based upon the population served.

Please contact me at phone number within the next 5 working days to discuss this issue and your available options. We are also available to meet with you to discuss this further.

Sincerely,

District Engineer, PE,
Field Office Name Field Office

Enclosure: Step 3 for GUDI Determinations

cc *Local Health Department, ATTN – District Medical Director*
VDH – ODW – Central Office

Groundwater Under the Direct Influence of Surface Water **STEP 3 - Water Quality Data Collection**

Overview

Step 3 of the GUDI evaluation procedure consists of gathering additional water quality and meteorological data to determine if there is a direct connection between the subsurface aquifer and the surface. The Step 3 monitoring and evaluation is time-consuming and may take several months to complete. In addition, the waterworks owner may need to acquire a turbidimeter, pH meter and other water quality monitoring equipment.

Developing a Monitoring Plan and Conducting the Sampling

A monitoring plan will be developed by ODW Field Office in cooperation with the owner, which is site-specific to the source being evaluated. The waterworks owner will conduct all monitoring prescribed in the approved monitoring plan and shall submit the monitoring data to the Field Office on a frequency defined in the monitoring plan.

STEP 3 consists of evaluating the results of additional water quality monitoring conducted in accordance with the approved monitoring plan. The monitoring must include source water Microscopic Particulate Analysis (MPA) and physical parameter monitoring (turbidity, water temperature, pH and/or conductivity) of the source water and, if applicable, of a nearby surface water source. In addition to the water quality parameter monitoring, records of rainfall and other meteorological events at the water source location must be recorded.

MPA testing shall be conducted by laboratories acceptable to the commissioner and shall include both *Giardia lamblia* and *Cryptosporidium*.

- a. All MPA testing and reporting of results must be in accordance with the USEPA “*Consensus Method for Determining Groundwaters Under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA)*” dated October 1992.
- b. To optimize the detection of direct surface water influence, MPA samples are typically collected during both wet and dry periods. The purpose of collecting both wet-period and dry-period samples is to analyze water that is most likely to contain indicator organisms typical of surface water, if any exist, at times when conditions for transport to the potential GUDI source are optimal. A minimum of four MPA tests are required, two samples collected each during a wet and a dry period. The MPA tests must be at least 60 days apart.

The waterworks owner must provide the Field Office with all of the monitoring results required in the monitoring plan. MPA results must be provided within 10 days of receipt by the owner if

the laboratory does not provide the ODW with the results directly. Other monitoring (physical parameters) can be provided along with applicable rainfall / meteorological data to the Field Office on a monthly or quarterly frequency as stipulated in the monitoring plan. All water quality monitoring data and rainfall data must be detailed and presented in the final report.

Evaluation of the Step 3 Sampling Results

Physical parameters (turbidity, water temperature, pH and/or conductivity) are indicators of direct surface water influence and will be evaluated for a direct correlation between groundwater monitoring results and monitoring results from a nearby surface water source, taking into account significant rainfall or other meteorological events, or a fluctuation in source water following a significant rainfall or other meteorological event.

The MPA laboratory results must be reported in accordance with the above mentioned EPA consensus method. Application of this method results in relative risk factors (scores) that will be used to determine the degree of risk associated with influence by surface water. The following relative risk factors will be used to make the GUDI determination:

- High risk – A lab-provided MPA risk calculation ≥ 20
 - Moderate risk – A MPA risk calculation equal to or greater than 10 and ≤ 19
 - Low risk – A MPA risk calculation ≤ 9
1. If any single MPA sample result indicates a score greater than or equal to 20, the source is determined to be GUDI.
 2. If any two MPA sample results indicate scores equal to or greater than 15, the source is determined to be GUDI.
 3. If all MPA sample results indicate scores of equal to or less than 9, the source is determined to be a groundwater source (NOT GUDI). Note that source water monitoring continues. ODW may increase the frequency of this monitoring or require additional monitoring parameters.
 4. If the source is not determined to be GUDI based upon the physical monitoring criteria or the MPA sample results; and if all the MPA results are not equal to or less than 9, a decision on future actions will be made. All of the available water quality data, geology, well construction, and any other relevant factors are reviewed and evaluated by ODW and either (1) the source is “at risk” and continued monitoring will be required, or (2) the source to be a declared a groundwater source (NOT GUDI). Note that even with this action source water monitoring continues.

EPA Relative Risk Tables

The following tables are excerpted from the USEPA "Consensus Method for Determining Groundwaters Under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA)" dated October 1992.

Table A. Numerical range of each bio-indicator based on numbers counted per 100 gallons filtered water*

Indicators of Surface Water*	Extremely Heavy	Heavy	Moderate	Rare	None Found
Giardia**	>30	16-30	6-15	1-5	0
Coccidia**	>30	16-30	6-15	1-5	0
Diatoms	>150	41-149	11-40	1-10	0
Other Algae	>300	96-299	21-95	1-20	0
Insects/Larvae	>100	31-99	16-30	1-15	0
Rotifers	>150	61-149	21-60	1-20	0
Plant Debris	>200	71-200	26-70	1-25	0

Table B. Relative surface water risk factors associated with scoring of bio-indicators present during MPA of subsurface water sources.

Particulates Indicative of Surface Water*	Extremely Heavy***	Heavy	Moderate	Rare	None Found
Giardia	40	30	25	20	0
Coccidia	35	30	25	20	0
Diatoms	16	13	11	6	0
Other Algae	14	12	9	4	0
Insects/Larvae	9	7	5	3	0
Rotifers	4	3	2	1	0
Plant Debris	3	2	1	0	0

Table C. Risk of Groundwater Contamination by Surface Water Influence

≥20****	High Risk
10-19	Moderate Risk
≤ 9	Low Risk

* According to EPA "Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources," March, 1991 ed.

** If *Giardia* cysts, *Cryptosporidium*, or other coccidia are found in any sample, irrespective of volume, score as above.

*** Refer to Table A for range of indicators counted per 100 gallons under 100X.

**** Refer to Table B for numerical relative risk factor.

Instructions and General Information

Completing the Monitoring Waiver Application Form

Introduction

The Safe Drinking Water Act requires that all community and nontransient noncommunity (NTNC) waterworks have their drinking water tested for the Phase II/V contaminants, in accordance with a Standardized Monitoring Framework consisting of a compliance cycle of 9 years made up of three consecutive 3-year compliance periods. This framework initially started in 1993 (1st cycle: 1993-1998; 2nd cycle: 2002-2010; 3rd cycle: 2011-2019; 4th cycle: 2020-2028; and so on repeating every 9 years.)

For each 3-year compliance period, all community and NTNC waterworks are required to monitor for the regulated Synthetic Organic Chemical (SOC) contaminants listed in Table 1, or the waterworks may apply for one or more SOC monitoring waivers. The Federal Regulations allow the State Health Commissioner (Commissioner), by his/her own volition or by waiver application evaluation, to grant waivers, contaminant by contaminant, for SOCs. In addition to SOC waivers, the Commissioner may grant a waiver for one inorganic chemical (IOC) - cyanide. Cyanide monitoring may be waived after the initial monitoring requirements have been completed with no detection.

The Commissioner will determine if these contaminant(s) will be waived by contaminant group, regional, or statewide grants. Waterworks that are not granted waivers must comply with the minimum sampling requirements defined in the 12VAC5-590-370, *Waterworks Regulations*. The Commissioner will grant waivers for a maximum of 3 or 9 years, depending on the contaminant and waterworks' specific conditions. Generally, waivers are renewable, but an application must be filed with the ODW prior to the waivers expiring. The Commissioner may rescind any waiver at his/her discretion, and waivers will not be granted by the Commissioner to any waterworks that knowingly falsifies information.

Definitions

"Source Water Assessment Area" is described as the watershed area as follows:

Zone 1 - This is an assessment area where contamination events are considered to have the highest risk to impact drinking water supplies under VDH Source Water Assessment Program (SWAP). Typically, Zone 1 represents a 5-mile radius upstream from a surface water intake, and a 1,000-ft radius from a groundwater source.

Zone 2 - This is an assessment area beyond Zone 1 where contamination events are considered to possibly exist and may still have an impact on drinking water supplies under the VDH SWAP. Zone 2 represents the watershed area beyond Zone 1 for a surface water intake, and the area between Zone 1 and a 1-mile radius from a groundwater source.

"Entry point" is defined as the initial location of water entering the distribution system which is representative of each source after treatment. Waterworks may have one or more entry points, and the SOC monitoring must occur at these entry points. All waiver applications must address each entry point to the waterworks.

Statewide Waivers

The United States Environmental Protection Agency (USEPA) allows States to propose statewide waivers based on geographic vulnerability assessments. The Commissioner has determined that statewide waivers

are appropriate for the following chemicals: Dioxin, Endothall, Asbestos, and Glyphosate. Waivers have already been granted for these contaminants to all community and NTNC waterworks.

Contaminant-Specific Waivers

The USEPA allows States to grant contaminant-specific waivers for chemicals listed in Table 1, based on use and susceptibility determination. The Commissioner may grant waivers for three SOCs: dibromochloropropane, ethylene dibromide, and diquat. However, waterworks that are in sandy soil areas of the Tidewater region, where diquat is used, will not be granted a waiver. In addition to SOC waivers, the Commissioner may grant a waiver for one IOC - cyanide. Cyanide monitoring may be waived after the initial monitoring requirements have been completed with no detection, with the condition that at least one cyanide sample must be taken while the waiver is effective. Waivers for cyanide are granted based on a compliance cycle of 9 years.

A waterworks may apply for other use waivers if it can be determined that the regulated contaminant(s) were not used, manufactured, stored, transported, or disposed of in the source water assessment area. Should any contaminant(s) exist in the source water assessment area, a monitoring waiver may or may not be granted, depending on proximity to the source and other factors.

A waterworks may apply for a susceptibility waiver if the waterworks owner provides the following information for review and evaluation:

- Previous monitoring data, including well developmental samples. If a contaminant has been detected in previous monitoring, the waterworks is normally not eligible for a waiver. However, for a “no detect” of a contaminant, a waiver will typically be granted.
- Contaminant persistence and transport. As an example, a contaminant such as polychlorinated biphenyls (PCBs), which is a “Semivolatile” SOC listed in Table 1, persists in the environment, but is generally not mobile. In such situations, it is unlikely that a waiver will be granted for the contaminant.
- Aquifer properties and geological setting. A shallow, unconfined aquifer is more susceptible to contamination than a deep, confined aquifer. If a waterworks source is located in a karst area, the waterworks is not normally eligible for a waiver. A groundwater well under the direct influence of surface water (GUDI) is considered susceptible to contamination, and would not normally be eligible for a susceptible waiver.
- Well construction. Wells that do not comply with the *Waterworks Regulations* regarding construction would not be eligible for a susceptibility waiver.

Completing the Waiver Application Form

Complete the enclosed waiver application form for all SOC and cyanide monitoring waivers. The following tables have been provided to assist you:

- **Table 1. List of the Regulated SOC (Synthetic Organic Chemical) Contaminants** that may be waived.
- **Table 2. Common Names for Synthetic Organic Chemicals** helps to identify between the common/commercial name (i.e., “Trade” name) and the “scientific” name of a chemical product, such as a pesticide.
- **Table 3. Source Water Assessment Typical Contaminants Compendium** describes various land use activities and the types of chemical contaminants that might potentially exist or be associated with these land use activities

You may choose to use information by others. For example, ODW has developed a Source Water Assessment (SWA) information tool that can generate outputs (e.g., maps and GIS data showing land use, potential contaminant sources, etc.) specific to your waterworks. This information can be made available to you upon request through your District Engineer.

Return the completed waiver application to the appropriate ODW Field Office on or before the stated deadline in the transmittal letter. Failure to submit a waiver application will result in the waterworks having to collect the appropriate SOC and/or cyanide samples in accordance with the *Waterworks Regulations*.

If you have questions or need technical assistance, contact your District Engineer at the appropriate ODW Field Office.

Table 1. List of the Regulated SOC (Synthetic Organic Chemical) Contaminants

<p>Volatile Fumigants</p> <ol style="list-style-type: none"> 1. Ethylene dibromide 2. Dibromochloropropane <p>Carbamates</p> <ol style="list-style-type: none"> 3. Carbofuran 4. Oxamyl (vydate) <p>Chlorinated Acid Herbicides</p> <ol style="list-style-type: none"> 5. Pentachlorophenol⁰ 6. 2,4-D 7. Dalapon 8. 2,4,5-TP 9. Dinoseb 10. Picloram 	<p>Semivolatiles</p> <ol style="list-style-type: none"> 11. Polychlorinated biphenyls 12. Toxaphene 13. Alachlor 14. Atrazine 15. Benzo [a] pyrene 16. Chlordane 17. Di(2-ethylhexy)adipate 18. Di(2-ethylhexy)phthalate 19. Endrin 20. Heptachlor 21. Heptachlor epoxide 22. Hexachlorobenzene 23. Hexachlorocyclopentadiene 24. Lindane 25. Methoxychlor 26. Simazine 	<ol style="list-style-type: none"> 27. Diquat 28. Endothall 29. Glyphosate 30. 2,3,7,8-TCDD (Dioxin)
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Table 2. Common Names for Synthetic Organic Chemicals

Chemical	Common Commercial Names	Origin and Use
Alachlor	Alanex; Alanox; Alatox; Alochlor; Alochlore; Chimiclor; CP 50144; Lasagrín; Lassagrín; Lasso; Lazo; Metachlor; Methachlor; and Pillarzo; Agrinate; Pillarmate	Alachlor was widely used as a pre-emergence herbicide to control annual grasses and broadleaf weeds in soybean, sorghum, cotton, vegetables, forage crops, beans, beets, cabbage, ornamentals, teas, potatoes, sugarcane, sunflowers, tobacco, peanuts, maize, groundnuts, lima beans, oilseed rape, brassicas, radish, soya bean, oil radish, and corn.
Aldicarb Sulfone	Aldoxycarb; ENT 4.9; ENT A13-29261; Standak; Sulfocarb; and UC-21865.	Aldicarb Sulfone is a breakdown product of aldicarb.
Aldicarb Sulfoxide	Temik Sulfoxide.	Aldicarb Sulfoxide is a breakdown product of aldicarb.
Aldicarb	Aldecarb; Carbamyl; Carbanolate; ENT 27,093; NCI-C08640; OMS 771; Sulfone aldoxycarb; Temic; Temik; and UC 21149.	Aldicarb was used as a pesticide to control insects, mites and nematodes on ornamentals, sugar beet, fodder beet, strawberries, potatoes, onions, hops, vine nurseries, tree nurseries, groundnuts, soya beans, citrus fruit, bananas, coffee, sorghum, pecans, cotton, and sweet potatoes.
Aldrin	Aldocit; Aldrec; Aldrex; Aldrine; Aldrite; Aldrix; Aldron; Aldrosol; Algran; HHDN; Kortofin; Ocludene; Seedrin; Seedrin; Soilgrin; Tatuzinho; and Tipula.	Aldrin is an insecticide used to control soil-dwelling pests.
Atrazine	A 361; Aatrex; Actinite; Akticon; Aktikon; Aktinit; Argezin; Atazinax; Atranex; Atrasine; Atrataf-, Atritol A; Atrazin; Atrex; Atred; Candex; Cekuzina-T; Chromozin; Crisatrina; Crisazine; Cyazin; Fenamin; Fenamine; Fenatrol; G 30027; Geigy 30,027; Gesaprim; Gesoprim; Griffex; Hungazin; Inakor; Oleogesaprim; Pitezin; Primatol; Primaze; Radazin; Radizine; Strazine; Triazine A 1294; Vectal; Weedex A; Wonuk; Farmco Atrazine; Fiffex 4L; G30027; Gesaprim; Malermais; Zeaphos; Zeazin; Zeazine; and Caswell No. 063.	Atrazine was widely used as a herbicide for control of broadleaf and grassy weeds in corn, sorghum, sugarcane, pineapple, citrus fruits, bananas, rangeland, macadamia orchards, turf grass sod, conifer reforestation, Christmas tree plantation, asparagus, forestry, grasslands, grass crops, roses, African oil palm, and coffee.
Benzo(a)pyrene	BaP; 3,4-Benz(a)pyrene	Benzo(a)pyrene is found in exhaust from motor vehicles and other gasoline and diesel engines, emission from coal-, oil-, and wood-burning stoves and furnaces, cigarette smoke; general soot and smoke of industrial, municipal, and domestic origin, and cooked foods, especially charcoal-broiled; in incinerators, coke ovens, and asphalt processing and use.
Butachlor	Aimehlor; Lambast; Mach-Mach; and Weedout.	Butachlor is an herbicide used to control most annual grasses and certain broadleaf weeds.
Carbaryl	Arilat; Arilate; Arylam; Atoxan; Befcema	Carbaryl is used as an insecticide for corn, alfalfa, livestock, poultry,

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Chemical	Common Commercial Names	Origin and Use
	<p>NMCSO; Bug Master; Carbamine; Carbaril; Cekubaryl; Crunch; Denapon; Devicarb; Dicarbam; <u>Germain's</u>; Hexavin; Karbaspray; Karbatox; Menaphtam; Monsur; Murvin; Panam; Pomex; Savit; Sedit F; Seffein; Septene; Sevin; Pellents; Tercyl; and Tricarnam.</p>	<p>gardens, lawns, mangoes, bananas, strawberries, nuts, vines, olives, okra, curcubits, sorghum, lucerne, potatoes, ornamentals, and forestry.</p>
Carbofuran	<p>Bay 70143; Brifur; Carbofuran; Chinufur; Crisfuran; Curateff; Curaterr; D1221; ENT 27164; FMC 10242; Furacarb; Furadan; Furodan; Kenofuran; Niagara 10242; OMS 964; Pillarfuran; and Yaltox.</p>	<p>Carbofuran was used as an insecticide, nematocide, and miticide to control insects, mites, and nematodes in corn, alfalfa weevil, aphids, lygus bugs, foliage feeding insects in tobacco, thrips in peanuts and cotton, rice water weevil, wireworms, sugarcane borer in sugarcane, greenbug in sorghum, Colorado potato beetle, leafhoppers, flea beetles in potatoes, mexican bean beetle in soybeans, foliar feeding insects, phylloxera in grapes, grasshoppers, stem weevils, and sunflower beetles.</p>
Chlordane	<p>Aspon-chlordane; Belt; CD 68; Chlor Kil; Chlordan; Chlordano; Chlorindan; Chlortox; Corodane; Cortilan-Neu; Dowchlor; ENT 25,552-X; ENT 9,932; Gold Crest C-100; HCS 3260; Intox; Kilex Lindane; Kypchlor; NCI-C00099; Niran; Octa-Klor; Octa-Klor; Octachlor; Oktaterr; Ortho-Klor; Pentiklor; Prentos; Synklor; Tat Chlor; Termini-Ded; Topiclor; Toxichlor; Velsicol 1068; and Intox 8.</p>	<p>Chlordane was used as a fumigant, an acaricide, and an insecticide to control underground termites, grubs, ants, webworms, armyworms, cutworms, fire ants, chiggers and leafhoppers in homes, gardens, ornamentals, deciduous fruits, nuts, corn, citrus, vegetables, lawns, turf, ditch banks, and roadsides.</p>
Dibromochloropropane (1,2-dibromo-3-chloropropane)	<p>BBC 12; DBCP; Fumagon; Fumazone; NCI-C00500; Nemabrom; Nemaftune; Nemagone; Nemanax; Nemapaz; Nemaset; Nematocide; and Nemawn.</p>	<p>Dibromochloropropane was used as a pesticide to control nematodes on cucumbers, summer squash, cabbage, cauliflower, carrots, snap beans, okra, aster, shasta, daisy, ornamental turf (lawns), bermuda grass, centipede grass, St. Augustine grass, zoysia gram, ardisia, azalea, camellia, forsythia, gardenia, hibiscus, roses and arborvitae. Dibromochloropropane's use was discontinued in 1979.</p>
2,4-D	<p>2,4-dichlorophenoxyacetic acid; A-4D; Acme LV 4; Acme Amine 4; Acme LV 6; Agent White; Agricorn D; Agrotect; Agroxone; AGSCO 400; Amoxone; AquaKleen; B-Selektionon; Barrage; Bladex-B; Brush Killer 64; Butyl Ester 4; Chipco Turf Herbicide D; Chloroxone; Croprider; Dicofur; Dinoxol; DMA 4; Dormon; 2,4-Dichloro-phenoxyacetic</p>	<p>2,4-D is an herbicide commonly used on wheat, sorghum, corn barley, rangeland, pasture, and by homeowners to control canada thistle, ragweed, annual mustards, lambs quarters, dandelions and other broadleaf plants in the lawn. If you have used a dandelion killer on your lawn, you have probably used 2,4-D.</p>

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Chemical	Common Commercial Names	Origin and Use
	acid; Fernesta; Ferxone; Green Cross Weed-No-More 80; Hedonal; Ipaner; Lawn-Keep; Macondray; Malerbane; Malerbane Cereali; Mota Maskros; Moxon; Netagrone; Permamine D; Pielik; Planotox; Plantgard; Red Devil Dry Weed Killer; Scott's 4XD; Silvaprop; Tributon; Verton; Weedone; Weed Rhap; Weed-Ag-Bar; Weed-B-Gone; Weedar; Weedatul; Weedez Wonder Bar; and Weedtrine-11.	
Dalapon	Alatex; Basfapon; Basinex; Crisapon; Dalacide; Dalapon-NA; Dawpon-RAE; Ded-Weed; Devipon; Dowpon; DPA; Gramevin; Kenapon; Liropon; Propon; Proprop; Radapon; Revenge; Unipon S-1315; S-95; 2,2-DPA; and 2,2-dichloro-propionic acid	Dalapon is used as an herbicide to control grasses in crops, drainage ditches, along railroads and in industrial areas.
Di(2-ethylhexyl)adipate	Adipol, Bisoflex, Effomoll, Kodiflex, Monoplex, Plastomoll, Sicol, Truflex, Vestinol, Wickenol, Witamol, Ergoplast, Kemester, Reomol, Rucoflex, and Staflex	Di(2-ethylhexyl)adipate is released in fly ash from municipal waste incineration, wastewater effluent from sewage treatment plants and chemical manufacturing plants. Since Di(2-ethylhexyl)adipates are known to leach from plumbing made of PVC plastic, they have been recognized as a potential drinking water contaminant. If released to soil or water, Di(2-ethylhexyl)adipate is expected to be broken down by microbes. It will adhere to sediments in water bodies and will not leach through soil to ground water.
Di(2-ethylhexyl)phthalate	BEHP; Bisoflex 81; DAF 68; DEHP; Dioctyl phthalate; Ergoplast; Eviplast; Fleximel; Flexol; Good-rite GP264; Hatcol; Hercoflex 260; Kodaflex; Mollan; Nuoplaz; Palatinol; Pittsburgh PX-138; Platinol AH; Octoil; RC Plasticizer; Reomol; Sicol; Staflex; Truflex; Vestinol; Vinicizer;	Disposal of polyvinyl chloride and other di(2-ethylhexyl)phthalate containing materials by incineration, landfill, etc., will result in the release of di(2-ethylhexyl)phthalate into the environment.
Dibromochloropropane	BBC 12; DBCP; Fumagon; Fumazone; Nemabrom; Nemafum; Nemafo; Nemanax; Nemapaz; Nemaset; Nemazon; Gro-Tone Nematode; and Durham Nematocide.	Dibromochloropropane was released into the environment from fumigants and nematocide uses.
Dicamba	Banvel; Brush Buster; Compound B; Dianat; MDBA; Mediben; Metambane; and Velsicol.	Dicamba is a post-emergence herbicide commonly used on corn oats, wheat, for lawn care, and right-of-ways. Dicamba controls weeds in crops lands and non-crop areas and to control brush and vines in non-cropland, pastures and rangeland areas.

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Chemical	Common Commercial Names	Origin and Use
Dieldrin	Alvit; Dieldrex; Dieldrite; Dielmoth; HEOD; Octalox; Quintox; Red Shield; Termitox; and Illoxol.	Dieldrin is an insecticide used for soil insects, termites, and several other pests.
Dinoseb	Aatox; Basanite; Butaphene; BNP-20; Caldon; Chemox; Chemsect; Desicoil; Dibutox; Dinitrall; Dinitro; Dinitrobutyl-phenol; Dow Selective Weed Killer; DNBP; Dynamyte; Dyttop; Elgetol; Gebutox; Hel-Fire; Hivertox; Kiloseb; Knox-Weed; Ladob; Laseb; Nitropone C; Premerge; Sinox General; Subitex; Unicrop DNBP; and Vertac Dinitro Weed Killer.	Dinoseb is used as an insecticide, ovicide, desiccant, and dormant fruit spray.
Diquat	Aquacide; Deiquat; Dextrone; Reglone; sand Weed-trine-D.	Diquat is commonly used on potatoes and for aquatic plant control.
Dioxin (2,3,7,8-TCDD)	Dioxin and Tetradoxin	Dioxin is one of the most toxic and environmentally stable tricyclic aromatic compounds of its structural class. Due to its very low water solubility, most of the dioxin occurring in water will adhere to sediments and suspended silts. Similarly, it tends to adhere to soil if released to land, and is not likely to reach ground water.
Endothall	Accelerate; Aquathol; Des-i-cate; Endothall Turf Herbicide (ETH); Endothall Weed Killer; Herbicide 273; Herbon Pennout; Hydout; Hydrothol; and Niagrathal.	Endothall is used as a defoliant, desiccant, and as an herbicide for terrestrial and aquatic weeds.
Endrin	Compound 269; EN 57; Endrex; Endricol; Hexadrin; Mendrin; Nendrin; and Oktanex.	Endrin is an insecticide used to control army cutworm, pale western cutworm, pine vole, meadow vole, and grasshoppers on cotton, maize, grains, rice, ornamentals, cereals, sugarcane, and apple orchards.
Ethylene Dibromide	Aadibroom; Bromofume; Celmid; Dowfume; E-D-Bee; EDB; EDB-85; ENT 15,349; Glycol dibromide; Iscobrome D; KopFume; NCIC00522; Nefis; Nephis; Pestmaster; Sanhyuum; Soilbrom; Soilfume; and Unifume.	Ethylene Dibromide was used as a fumigant, an insecticide, a nematicide, and a solvent for agricultural settings but it is no longer used to control nematodes, to fumigate grains and fruits, to dissolve resins, gums, and waxes, and as a scavenger for lead in gasoline. EPA banned the use of Ethylene Dibromide in 1983.
Glyphosate	Glialka; Glifonox; Glycel; Glycine; Muster; Rodeo; Rondo; Round-up; Sonic; Spasor; Sting; and Tumbleweed.	Glyphosate is an herbicide used in field crops, right-of-ways, and homeowners use for control of grasses, broadleaf weeds and woody brush.
Heptachlor and Heptachlor Epoxide	Aahepta; Agroceres; Basaklor; Drinox; H-34; Eptacloro; Gold Crest H-60; GPKH; Hepta; Heptachloor; Heptachlorane; Heptachlore; Heptagran; Heptagranox; Heptamak;	Heptachlor was used as an insecticide for control of termite, cotton boll weevil, white grubs, root weevils and wireworms on certain field crops, citrus crops, foliar treatment, seed treatment, vegetables, sugar beets, and pineapples.

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Chemical	Common Commercial Names	Origin and Use
	Heptarnul; Heptamul; Heptasol; Heptox; Rhodiachlor; Soleptax; Termide; and Velsicol.	
Hexachlorobenzene	Anticarie; Amatin; Bunt-cure; Bunt-no-more; Ceku C.B.; Co-op hexa; Granox; HCB; Hexa CB; Julin's carbon chloride; No Bunt; Phenyl perchloryl; Perchlorobenzene; Sanocide; Snieciotox; Smut-go; and Voronit C.	Hexachlorobenzene is used as a fungicide for seed protection.
Hexachlorocyclopentadiene	Hex and Hexachloropentadiene	Hexachlorocyclopentadiene is not a persistent environmental contaminant. If released to soil, it is likely to adhere to soil where it will be degraded by microbes. In water it evaporates quickly and is attacked by sunlight and other reactive chemicals.
3-Hydroxycarbofuran	Carbofuran-3-hydroxy;	3-Hydroxycarbofuran is a metabolite of the insecticide carbofuran, a fumigant used on rice and alfalfa.
Lindane	Agronexit; Etan 3G; Exagamma; Forlin; Gamaphex; Gamma BHC; Gamma-Hexachlorocyclohexane; Gamma-Mean 400; Gamma-Mean L.O.; Gammex; Gammaphex; HCH; Hi Lin; Inexit; Isotox; Kwell; Lacco Lin-0-Mulsion; Lacco; Lin-O-Sol; Lindagam; Lindagranox; Lindaterra; Lovigram; Necit; Novigam; and Silvanol.	Lindane was used as a insecticide for corn, wheat, ornamental, pastures, forage crops, forestry, timber protection, livestock, and for soil and seed treatment and viticulture.
Methomyl	Metomil; Mesomile; Acinate, Agrinate, DuPont 1179, Flytek, Kipsin, Lannate, Lanox, Memilene, Methavin, Methomex, Nudrin, NuBait, Pillarmate; and SD 14999	Methomyl is a broad-spectrum insecticide that is used to kill <u>insect pests</u> . It is registered for commercial/professional use under certain conditions on sites including field, vegetable, and orchard crops; turf (<u>sod farms only</u>); <u>livestock</u> quarters; commercial premises; and refuse containers. Products containing 1% Methomyl are available to the general public for retail sale, but more potent formulations are classified as restricted-use pesticides.
Methoxychlor	Chemform; Dimethoxy-DDT; DMDT; Double-M EC; Flo Pro Mc; Higalmetox; Maralate; Methoxcide; Methoxo; Methoxy-DDT; Methoxo; Methoxcide; Metox; and Moxie.	Methoxychlor is used as an insecticide on sweet corn, snap beans, apples, and is effective against mosquito larvae and house-flies.
Metolachlor	Bicep; COA; Dual; Humextra; Metelilachlor; Metolachlore; Pennant; Primagram; and Primextra.	Metolachlor is a selective herbicide used for pre-emergence and preplant incorporated weed control in corn soybean, potatoes, maize, sorghum, cotton, sugar beet, fodder. beet, groundnuts, safflowers, sunflowers, woody ornamentals, sunflowers and flax.
Metribuzin	Bay; Bayer; Lexone; Sencor; Sencoral;	Metribuzin is an herbicide used to control grassy and broadleaf weeds in

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Chemical	Common Commercial Names	Origin and Use
	Sencorex; and Sengoral.	soybeans and potatoes.
Oxamyl	DPX 4010; Dioxamyl; Dupont 1410; Oxamil; Thioxamyl; and Vydate.	Oxamyl is used as an insecticide, acaricide and nematocide on field crops, vegetables, apples, other fruits, ornamentals, and mint.
Pentachlorophenol	Antimicrobial; Block Penta; Chlon; Dowicide EC-7; Dura Treet 11; Forpen-50; Fungifen; GLAZD Penta; Grundier Arbezol; Lauxtol; Liropren; Ontrack WE Herbicide; Osmose WPC; PCP; Penchlorol; Penta; Penta Ready; Penta WR; Pentacon; Penwar; Permasan; Priltax; Santobrite; Santophen; Sinituho; Watershed WP; Weed and Brush Killer; Weedone; and Woodtreat.	Pentachlorophenol is a wood preservative commonly used for treating fence posts and in other applications where wood is expected to come in contact with the soil to protect against fungal decay and termite attack. In addition, pentachlorophenol is used as an herbicide, antimicrobial agent, disinfectant, molluscicide, slimicide, algaecide, and defoliant.
Picloram	Agent White; Arndon; Borolin; Grazon; K-Pin; Pinene; and Tordon.	Picloram is used as an herbicide for control of broadleaf and woody plants in range lands, pastures, and in rights-of-way for powerlines and highways.
Polychlorinated Biphenyls (PCBs)	Aroclor; Dykanol; Chlorextol; Chlorinated diphenyl; Clophen; Fenclor; Inerteen; Kanechlor; Monter; Noflamol; PCB; Pyralene; Santotherm; Sovol; and Therminol.	Polychlorinated Biphenyls current releases are due mainly to the cycling of this persistent contaminant from soil to air to soil. PCBs are released from landfills, incineration of municipal refuse and sewage sludge, and improper (or illegal) disposal of PCB materials, such as waste transformer fluid, to open areas.
Propachlor	Ramrod; Bexton; and CP 31393.	Propachlor is a preemergence herbicide on corn (all types), soybeans (seed only), grain sorghum (milo), green peas, pumpkins, cotton, and flax. In corn, it can also be applied as an early postemergence control. Sorghum is the largest use site for propachlor, accounting for most uses of the wetttable powder formulation. Corn is the second largest use site for propachlor, accounting for most uses of the granular formulation.
Simazine	Aktinit; Aquazine; Batazina; Bitemol; CAT; CDT; Cekusina; CET; Geigy; Gerbazin; Gerbex; Gesatop; Herbazin; Herbex; Hungazin; Premazine; Primatol S; Princep; Printop; Radocon; Simadex; Tafazine; Totazina; and Zeapur.	Simazine is an herbicide used as a selective pre-emergence herbicide for control of most annual grasses and broadleaf weeds in corn, apples, and various other crops and in certain ornamental and tree nursery stock, such as Christmas trees and in turf grass soil production. It is also used to inhibit the growth of algae in aquariums, fish ponds and fountains.
Toxaphene	Agricide Maggot Killer; Alltex; Alltox; Anatox; Attac; Argo-Chem Brand Torbidan 28; Camphechlor; Camphochlor; Camphophene Huileux; Chem-Phene; Chlorinated Camphene; Cotton-Tox; Crestoxo; Compound 3956; Dr. Roger's Toxene; Estonox; Fasco-Terpene; Geniphene; Gy-phene; Hercules; Kamfochlor; M5055; Melipax; Motox;	Toxaphene is used as an insecticide for cranberries, strawberries, apples, pears, quinces, nectarines, peaches, bananas, pineapple, eggplant, peppers, pimentos, tomatoes, broccoli, brussel sprouts, cabbage, cauliflower, collards, kale, kohlrabi, spinach, lettuce, parsnips, rutabagas, beans, cowpeas, okra, barley, oats, rye, celery, cotton, peas, soybeans, peanut, corn, wheat, rice, alfalfa, sorghum, fruits, nuts, ornamentals, forage, turf, cattle, sheep, goats, swine, and horses.

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Chemical	Common Commercial Names	Origin and Use
	Octachlorocamphene; PCC; Penphene; Phenacide; Phenatox; Polychlorocamthene; Poxyphe; Rigo Toxaphene; Royal Brand Bean Tox; Security Tox-Sol-6; Security Tox-MP cotton spray; Strobane T-90; Strobane-T; Toxadust; Tox"; Toxaphen; Toxon 63; and Vertac 90%.	
2,4,5-Trichlorophenoxypropionic Acid (2,4,5-TP)	2-(2,4,5-trichlorophenoxy)propionic acid; Amchern; Amchem 2,4,5 TP; Aqua-Vex; Color-Set; Ded-Weed; Double Strength; Fenoprop; Fenormone; Fruitone T; Garlon; Kuron; Kurosai; Miller Nu Set; O-X-D; Propon; Silvex; Silvi-Rhap; Sta-Fast; and Weed-B-Gone.	2,4,5-Trichlorophenoxypropionic Acid is used as an herbicide for weed and brush control on floodways, canals, reservoirs, streams, pasture, rangeland, lawns, turf, and aquatic use.

Table 3. Source Water Assessment - Typical Contaminants Compendium

Land Use or Activity	Typical Contaminants ^{1,2,3}	Potential Contaminant Types
COMMERCIAL / INDUSTRIAL		
Auction lots	Livestock sewage wastes; nitrates; phosphates; coliform and noncoliform bacteria; giardia, viruses; total dissolved solids	Inorganics
Automotive Body shops/repair shops Car washes Gas stations	Waste oils; solvents; acids; paints; automotive wastes ⁴ ; miscellaneous cutting oils Soaps; detergents, waxes; miscellaneous chemicals oils; solvents; gasoline, diesel, miscellaneous wastes, lead	Inorganics, SOCs, VOCs
Boat Services/repair/refinishing	Diesel fuels; oil; septage from boat waste disposal area; wood preservative and treatment chemicals; paints; waxes; varnishes; automotive wastes ⁴	Inorganics, SOCs, VOCs
Cement / concrete plants	Diesel fuels; solvents; oils; miscellaneous wastes	Inorganics, SOCs, VOCs
Dry cleaners	Solvents (perchloroethylene, petroleum solvents, Freon); spotting chemicals (trichloroethane, methyl chloroform, ammonia, peroxides, hydrochloric acid, rust removers, amyl acetate)	VOCs
Electrical/electronic manufacturing	Cyanides; metal sludges; caustic (chromic acid); solvents; oils; alkalis; acids; paints and paint sludges; calcium fluoride sludges; methylene chloride; perchloroethylene; trichloroethane; acetone; methanol; toluene; PCBs	Inorganics, SOCs, VOCs
Food processing / Animal Slaughtering	Nitrates; salts; phosphorus; miscellaneous food wastes; chlorine; ammonia; ethylene glycol	Inorganics, Microbial, VOCs, SOCs
Funeral homes and Mortuaries	External corporeal wash water, internal body fluids, as well as residual arterial embalming chemicals (formaldehyde, phenol, and methanol)	Inorganics, Microbial, SOCs, VOCs
Furniture repair/manufacturing	Paints; solvents; degreasing and solvent recovery sludges; lacquers; sealants	Inorganics, SOCs, VOCs
Hardware/lumber/parts stores	Hazardous chemical products in inventories; heating oil and fork lift fuel from storage tanks; wood-staining and treating products such as creosote; paints; thinners; lacquers; varnishes	Inorganics, SOCs, VOCs
Home manufacturing	Solvents; paints; glues and other adhesives; waste insulation; lacquers; tars; sealants; epoxy wastes; miscellaneous chemical wastes	Inorganics, SOCs, VOCs
Hospitals/Research laboratories	X-ray developers and fixers ⁵ ; infectious wastes; radiological biological wastes, disinfectants; asbestos; beryllium; solvents; infectious materials; drugs; disinfectants; (quaternary ammonia, hexachlorophene, peroxides, chlorhexidine, bleach); and miscellaneous chemical wastes.	Inorganics, Microbial, RADs, SOCs, VOCs

AM#1740 - Attachment A.1 Instructions & General Information for the Completion of the Waiver Application Form by Waterworks Owners.

Junk/scrap/salvage yards	Automotive wastes ⁴ ; PCB contaminated wastes; any wastes from businesses ⁶ and households ⁷ ; oils; lead	Inorganics, SOCs, VOCs
Machine shops	Solvents; metals; miscellaneous organics; sludges; oily metal shavings; lubricant and cutting oils; degreasers (tetrachloroethylene); metal marking fluids; mold-release agents	Inorganics, SOCs, VOCs
Medical/vet offices	X-ray developers and fixers ⁸ ; infectious wastes; radiological wastes; biological wastes; disinfectants; asbestos; beryllium; dental acids; variable miscellaneous chemicals	Inorganics, Microbial, RADs, SOCs, VOCs
Metal plating/finishing/ fabricating	Sodium and hydrogen cyanide; metallic salts; hydrochloric acid; sulfuric acid; chromic acid; boric acid; paint wastes; heavy metals; plating wastes; oils; solvents	Inorganics, SOCs, VOCs
Military installations	Wide variety of hazardous and nonhazardous wastes depending on the nature of the facility and operation ⁹ ; diesel fuels; jet fuels; solvents; paints; waste oils; heavy metals; radioactive wastes	Inorganics, RADs, SOCs, VOCs
Office buildings/complexes	Building wastes ⁶ ; lawn and garden maintenance chemicals ⁵ ; gasoline; motor oil	Inorganics, SOCs, VOCs
Parking lots/malls	Hydrocarbons; heavy metals; building wastes ⁶	Inorganics, SOCs, VOCs
Pharmaceutical	TSS, oil & grease, fecal coliform, volatile organic compounds, nonconventional pollutants.	Microbial, SOCs, VOCs
Photo processing, print shop	Ethanol, isopropanol, ethylene glycol, xylene, toluene, cyclohexanone, petroleum products, volatile organic compounds, lead, chromium, silver, cadmium, and barium,	Inorganics, SOCs, VOCs
Textiles	Scouring alkali waste, oils, surfactants, lubricants, dye, bleaching (hydrogen peroxide, sodium hypochlorite, sodium chlorite, sulfur dioxide), caustic soda, salts	Inorganics, SOCs
Wood preserving/treating	Wood preservatives; creosote, pentachlorophenol, arsenic, dioxin.	Dioxin, Inorganics, SOCs
Wood/pulp/paper processing and mills	Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals ⁹ ; organic sludges; sodium hydroxide; chlorine; hypochlorite; chlorine dioxide; hydrogen peroxide; treated wood residue (copper quinolate, mercury, sodium azide); tanner gas; paint sludges; solvents; creosote; coating and gluing wastes, dioxin.	Dioxin, Inorganics, SOCs
Chemical Processing / Storage		
Above/Below ground storage tanks	Heating oil; diesel fuel; gasoline; other chemicals	Inorganics, SOCs, VOCs
Chemical/petroleum processing/storage	Hazardous chemicals; solvents; hydrocarbons; heavy metals; asphalt	Inorganics, SOCs, VOCs
Coal Gasification Facility	Gas loss, leaching of residual products found in ash residue in the spent gasification cavity (calcium, sodium, sulfate, bicarbonate, metals), condensed liquids (BTEX, phenolic compounds, Polycyclic aromatic hydrocarbons (PAHs) and heterocyclic compounds.	Inorganics, SOCs, VOCs
Pesticide / Herbicide / Fertilizer Manufacture / Distribution / Storage	Wide variety of hazardous and nonhazardous wastes depending on the nature of the facility.	Inorganics, SOCs, VOCs
Plastics/synthetics producers	Solvents; oils; miscellaneous organic and inorganics (phenols, resins); paint wastes; cyanides; acids; alkalis; wastewater treatment sludges; cellulose esters; surfactant; glycols; phenols; formaldehyde; peroxides; etc.	Inorganics, SOCs, VOCs

AM#1740 - Attachment A.1 Instructions & General Information for the Completion of the Waiver Application Form by Waterworks Owners.

Disposal		
Solid Waste Collection / Transfer Site	Wide variety of contaminants depending on the historical use. Anthropogenic waste (toxic metals, hydrocarbons, chlorinated hydrocarbons, surfactant-derived compounds, phthalates, pharmaceutical chemicals. Biological waste (ammonia, dissolved organic carbon, aliphatic compounds, phenols, derivatives of abietic acid)	Inorganics, Microbial, SOCs, VOCs
Hazardous Waste Recovery Facility / Waste Transfer / Storage / Disposal and Superfund Sites	Wide variety of contaminants depending on historical use.	Inorganics, Microbial, RADs, SOCs, VOCs
Resource Extraction		
Shale Gas extraction / Coalbed methane extractions / Tight sands hydraulic fracturing	Total dissolved solids, fracturing fluid additives: acids, biocides, gel agents, clay stabilizers, corrosion inhibitors, pH adjusting agents, scale inhibitors, surfactants; metals, naturally occurring radioactive materials.	Inorganics, RADs, SOCs, VOCs
Mines/gravel pits	Mine spills or tailings that often contain metals; acids; highly corrosive mineralized waters; metal sulfides; metals; acids; minerals sulfides; other hazardous and nonhazardous chemicals ⁹	Inorganics, RADs, VOCs
NON-INDUSTRIAL		
Golf courses	Fertilizers ¹² ; herbicides ¹¹ ; pesticides for controlling mosquitoes, ticks, ants, gypsy moths, and other pests ⁵	Inorganics, SOCs, VOCs
Transportation		
Airports (maintenance/fueling areas)	Jet fuels; deicers; diesel fuel; chlorinated solvents; automotive wastes; ⁴ heating oil; building wastes ⁶	VOCs
Barge and Vessel Traffic	Fuel, miscellaneous wastes; oil; variable transported materials	Inorganics, Microbial, RADs, SOCs, VOCs
Boat ramps and marinas	Gasoline, diesel, miscellaneous wastes, lead, waste oil; solvents; gasoline and diesel fuel from vehicles and storage tanks; fuel oil; other automotive wastes ⁴ ; deicing products; variable transported materials	Inorganics, SOCs, VOCs
Fleet / trucking / bus terminals	Waste oil; solvents; gasoline and diesel fuel from vehicles and storage tanks; fuel oil; other automotive wastes ⁴	Inorganics, SOCs, VOCs
Primary Roadways / Truck Terminals	Gasoline, diesel, miscellaneous wastes, lead, waste oil; solvents; gasoline and diesel fuel from vehicles and storage tanks; fuel oil; other automotive wastes ⁴ ; deicing products; variable transported materials	Inorganics, Microbial, RADs, SOCs, VOCs
Railroad tracks / yards / maintenance / fueling areas	Diesel fuel; herbicides for rights-of-way ¹¹ ; creosote from preserving wood ties; solvents; paints; waste oils	Inorganics, Microbial, RADs, SOCs, VOCs
Agriculture		
Crop and Fodder Production/ Specialty Crop Production/Nursery	Pesticides, herbicides, fertilizers, nitrates.	Inorganics, SOCs, VOCs
Pasture (Grazing)/Confined Animal Feeding Operations/Aquaculture	Nutrients: nitrogen, ammonia, and phosphorus; organic matter; pathogens; parasites, bacteria, and viruses; solid matter; pesticides and hormones; antibiotics, metals	Inorganics, Microbial
Land Disposal		

AM#1740 - Attachment A.1 Instructions & General Information for the Completion of the Waiver Application Form by Waterworks Owners.

Cemetery	Microbiological contaminants including <i>Staphylococcus spp.</i> , <i>Bacillus spp.</i> , <i>Enterobacteriaceae spp.</i> , fecal streptococci, <i>Clostridium spp.</i> , <i>Helicobacter pylori</i> , enteroviruses, rotavirus, calicivirus; arsenic, mercury, formaldehyde, copper, lead, zinc.	Inorganics, Microbial, SOCs
Injection wells/drywells/sumps	Stormwater runoff; spilled liquids; used oils; antifreeze; gasoline; solvents; other petroleum products; pesticides ¹¹ ; and a wide variety	Inorganics, Microbial, RADs, SOCs, VOCs
Landfills/dumps (active and closed)	Leachate; organic and inorganic chemical contaminants; waste from households ⁷ and businesses ⁶ ; nitrates; oils; metals; solvents; sludge	Inorganics, Microbial, SOCs, VOCs
Septic systems	Nitrates; septage; Cryptosporidium; Giardia; coliform ¹⁰ and noncoliform bacteria; viruses; drain cleaners; solvents; heavy metals; synthetic detergents; cooking and motor oils; bleach; pesticides, ^{5,13} paints; paint thinner; swimming pool chemicals; ¹⁴ septic tank/cesspool cleaner chemicals ¹⁵ ; elevated levels of chloride, sulfate, calcium, magnesium, potassium, and phosphate; other household hazardous wastes ⁷	Inorganics, Microbial
Utilities		
Urban stormwater management infrastructure	TSS, pesticides and fertilizers, animal waste, metals, oil and grease/hydrocarbons, bacteria and viruses, nitrogen and phosphorus ,	Inorganics, Microbial, SOCs, VOCs
Utility stations/maintenance areas	PCBs from transformers and capacitors; oils; solvents; sludges; acid solution; metal plating solutions (chromium, nickel, cadmium); herbicides from utility rights-of-way	Dioxin, SOCs
Wastewater treatment facilities	Municipal wastewater; sludge ¹⁶ ; treatment chemicals ¹⁷ ; nitrates; heavy metals; coliform ¹⁰ and noncoliform bacteria; nonhazardous wastes ¹⁶	Inorganics, Microbial, SOCs, VOCs

NOTES

¹ This table lists the most common wastes, but not all potential wastes. For example, it is not possible to list all potential contaminants contained in stormwater runoff or from military installations.

² In general, water contamination stems from the misuse and improper disposal of liquid and solid wastes; the illegal dumping or abandonment of household, commercial, or industrial chemicals; the accidental spilling of chemicals from trucks, railways, aircraft, handling facilities, and storage tanks; or the improper siting, design, construction, operation, or maintenance of agricultural, residential, municipal, commercial, and industrial drinking water wells and liquid and solid waste disposal facilities. Contaminants also can stem from atmospheric pollutants, such as airborne sulfur and nitrogen compounds, which are created by smoke, flue dust, aerosols, and automobile emissions, fall as acid rain, and percolate through the soil. When the contaminants list in this table are used and managed properly, environmental contamination is not likely to occur.

³ Contaminants can reach water bodies from activities occurring on the land surface, such as industrial waste storage; from sources below the land surface but above the water table, such as septic systems; from structures beneath the water table, such as wells; or from contaminated recharge water.

⁴ Automobile wastes can include gasoline; antifreeze; automatic transmission fluid; battery acid; engine and radiator flushes; engine and metal degreasers; hydraulic (brake) fluid; and motor oils.

⁵ Common pesticides used for lawn and garden maintenance (i.e., weed killers, and mite, grub, and aphid controls) include such chemicals as 2,4-D; chlorpyrifos; diazinon; benomyl; captan; dicofol; and methoxychlor.

⁶ Common wastes from public and commercial buildings include automotive wastes; and residues from cleaning products that may contain chemicals such as xylenols, glycol esters, isopropanol, 1,1,1-trichloroethane, sulfonates, chlorinated phenols, and cresols.

⁷ Household hazardous wastes are common household products which contain a wide variety of toxic or hazardous.

⁸ X-ray developers and fixers may contain reclaimable silver, glutaraldehyde, hydroquinone, potassium bromide, sodium sulfite, sodium carbonate, thiosulfates, and potassium alum.

AM#1740 - Attachment A.1 Instructions & General Information for the Completion of the Waiver Application Form by Waterworks Owners.

- ⁹ The Resource Conservation and Recovery Act (RCRA) defines a hazardous waste as a solid waste that may cause an increase in mortality or serious illness or pose a substantial threat to human health and the environment when improperly treated, stored, transported, disposed of, or otherwise managed. A waste is hazardous if it exhibits characteristics of ignitability, corrosivity, reactivity, and/or toxicity. Not covered by RCRA regulations are domestic sewage; irrigation waters or industrial discharges allowed by the Clean Water Act; certain nuclear and mining wastes; household wastes; agricultural wastes (excluding some pesticides); and small quantity hazardous wastes (i.e., less than 220 pounds per month) generated by businesses.
- ¹⁰ Coliform bacteria can indicate the presence of pathogenic (disease-causing) microorganisms that may be transmitted in human feces. Diseases such as typhoid fever, hepatitis, diarrhea, and dysentery can result from sewage contamination of drinking water supplies.
- ¹¹ Pesticides include herbicides, insecticides, rodenticides, fungicides and avicides. EPA has registered approximately 50,000 different pesticide products for use in the United States. Many are highly toxic and quite mobile in the subsurface. An EPA survey found that the most common pesticides found in drinking water wells were DCPA (dacthal) and atrazine, which EPA classifies as moderately toxic (class 3) and slightly toxic (class 4) materials, respectively
- ¹² The EPA National Pesticides Survey found that the use of fertilizers correlates to nitrate contamination of groundwater supplies.
- ¹³ Common household pesticides for controlling pests such as ants, termites, bees, wasps, flies, cockroaches, silverfish, mites, ticks, fleas, worm, rates, and mice can contain active ingredients include naphthalene, phosphorus, xylene, chloroform, heavy metals, chlorinated hydrocarbons, arsenic, strychnine, kerosene, nitrosamines, and dioxin.
- ¹⁴ Swimming pool chemicals can contain free and combined chlorine; bromine; iodine; mercury-based, copper-based, and quaternary algaecides; cyanuric acid; calcium or sodium hypochlorite; muriatic acid; sodium carbonate.
- ¹⁵ Septic tank/cesspool cleaners include synthetic organic chemicals such as 1,1,1 trichloroethane, tetrachloroethylene, carbon tetrachloride, and methylene chloride.
- ¹⁶ Municipal wastewater treatment sludge can contain organic matter, nitrates; inorganic salts, heavy metals; coliform and noncoliform bacteria; and viruses.
- ¹⁷ Municipal wastewater treatment chemicals include calcium oxide; alum; activated alum, carbon, and silica; polymers; ion exchange resins; sodium hydroxide; chlorine; ozone; and corrosion inhibitors.

Application for Monitoring Waivers

Compliance Period: 2017-2019

To apply for monitoring waivers, the waterworks owner must complete all the information requested on this form for each entry point. **Use a separate form for each entry point.** Providing false information will result in a denial of waivers. This application is for the following waivers:

Name of Waterworks	PWSID #
Printed Name of Applicant	Title
Street Address of Waterworks	(Area Code) Telephone Number
City or Town; State; Zip Code	County/City
WATERWORKS CLASSIFICATION (check one): <input type="checkbox"/> Community <input type="checkbox"/> Non-transient Non-community	TYPE OF SOURCE (check one): <input type="checkbox"/> Groundwater (including springs) <input type="checkbox"/> Surface water (including GUDIs)
ENTRY POINT:	
SOURCE NAME*:	

* List additional sources that are associated with this entry point. Note: The Source Name and Entry Point designation **must agree** with those previously established by the ODW field office.

Monitoring Waivers Requested [Check all that apply]	
<input type="checkbox"/> SOC – Volatile Fumigants	<input type="checkbox"/> SOC – Semi-Volatiles
<input type="checkbox"/> SOC – Carbamates	<input type="checkbox"/> SOC – Diquat
<input type="checkbox"/> SOC – Chlorinated Acid herbicides	<input type="checkbox"/> Cyanide (if applicable)

Please mark what best describes the soil in the assessment area [1,000-foot radius (Zone 1) for Groundwater Source or 5-mile radius upstream of a Surface Water Source intake]:
<input type="checkbox"/> Sandy soil underlain by unconsolidated formations <input type="checkbox"/> Topsoil rich in humus <input type="checkbox"/> Topsoil with heavy clay <input type="checkbox"/> Other soils (please describe):

Observed Land Use/Activity - Check <input checked="" type="checkbox"/> all that apply	
<input type="checkbox"/> Residential	<input type="checkbox"/> Undeveloped
<input type="checkbox"/> Livestock	<input type="checkbox"/> Abandoned Wells
<input type="checkbox"/> Crop Land	<input type="checkbox"/> Agricultural Chemical Storage
<input type="checkbox"/> Industrial	<input type="checkbox"/> Caves/Sinkholes
<input type="checkbox"/> Pesticide/Herbicide Manufacturer	<input type="checkbox"/> Electroplating/Metal Finishing
<input type="checkbox"/> Petroleum Storage Tank Farm	<input type="checkbox"/> Furniture/Boat Refinish
<input type="checkbox"/> Wood Preservative Manufacturer	<input type="checkbox"/> Golf Course/Nursery
<input type="checkbox"/> Hazardous Waste Recovery Facility	<input type="checkbox"/> Industrial Waste Site
<input type="checkbox"/> Airport	<input type="checkbox"/> Laboratories
<input type="checkbox"/> Landfill	<input type="checkbox"/> Machine Shop
<input type="checkbox"/> Gasoline Station/Service Centers	<input type="checkbox"/> Mining Waste Sites
<input type="checkbox"/> Plastic Manufacturer	<input type="checkbox"/> Oil & Gas Production
<input type="checkbox"/> Coal Gasification Facility	<input type="checkbox"/> Photo Processor
<input type="checkbox"/> Dry Cleaning Establishment	<input type="checkbox"/> Underground Injection Wells
<input type="checkbox"/> Hazardous Material Transfer, Storage, or Disposal	<input type="checkbox"/> Underground Storage Tanks
<input type="checkbox"/> Superfund Site	<input type="checkbox"/> Other (describe)
<input type="checkbox"/> Pipeline/Power line Right of Way	
Observed Use or Storage of these Chemicals - Check <input checked="" type="checkbox"/> all that apply	
<input type="checkbox"/> Alachlor	<input type="checkbox"/> Hexachlorobenzene
<input type="checkbox"/> Aldrin	<input type="checkbox"/> Hexachlorocyclopentadiene
<input type="checkbox"/> Atrazine	<input type="checkbox"/> Lindane
<input type="checkbox"/> Benzo(a)pyrene	<input type="checkbox"/> Methomyl
<input type="checkbox"/> Butachlor	<input type="checkbox"/> Methoxychlor
<input type="checkbox"/> Carbaryl	<input type="checkbox"/> Metolachlor
<input type="checkbox"/> Carbofuran	<input type="checkbox"/> Metribuzin
<input type="checkbox"/> Chlordane	<input type="checkbox"/> Oxamyl (Vydate)
<input type="checkbox"/> Dibromochloropropane	<input type="checkbox"/> Pentachlorophenol
<input type="checkbox"/> Dalapon	<input type="checkbox"/> Picloram
<input type="checkbox"/> Dicamba	<input type="checkbox"/> Polychlorinated biphenyls (PCBs)
<input type="checkbox"/> Dinoseb	<input type="checkbox"/> Propachlor
<input type="checkbox"/> Dieldrin	<input type="checkbox"/> Simazine
<input type="checkbox"/> Diquat	<input type="checkbox"/> Toxaphene
<input type="checkbox"/> Di(2-ethylhexyl)adipate	<input type="checkbox"/> 2,4-D
<input type="checkbox"/> Di(2-ethylhexyl)phthalate	<input type="checkbox"/> 2,4,5-TP
<input type="checkbox"/> Ethylene dibromide	<input type="checkbox"/> 3-Hydroxycarbofuran
<input type="checkbox"/> Endrin	<input type="checkbox"/> Cyanide
<input type="checkbox"/> Hepachlor	
<input type="checkbox"/> Hepachlor epoxide	
Have changes to land use/activity taken place [Check all that apply]	
Within a 1000-foot radius of the groundwater source (Zone 1)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know
Within a 1-mile radius of the groundwater source (Zone 2)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know
Within a 5-mile radius upstream of the surface water intake?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know

Responsible Party:	
Signature	Title
Date:	

For VDH Use Only		
Evaluator's Name:		Evaluation Date:
Any land use/activity changes in the source water assessment area?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Any other related risks or concerns from the Source Water Assessment reports?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Sanitary Survey or other evaluations indicate a potential for SOC contamination?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Are any modifications to current waiver status warranted?		<input type="checkbox"/> Yes <input type="checkbox"/> No
If "yes" for any above, explain:		
Has nitrate ever exceeded the MCL?		<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes", what is the suspected source of nitrate?		
Has Diquat ever been detected in this source/entry point or in any neighboring sources?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Have any samples from the source/entry point detected the following: Benzene, ethylbenzene, toluene, xylene, or 1,2-dichloroethane <i>(If "yes, circle the ones that were detected)</i>		<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, have any samples for ethylene dibromide (EDB) been collected?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Waiver Recommendations		
Place an "S" for Susceptibility or a "U" for Use depending on the type of waiver granted or denied in the appropriate column.		
Contaminant / Group	Granted	Denied
Volatile Fumigants		
Carbamates		
Chlorinated Acid Herbicides		
Semi-Volatiles		
Diquat		
Cyanide (if applicable)		
Comments:		

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1. PURPOSE

This document provides general guidance to use VDH SWAP in support of SOC monitoring waiver evaluations.

2. DEFINITIONS

The following table defines the most commonly used terms and acronyms.

Term/Acronym	Definition/Description
AM	Action Memo
GIS	Geographic Information Systems
Layer	A collection of features sharing the same schema
ODW	Office of Drinking Water; an office within VDH
PSC	Potential Source(s) of Contamination
SOC	Synthetic Organic Chemicals
SWA	Source Water Assessment
SWA Outputs	Documents produced with VDH SWAP GIS Tool (i.e., maps, tables)
SWAP	Source Water Assessment Program
VDH	Virginia Department of Health
Zone 1	Assessment area where contamination events are considered to have the highest risk to impact a drinking water supplies under VDH SWAP. Typically, Zone 1 represents 5 mile radius from an intake into its watershed delineation, and 1,000 feet radius from a groundwater source.
Zone 2	Assessment area beyond Zone 1 where contamination events may still have an impact on drinking water supplies under VDH SWAP. Zone 2 represents the watershed area beyond Zone 1 of an intake, and the area between Zone 1 and 1 mile radius from a groundwater source.

3. PROCEDURES

The following sections describe how to use relevant SWA Outputs associated with SOC monitoring waiver determinations. The main location to access SWAP information is <\\odwsrv1\odwshare\15-SWAP-Processing>.

3.1. Processing SWA Outputs requests from Waterworks

Waterworks owners have the right to request copies of the SWA Outputs for their system(s). Processing waterworks requests for SWA Outputs is accomplished as follows:

1. Open SWAP Tracking Log
\\odwsrv1\odwshare\15-SWAP-Processing\SWAP_TrackingLog.xlsx
2. Fill a request following instructions from the log.
Note: Make sure to provide owner's email and/or mailing address in Column P.

Central Office will then deliver the information to the waterworks and update the log.

3.2. Searching for SWA Outputs

SWA Outputs for active sources should be available at \\odwsrv1\odwshare\15-SWAP-Processing\08-SWA_Outputs.

Each SWA Output is compressed into a .zip file. These files follow a three-part naming convention, where each part is segregated by underscores. (i.e., PWSID_WATERWORKS NAME_SOURCE ID.zip)

Files may be searched by any of the three parts from the naming convention. **Searching by PWSID is recommended** to quickly find all sources associated with a system.

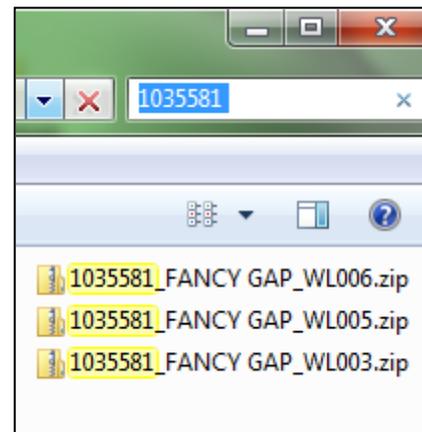


Figure 1 (right) depicts how entering PWSID 1035581 in the search bar returns associated files.

Figure 1: SWA Outputs search results

NOTE: If SWA Outputs for a known active source are unavailable, contact the Special Projects Engineer.

3.3. Relevant SWA Outputs

Figure 2 (right) illustrates the content of a SWA Outputs .zip. Highlighted items may support approval/denial of SOC monitoring waiver applications.

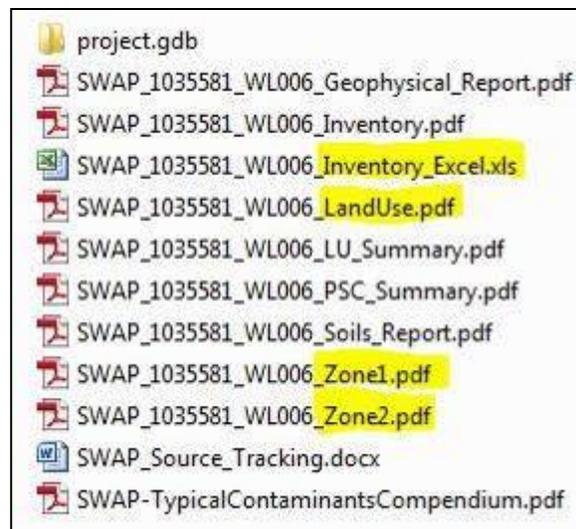


Figure 2: SWA Outputs .zip content

4. Using SWA Outputs

4.1.1. Getting Started

To maximize the utility of .pdf files, particularly of maps, **make sure Navigation Pane Buttons are active in Adobe Acrobat**. If it is active, you should be able to see the icons depicted in **Figure 3** (right) on the top left of your Adobe Acrobat window.

NOTE: The button (icon) pointed by the arrow on Figure 3 will only be available for files that contain layers, such as the maps. It allows users to turn layers on/off to facilitate finding the information of interest.

If Navigation Pane Buttons are not visible:

1. Right click inside the Adobe Acrobat window
2. Select “Show Navigation Pane Buttons” (at bottom of pop-up menu)

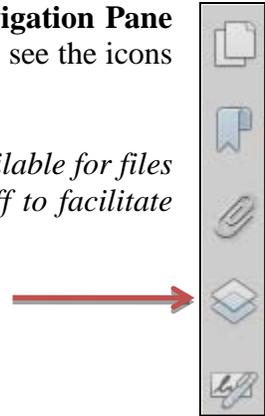


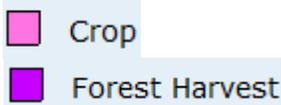
Figure 3: Navigation Pane Buttons

4.1.2. Land Use Map

The land use map illustrates generalized activities that may be taking place or have taken place in different areas of Virginia. *Crop* (pink) and *Forest Harvest* (magenta) land use activity may represent risk of contamination from regulated SOCs.

The following procedure describes how to find if these layers are within assessment area Zone 1 or 2 of a drinking water source:

1. Open ..._LandUse.pdf
2. Look for:



4.1.3. Zone 1 & 2 Maps

The Zone 1 & 2 maps illustrate the approximate location of known PSC that may threaten drinking water sources. PSC such as *Other PSC* (VDH Staff/Contractor collected information), *Injection Wells*, *Superfund*, *Landfills*, *Industrial*, *RCRA*, *Golf Courses*, *NPDES*, *Petroleum Tank – Active/Close* and *Airports* may represent risk of contamination from regulated SOCs. These PSC are labeled with numbers, starting at “1” for the closest point to the drinking water source and so on. This labeling practice is intended to help associate PSC location with additional details provided in the PSC Inventory files (discussed in **Section 4.1.4** below).

The following procedure describes how to find if these layers are within assessment area Zone 1 or 2 of a drinking water source:

1. Open ..._Zone1.pdf or ..._Zone2.pdf
2. Look for:



4.1.4. PSC Inventory

The PSC Inventory files provide additional information about known PSC depicted in Zone 1 & 2 maps (discussed in **Section 4.1.3** above.) There are two type of Inventory files: .pdf and .xls. **Using ..._Inventory.xls is recommended** because it may provide information on up to 14 fields vs. 7 on ..._Inventory.pdf. For example, ..._Inventory.xls may offer facility hyperlinks to EPA's website (when available).

AM#1740 - Attachment B.1. Waiver Application Transmittal Letter

INSTRUCTIONS: Complete/select items with *(italics)*, and convert to regular font. Print 1st page on VDH letterhead. Pages are 1" top, shown bottom, and side margins.

SUBJECT: County/City
Waterworks: Waterworks Name
PWSID No: PWSID

Date

Waterworks Owner
Address
City/County, State Zip

Dear Waterworks Owner:

Synthetic Organic Chemical (SOC) monitoring waivers granted for the 2014-2016 compliance period will expire on December 31, 2016. Pursuant to 12VAC5-590-370 B.2.e.(2) of the *Waterworks Regulations*, please complete the enclosed waiver application form for each source water entry point and submit to this office for evaluation on or before **September 30, 2016**. Failure to submit this form will result in monitoring requirements at your waterworks for the following SOC contaminant categories:

- Volatile Fumigants;
- Carbamates;
- Chlorinated Acid Herbicides;
- Semivolatiles; and
- Diquat.

The State Health Commissioner has extended statewide waivers for dioxin (2,3,7,8-TCDD), endoathal, glyphosate, and asbestos. These waivers will continue to be in effect during the 2017-2019 compliance period.

Information specific to your waterworks from Virginia's source water assessment program (e.g., land use maps and potential sources of contamination data) can be made available to you upon request. Please contact me at (phone #) or email (email address) for this information, or if you have any questions.

Sincerely,

(Name)
District Engineer/Inspector
(Name) Field Office

ABC/xyz

Enclosure: Waiver Instructions & Application Form

cc: Insert LHD information
VDH, ODW – Central Office

AM#1740 - Attachment B.2. SOC Waivers Denied/Granted

INSTRUCTIONS: Complete/select items shown with (*italics*), and convert to regular font. Print 1st page on VDH letterhead. Pages are 1" top, bottom, and side margins.

SUBJECT: County/City
Waterworks: Waterworks Name
PWSID No: PWSID

Date

Waterworks Owner
Address
City/County, State Zip

Dear Waterworks Owner:

The Virginia Department of Health Office of Drinking Water has evaluated your Synthetic Organic Chemical (SOC) monitoring waiver application received on (date) pursuant to 12VAC5-590-370 B.2.e.(2) of the *Waterworks Regulations*. Based on the information provided in your application and the Department's understanding of prevailing conditions affecting water quality at your waterworks, the State Health Commissioner has approved or denied your monitoring waiver request for the SOC contaminant categories (and associated Entry Point) indicated in the table(s) below.

Entry Point: (<i>name of entry point; repeat table style/format for multiple entry points</i>)				
Contaminant Groups	Effective Date	Expiration Date	Granted	Denied
Volatile Fumigants	January 1, 2017	December 31, 2019		
Carbamates	January 1, 2017	December 31, 2019		
Chlorinated Acid Herbicides	January 1, 2017	December 31, 2019		
Semi-Volatiles	January 1, 2017	December 31, 2019		
Diquat	January 1, 2017	December 31, 2019		
<i>Cyanide (if applicable)</i>				

Use the following paragraph for all denied waivers:

[You must collect (number) (quarterly or annual) sample(s) from each entry point for which a SOC contaminant category monitoring waiver request was denied. As provided by Rule 2A:2 of the Supreme Court of Virginia, you have thirty days from the date of this letter within which to appeal this decision by filing a notice of appeal in accordance with the Rules of the Supreme Court of Virginia with the State Health Commissioner. In the event that this decision was served to you by mail, three days are added to that period.]

Your approved monitoring waiver requests will expire on December 31, 2019. You should reapply for SOC monitoring waivers no later than **September 30, 2019**. You will be notified prior to the next compliance period of the required submittals.

If you have any questions concerning this matter, please contact (name), District Engineer, at (phone #) or email (email address).

Sincerely,

(Name)
Engineering Field Director
(Name) Field Office

AM#1740 - Attachment B.2. SOC Waivers Denied/Granted

INSTRUCTIONS: Complete/select items shown with (*italics*), and convert to regular font. Print 1st page on VDH letterhead. Pages are 1" top, bottom, and side margins.

ABC/xyz

cc: Insert LHD information
VDH, ODW – Central Office

Sampling Manual Chapter 13, Attachment A.1. Notification of LT2 Source Water Monitoring Requirements

INSTRUCTIONS: Complete/select items shown with italics, and convert to regular font. Print 1st page on VDH letterhead. Pages are 1" top, bottom, and side margins

SUBJECT: County/City
Waterworks: Waterworks Name
PWSID No: PWSID

Date

Waterworks Owner

Address 1

Address 2

City, State, Zip

Dear Waterworks Owner:

This letter serves to notify you of your upcoming sampling requirements as part of the U.S. Environmental Protection Agency (EPA) Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule). You are required to establish a Source Water Monitoring Plan to conduct an initial and a second round of source water monitoring for each plant that treats a surface water or groundwater under the direct influence of a surface water source. Your waterworks shall begin the LT2 (insert Round 1 or Round 2 as applicable) sampling requirements by (select as appropriate: insert date typically <6 months after issuance/re-issuance of the Operation Permit for the initial round for new waterworks and new sources to existing waterworks; for Round 2, insert date not to exceed 6 years after the initial round is completed with bin determination).

(Option 1- $\geq 10,000$ population)

Your waterworks serves at least 10,000 people, and shall therefore sample the source water for *Cryptosporidium*, *E.coli*, and turbidity at least monthly for 24 months.

(Option 2- <10,000 population)

Your waterworks serves fewer than 10,000 people, and shall therefore sample the source water for *E.coli* at least once every 2 weeks for 12 months. Alternatively, you shall sample for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months. If you elect to monitor for *Cryptosporidium*, you must notify us no later than (insert date). Your waterworks can elect to use either of these monitoring options. However, your waterworks must sample for *Cryptosporidium* if either of the following conditions are determined following the results of *E. coli* monitoring:

1. For waterworks using lake/reservoir sources, the annual mean *E. coli* concentration is greater than 10 *E. coli*/100 mL.
2. For waterworks using free-flowing stream sources, the annual mean *E. coli* concentration is greater than 50 *E. coli*/100 mL.

Please submit a Source Water Monitoring Plan that includes your waterworks' LT2 sampling schedule and description of sample location(s) to the (insert field office name) no later than 3 months prior to your first sampling date. At the latest, ODW shall receive this information by (insert date). ODW will review the proposed schedule and provide your waterworks with a written approval letter no later than 30 days prior to the scheduled start of monitoring.

Source Water Monitoring Plans should be developed following EPA's 1996 Source Water Monitoring Guidance Manual for Public Water Systems. It is available at http://www.epa.gov/ogwdw/disinfection/lt2/pdfs/guide_lt2_swmonitoringguidance.pdf. In addition, consider the following sampling location guidelines when completing your Source Water Monitoring Plan:

Sampling Manual Chapter 13, Attachment A.1. Notification of LT2 Source Water Monitoring Requirements

INSTRUCTIONS: Complete/select items shown with italics, and convert to regular font. Print 1st page on VDH letterhead. Pages are 1" top, bottom, and side margins

- 1) Each water plant must monitor separately, except where multiple plants draw water from the same influent pipeline or intake. In such case a representative sample for all of the plants may be used.
- 2) Samples are to be collected prior to any chemical treatment, unless ODW makes a specific determination that:
 - a) Sampling prior to chemical treatment is not feasible; and
 - b) Chemical treatment will not have any adverse impact on analysis of the sample.
- 3) If a waterworks practices recycle of the filter backwash, all samples must be collected prior to the point of any filter backwash water addition.
- 4) Plants with multiple water sources which include multiple surface water sources and blended surface water and ground water sources must use the following criteria:
 - a) The use of multiple sources during monitoring must be consistent with routine operational practice.
 - b) Must use a sample tap where the sources are combined prior to treatment, if available.
 - c) If a combined sample tap is not available then samples must be collected at each source intake on the same day and must either:
 - i) Composite the samples into one sample prior to analysis. (This composite must be flow weighted based on the proportion of the source in the total plant flow at the time the sample was collected.), or
 - ii) Analyze each sample and calculate a weighted average of the analysis results for each sampling date. The weighted average must be calculated by multiplying the analysis result for each source by the fraction the source contributed to total plant flow at the time the sample was collected and then summing these values.

You must submit your (insert Round 1 or Round 2) samples for the LT2 Rule to analytical laboratories certified by the Virginia Division of Consolidated Laboratory Services (DCLS) for *Cryptosporidium* and *E. coli*. You can go to the DCLS website www.dgs.state.va.us/DivisionofConsolidatedLaboratoryServices and click on Drinking Water and Tuning Fork Certification on the right column menu for a current list of certified laboratories. DCLS does not analyze drinking water for *Cryptosporidium*. Laboratories performing *Cryptosporidium* analyses must use EPA Method 1622, EPA Method 1623, or EPA Method 1623.1 (ODW's preferred method). Laboratories performing *E. coli* analyses must use an *E. coli* enumeration method (presence/absence is not acceptable). Turbidity measurements may be taken by the waterworks.

We look forward to working with you to ensure that your waterworks achieves compliance with these sampling requirements of the LT2 Rule. If you have any questions or would like to meet to discuss this requirement, please do not hesitate to contact me at (phone) or (email).

Sincerely,

(Name), District Engineer
Name of field office

ABC:xyz

ec/enc: (electronic copy, if applicable)

cc: Name, (Health Director/Environmental Health Manager), Name of LHD
VDH, ODW-Central Office

Sampling Manual Chapter 13 Attachment A.2. Approval Letter for Source Water Monitoring Plan
INSTRUCTIONS: Complete/select items shown with italics, and convert to regular font. Print 1st page on VDH letterhead. Pages are 1" top, bottom, and side margins

SUBJECT: County/City
Waterworks: Waterworks Name
PWSID No: PWSID

Date

Waterworks Owner
Address 1
Address 2
City, State, Zip

Dear Waterworks Owner:

We have received your proposed Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) Source Water Monitoring Plan for (*insert Round 1 or Round 2*), dated (*insert date*). Your proposed monitoring schedule and sampling location(s) have been found by the Virginia Department of Health to meet the requirements of the *Waterworks Regulations*.

(*Option for waterworks with filtered systems serving $\geq 10,000$ people*)

Please remember that all samples must be collected per the approved schedule (no more than 2 days before or 2 days after the scheduled date). Samples must be analyzed by a laboratory which has been certified by DCLS for *Cryptosporidium* using EPA Method 1622, EPA Method 1623, or EPA Method 1623.1 (ODW's preferred method) and *E. coli* using an enumeration method (presence/absence is not acceptable). The laboratory(s) shall report the results directly to our Central Office in Richmond no later than the tenth day of the month following the month in which the sample was collected (e.g., a January sample must be reported no later than February 10th).

Please request the analytical laboratory to email your *Cryptosporidium* and turbidity analysis report to labadmin@vdh.virginia.gov with the subject line of their email as "*Cryptosporidium* Results for VApwsid#." Analytical laboratories should submit *E.coli* results using our standard template for electronic data submittals (see www.vdh.virginia.gov/ODW/InformationforLaboratories.htm). As the owner, you should request that the laboratory provide you with a copy of the analytical results for your records. Additionally, it is important that you record your turbidity results from the LT 2 sampling events on the laboratory chain-of-custody form for the *Cryptosporidium* sample submittal.

(*Option for waterworks with filtered systems serving $< 10,000$ people doing *E. coli* monitoring*)

Please remember that all samples must be collected per the approved schedule (no more than 2 days before or 2 days after the scheduled date), and must be analyzed by a laboratory which has been certified by DCLS for *E. coli* (enumeration). The laboratory will report the results directly to our Central Office in Richmond no later than the tenth day of the month following the month in which the sample was collected (e.g., a January sample must be reported no later than February 10th). Analytical laboratories should submit *E.coli* results using our standard template for electronic data submittals (see www.vdh.virginia.gov/ODW/InformationforLaboratories.htm). As the owner, you should request that the laboratory provide you with a copy of the analytical results for your records.

Sampling Manual Chapter 13 Attachment A.2. Approval Letter for Source Water Monitoring Plan
INSTRUCTIONS: Complete/select items shown with italics, and convert to regular font. Print 1st page on VDH letterhead. Pages are 1" top, bottom, and side margins

(Option for waterworks with filtered systems serving <10,000 people doing Cryptosporidium monitoring)

Please remember that all samples must be collected per the approved schedule (no more than 2 days before or 2 days after the scheduled date), and must be analyzed by a laboratory which has been certified by DCLS for *Cryptosporidium* using EPA Method 1622, EPA Method 1623, or EPA Method 1623.1 (ODW's preferred method). The laboratory will report the results directly to our Central Office in Richmond no later than the tenth day of the month following the month in which the sample was collected (e.g., a January sample must be reported no later than February 10th). Please request the analytical laboratory to email your *Cryptosporidium* and turbidity analysis report to labadmin@vdh.virginia.gov with the subject line of their email as "*Cryptosporidium* Results for VApwsid#."

As the owner, you should request that the laboratory provide you with a copy of the analytical results for your records. If you have any questions or concerns, please do not hesitate to contact *(insert name)*, District Engineer, of this office at *(insert phone number)* or *(insert email)*.

Sincerely,

(Name), Engineering Field Director
Name of field office

ABC:xyz

ec/enc: *(electronic copy, if applicable)*

cc: *Name, (Health Director/Environmental Health Manager), Name of LHD*
VDH, ODW-Central Office

Sampling Manual Chapter 13, Attachment A.3 Approval of Bin Classification

INSTRUCTIONS: Complete/select items shown with italics, and convert to regular font. Print 1st page on VDH letterhead. Pages are 1" top, bottom, and side margins

SUBJECT: County/City
Waterworks: Waterworks Name
PWSID No: PWSID

Date

Waterworks Owner
Address 1
Address 2
City, State, Zip

Dear Waterworks Owner:

We have received the LT2 Bin Classification Statement for your waterworks, submitted in accordance with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule).

(Option 1 - use for all source water monitoring with BIN 1 determination)

The (mean *Cryptosporidium* / highest annual mean *Cryptosporidium*) concentration for (insert Round 1 or Round 2 as applicable) source water samples from your waterworks is (insert number) oocysts per Liter. According to the LT2 Rule bin classification table in 12VAC5-590 420 B 3 c (1) (b), your waterworks is hereby classified as Bin 1. This means that no additional treatment is required of your waterworks with respect to *Cryptosporidium*. (Choose one as appropriate: The Virginia Department of Health will advise you in the future concerning the second round of required source water monitoring (Round 2) and of any other reporting requirements. OR This completes the required source water monitoring under the LT2 Rule.)

(Option 2 - use for Round 1 monitoring with >BIN 1 determination)

The (mean *Cryptosporidium* / highest annual mean *Cryptosporidium*) concentration for the Round 1 source water samples from your waterworks is (insert number) oocysts per Liter. According to the LT2 Rule bin classification table in 12VAC5-590 420 B 3 c, your waterworks is hereby classified as Bin (insert number). This means that your waterworks will need to provide an additional (insert number) logs of removal/inactivation for *Cryptosporidium*, in order to achieve a total removal and inactivation of (insert number) logs. Please contact this office to schedule a meeting to discuss your plans and schedule for implementing the additional *Cryptosporidium* removal/inactivation requirement.

(Option 3 - use for Round 2 if remaining with >BIN 1 determination.)

The (mean *Cryptosporidium* / highest annual mean *Cryptosporidium*) concentration for the Round 2 source water samples from your waterworks is (insert number) oocysts per Liter. According to the LT2 Rule bin classification table in 12VAC5-590 420 B 3 c, your waterworks is hereby classified as Bin (insert number). Under the Round 1 source water monitoring, your waterworks was classified as Bin (insert number). This means that no additional treatment is required of your waterworks with respect to *Cryptosporidium*. This completes the required source water monitoring under the LT2 Rule.

(Option 4 - used if increasing BIN Number)

The (mean *Cryptosporidium* / highest annual mean *Cryptosporidium*) concentration for the Round 2 source water samples from your waterworks is (insert number) oocysts per Liter. According to the LT2 Rule bin classification table in 12VAC5-590 420 B 3 c (1) (b), your waterworks is hereby classified as Bin (insert number). Under Round 1 source water monitoring, your waterworks was classified as Bin (insert number). This means that your waterworks will need to provide an additional (insert number) logs

Sampling Manual Chapter 13, Attachment A.3 Approval of Bin Classification

INSTRUCTIONS: Complete/select items shown with italics, and convert to regular font. Print 1st page on VDH letterhead. Pages are 1" top, bottom, and side margins

of removal/inactivation for *Cryptosporidium*, in order to achieve a total removal and inactivation of *(insert number)* logs. Please contact this office to schedule a meeting to discuss your plans and schedule for implementing the additional *Cryptosporidium* removal/inactivation requirement.

A copy of the approved Bin Classification Statement is enclosed for your files and information.

If you have any questions regarding this matter, please do not hesitate to contact *(insert name)*, District Engineer, of this office at *(insert phone number)* or *(insert email)*.

Sincerely,

Name, Engineering Field Director
Name of field office

ABC/xyz

Enclosure: Bin Classification Statement

ec/enc: *(electronic copy, if applicable)*

cc: *Name, (Health Director/Environmental Health Manager), Name of LHD*
VDH, ODW-Central Office

Sampling Manual Chapter 13, Attachment A.4. Cryptosporidium Sampling Data Results and Bin Recommendation

INSTRUCTIONS: Complete/select items shown with italics, and convert to regular font. Print 1st page on VDH letterhead. Pages are 1" top, bottom, and side margins

SUBJECT: County/City
Waterworks: Waterworks Name
PWSID No: PWSID

Date

Waterworks Owner

Address 1

Address 2

City, State, Zip

Dear Waterworks Owner:

We have received *Cryptosporidium* data from your waterworks, collected for the (*insert Round 1 or Round 2*) source water monitoring under the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule). This letter is to advise that the Virginia Department of Health has reviewed the data, and has calculated the (*mean Cryptosporidium / highest annual mean Cryptosporidium*) concentration, as required by the rule.

(Option 1 - Round 1)

The (*mean Cryptosporidium / highest annual mean Cryptosporidium*) concentration for the source water samples from your waterworks is (*insert number*) oocysts per Liter. According to the LT2 Rule bin classification table in 12VAC5-590 420 B 3 c (1) (b), your waterworks is classified as Bin (*insert number*).

(Option 2 - If Round 2 is same as Round 1)

Under Round 1 of the source water monitoring, your waterworks was classified as Bin (*insert number*). The (*mean Cryptosporidium / highest annual mean Cryptosporidium*) concentration for the Round 2 source water samples from your waterworks is (*insert number*) oocysts per Liter. According to the LT2 Rule bin classification table in 12VAC5-590 420 B 3 c, your waterworks shall retain the Bin (*insert number*) classification.

(Option 3 - If Round 2 is higher than Round 1)

Under Round 1 of the source water monitoring, your waterworks was classified as Bin (*insert number*). The (*mean Cryptosporidium / highest annual mean Cryptosporidium*) concentration for the Round 2 source water samples from your waterworks is (*insert number*) oocysts per Liter. According to the LT2 Rule bin classification table in 12VAC5-590 420 B 3 c, your waterworks will increase to the Bin (*insert number*) classification.

(Option 4 - If Round 2 is lower than Round 1)

Under Round 1 of the source water monitoring, your waterworks was classified as Bin (*insert number*). The (*mean Cryptosporidium / highest annual mean Cryptosporidium*) concentration for the Round 2 source water samples from your waterworks is (*insert number*) oocysts per Liter. According to the LT2 Rule bin classification table in 12VAC5-590 420 B 3 c, this means that your waterworks would be classified as Bin (*insert new bin number*). However, the Round 2 bin classification may not be lower than the initial Round 1 bin classification. Thus, your waterworks will retain the Round 1 Bin (*insert number*) classification.

Sampling Manual Chapter 13, Attachment A.4. Cryptosporidium Sampling Data Results and Bin Recommendation

INSTRUCTIONS: Complete/select items shown with italics, and convert to regular font. Print 1st page on VDH letterhead. Pages are 1" top, bottom, and side margins

If you are in agreement with our findings, please complete the enclosed LT2 Bin Classification Statement, and return it to this office by *(insert deadline)*. A copy of the bin calculation worksheet, listing the *Cryptosporidium* results for your waterworks, is attached to the Bin Classification Statement, for your files and information. If you have any objections to the proposed classification, please respond as soon as possible, providing additional information and justification for an alternate classification, so that we may begin discussions concerning your alternate classification.

If you have any questions regarding this matter, please do not hesitate to contact me at *(phone number)* or *(email)*.

Sincerely,

(Name), District Engineer
Name of field office

ABC:xyz

Enclosures: Owner's Bin Classification Statement and Bin Calculation Worksheet

ec/enc: *(electronic copy, if applicable)*

cc: *Name, (Health Director/Environmental Health Manager), Name of LHD*
VDH, ODW-Central Office

Sampling Manual Chapter 13, Attachment A.5. *E.coli* Sampling Data Results and Bin Recommendation

INSTRUCTIONS: Complete/select items shown with italics, and convert to regular font. Print 1st page on VDH letterhead. Pages are 1" top, bottom, and side margins

SUBJECT: County/City
Waterworks: Waterworks Name
PWSID No: PWSID

Date

Waterworks Owner
Address 1
Address 2
City, State, Zip

Dear Waterworks Owner:

We have received *E. coli* data from your waterworks, collected during source water monitoring under the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule). This letter is to advise that the Virginia Department of Health has reviewed the data, and has calculated the mean annual *E. coli* concentration, as required by the rule.

The water source of your waterworks is a (choose correct source type: lake or reservoir/free flowing stream/GUDI). Per 12VAC5-590-420 B 3 a, a waterworks with your source type has a trigger level of (insert number) *E. coli* per 100 mL.

(Option 1)

The mean annual concentration of the Round 1 source water samples from your waterworks is (insert number) *E. coli* per 100 mL. This means that your waterworks has not exceeded the trigger level. According to the LT2 Rule bin classification table in 12VAC5-590 420 B 3 c (1) (b), your waterworks is hereby classified as Bin 1. This means that no additional treatment is required of your waterworks with respect to *Cryptosporidium*. VDH will advise you in the future concerning the second round (Round 2) of required source water monitoring and of any other reporting requirements.

(Option 2)

The mean annual concentration of the Round 1 source water samples from your waterworks is (insert number) *E. coli* per 100 mL. This means that your waterworks has exceeded the trigger level. According to 12VAC5-590-420 B 3 a (c), your waterworks must now proceed to *Cryptosporidium* monitoring. You will need to develop a monitoring plan for *Cryptosporidium*, and submit that schedule to VDH for approval within the next 60 days. Please contact this office for guidance in developing this monitoring plan.

If you have any questions regarding this matter, please do not hesitate to contact (insert name), District Engineer, of this office at (insert phone number) or (email).

Sincerely,

(Name), Engineering Field Director
Name of field office

ABC:xyz

ec/enc: (*electronic copy, if applicable*)

cc: Name, (Health Director/Environmental Health Manager), Name of LHD
VDH, ODW-Central Office

Sampling Manual Chapter 13, Attachment A.6. LT2 Bin Classification Statement

INSTRUCTIONS: Fill out top section of form for the waterworks; Field Director to complete bottom section of the form

LT2 BIN CLASSIFICATION STATEMENT

Waterworks Name: _____ PWSID No.: _____

I have reviewed the attached spreadsheet containing *Cryptosporidium* data collected from the _____ waterworks, and the bin classification based on that data. I accept the classification based on the results of the monitoring.

Round 1 Source Water Monitoring

Round 2 Source Water Monitoring

<i>Cryptosporidium</i> concentration	Bin Classification
<i>Cryptosporidium</i> < 0.075 oocysts per Liter	1
0.075 oocysts per Liter ≤ <i>Cryptosporidium</i> < 1.0 oocysts per Liter	2
1.0 oocysts per Liter ≤ <i>Cryptosporidium</i> < 3.0 oocysts per Liter	3
<i>Cryptosporidium</i> ≥ 3.0 oocysts per Liter	4

Cryptosporidium concentration: _____

Bin Classification: _____

Owner Signature: _____ Date: _____

Printed Name: _____

Title: _____

Attachment: *Cryptosporidium* data – Bin calculation worksheet

For ODW use only:

After reviewing the above Owner's Statement and the data in the attached spreadsheet, this is to advise that this Bin Classification is:

Approved Disapproved

By _____

Engineering Field Director

Date

Sampling Manual Chapter 13, Attachment A.6. LT2 Bin Classification Statement

INSTRUCTIONS: Fill out top section of form for the waterworks; Field Director to complete bottom section of the form

Review Sheet: LT2 Source Water Monitoring Plan

City / County _____
 Waterworks _____
 PWSID # _____ Plant _____
 Is waterworks part of a CDS Yes No
 Reviewed By: _____
 Total time spent: _____

	Date
SWM Plan Received	
Review Started	
Modifications Requested	
Revisions Received	
Approved	

I. GENERAL		
Population served	_____ Persons	
Is system on this schedule because of being part of a CDS?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Required date for plan submission	Date due _____	
Plan received by due date	<input type="checkbox"/> Yes <input type="checkbox"/> No	
II. MONITORING REQUIREMENTS		COMMENT
No. of months of monitoring required	<input type="checkbox"/> 24 <input type="checkbox"/> 12	
Sufficient number of months scheduled	<input type="checkbox"/> Yes <input type="checkbox"/> No	
At least one sample per month provided (every two weeks for Schedule 4 doing <i>E. coli</i>)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Monitor for:		
Cryptosporidium	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<i>E. coli</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Turbidity	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Actual sample dates specified	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Plan addresses monitoring windows	<input type="checkbox"/> Yes <input type="checkbox"/> No	
III. ANALYTICAL REQUIREMENTS		COMMENT
<i>Cryptosporidium</i>		
DCLS-approved labs	<input type="checkbox"/> Yes <input type="checkbox"/> No	_____
Method identified	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> 1622 <input type="checkbox"/> 1623 <input type="checkbox"/> 1623.1
Filtered on-site	<input type="checkbox"/> Yes <input type="checkbox"/> No	Type: _____
Full sample shipped	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Plan addresses matrix spike samples	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Sampling procedures discussed	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<i>E. coli</i>		
Lab identified	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Exact analytical method identified	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Lab certified for <i>E. coli</i> enumeration?	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Sampling Manual Chapter 13, Attachment B.1. Review Sheet for Source Water Monitoring Plan

Turbidity		
On-site measurement? If no, lab identified	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
On-site equipment/Method identified	<input type="checkbox"/> Yes <input type="checkbox"/> No	
IV. SAMPLING LOCATION(S)		COMMENT
Does plant have more than one source	<input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, are flows combined at a point prior to sample collections	<input type="checkbox"/> Yes <input type="checkbox"/> No	
If no, how will plant sample	<input type="checkbox"/> Flow-weighted composite samples <input type="checkbox"/> Flow-weighted averaged results	
Discuss sample location(s)		
Schematic(s) of sample location(s) provided	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Schematic show appropriate sample locations	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Will plant monitor prior to the addition of any chemicals	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Will plant monitor prior to the addition of filter backwash water recycle	<input type="checkbox"/> Yes <input type="checkbox"/> No	
If answer to either of last two questions is "No", discuss:		

General comments & discussion:

DETERMINATION:

Source Water Monitoring Plan **IS** **IS NOT** acceptable.

Review Completion Date: _____ By: _____

Sampling Manual Chapter 13, Attachment B.2. – Review Sheet for LT2 Source Water Monitoring - *Cryptosporidium*

Review Checklist - LT2 Source Water Monitoring <i>Cryptosporidium</i> Results		
City/County: _____	Waterworks Name: _____	
PWSID #: _____	Water Plant Name: _____	
System Population: _____	Date of Data Submission: _____	
Reviewed By: _____	Date Review Started: _____	
I. GENERAL		
Date Source Water Monitoring (SWM) Plan approved	_____	
Samples collected in accordance with approved SWM plan		
Within "5 day window"?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
At approved sample locations?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Using laboratory identified in SWM plan?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
If "No", identify laboratory?	_____	
Is new lab on DCLS' list of approved labs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Has new lab submitted "certification letter" about analytical work?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Was approved SWM plan revised?	<input type="checkbox"/> Yes <input type="checkbox"/> No (if so, discuss below)	
II. REVIEW OF RESULTS		COMMENT
Results submitted in a timely fashion	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Results reported appropriately (i.e., "oocysts)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Appropriate number of matrix spiked (MS) samples collected and reported?	<input type="checkbox"/> Yes <input type="checkbox"/> No	

(see attached pages for check of individual results)

General comments & discussion:

DETERMINATION:

Cryptosporidium data IS IS NOT acceptable.

Date Review Completed: _____

Reviewed By: _____

Sampling Manual Chapter 13, Attachment B.2. – Review Sheet for LT2 Source Water Monitoring - *Cryptosporidium*

Source Water Monitoring <i>Cryptosporidium</i> Data Quality Control Checklist				
Required Elements	Sample ID:			
	Collection Date:			
Sample Type	field or matrix spike			
Samples arrive between 0°-8°C	°C			
Samples analyzed within holding time limit (96 hours from collection)	hours			
Sample volume filtered (L)	Liters			
Was 100% of filtered volume examined? *	Yes or No			
Number of oocysts counted	Number			
Results (oocysts per Liter) – three decimal places	Number			
If less than 100% examined				
Volume of resuspended concentrate	Liters			
Volume of resuspended concentrate processed via IMS	Liters			
If less than 10 L filtered or less than 100% examined				
Number of filters used *	Number			
Packed pellet volume *	mL			
For matrix spike samples				
Sample volume spiked	Liters			
Estimated number of oocysts spiked	Number			
Sample meets all requirements?	Yes or No			

*Volume analyzed for all field samples must be at least 10 L, 2 mL of packed pellet, or as much volume as could be filtered by 2 filters

NOTE: Make copies of this page, in order to complete for each sample submitted. If sample is NOT acceptable, contact waterworks **immediately** to advise of quality assurance/quality control concern, and to discuss possible resolution of the concern.

Sampling Manual Chapter 13, Attachment B.3. Review Sheet for LT2 Source Water Monitoring - *E.coli*

Review Checklist - LT2 Source Water Monitoring for Waterworks < 10,000 population Worksheet for <i>E. coli</i> results	
City/County: _____	Waterworks Name: _____
PWSID #: _____	Water Plant Name: _____
System Population: _____	Date of Data Submission: _____
Evaluated By: _____	Date: _____
Monitoring Requirement:	Met?
Requirement: Sample at least every two weeks for 12 months (If not met, discuss on next page)	<input type="checkbox"/> Yes <input type="checkbox"/> No

Sample No.	Month	Year	Result (<i>E. coli</i> /100 mL)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			

Name of Laboratory: _____

Certified by DCLS for *E. coli* enumeration. Lab Certification #: _____

(Continued)

Sampling Manual Chapter 13, Attachment B.3. Review Sheet for LT2 Source Water Monitoring - *E.coli*

Results: Average of all results: _____ *E. coli* per 100 mL

Water Source for Plant: _____

Water Source Type and “Trigger Levels”: Lake/Reservoir: 10 *E. coli*/100 mL

Stream/River: 50 *E. coli*/100 mL

GUDI: _____ *E. coli*/100 mL

Do results exceed “Trigger Levels”? Yes No

If “No”: Plant is classified as “Bin 1”

If “Yes”: Plant must perform Source Water Monitoring for *Cryptosporidium* in order to determine bin classification

Monitoring Performance (discussion):

The LT2 Rule requires filtered systems serving < 10,000 to sample for *E. coli* every two weeks for 12 months, or proceed to *Cryptosporidium* monitoring. If the waterworks did not collect the full number of required samples, discuss what will be done to resolve the issue.