Source Water Manual

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VDH VIRGINIA DEPARTMENT OF HEALTH
Protecting You and Your Environment

Office of Drinking Water
Safe Drinking Water for a Healthy Virginia

Source Water Manual

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Foreword

This manual provides procedural guidance for the Office of Drinking Water (ODW) staff and serves as an informational resource for waterworks owners and operators. It describes actions ODW staff will complete in order to monitor and protect source water and provides information to aid ODW and waterworks to prevent and respond to source water contamination events.

This document replaces Working Memo 777, Working Memo 840, Working Memo 852, and Working Memo 878 in their entirety, including all appendices.

Revisions Summary

DATE	DESCRIPTION OF CHANGES
September 11, 2019 (Version 1.0)	Original Issuance

List of Abbreviations

AWWA	American Water Works Association
DEQ	Virginia Department of Environmental Quality
ELISA	Enzyme-linked immunosorbent assay
EPA	United States Environmental Protection Agency
HAB	Harmful Algal Bloom
HPLC/MS/MS	High performance liquid chromatography–tandem mass spectrometry
GIS	Geographic Information System
GUDI	Groundwater Under the Direct Influence of Surface Water
LC/MS/MS	Liquid chromatography– tandem mass spectrometry
ODW	Virginia Department of Health - Office of Drinking Water
OEHS	Virginia Department of Health - Office of Environmental Health Services
PC	Potential Conduit
PreSWA	Preliminary Source Water Assessment
PSC	Potential Source of Contamination
SDWIS	Safe Drinking Water Information System
SWAP	Source Water Assessment Program
VDH	Virginia Department of Health
VHASS	Virginia Healthcare Alerting and Status System
WTP	Water treatment plant

Glossary of Terms

Aquifer	A water bearing geological formation that will yield water to wells or springs.
Aquitard	An underground confining bed of earthen material that retards, but does not prevent, the flow of water between adjacent aquifers.
Confined or Non-sensitive Aquifer	An aquifer bounded above and below by impermeable beds or by beds of distinctly lower permeability than that of the aquifer itself; an aquifer containing confined groundwater
Cyanobacteria	Cyanobacteria are a type of microorganism that are capable of photosynthesis. They are prokaryotic and represent the earliest known form of life on the earth.
Cyanotoxin	Cyanotoxins are produced and contained within the cyanobacterial cells (intracellular). The release of these toxins in an algal bloom into the surrounding water occurs mostly during cell death and lysis (i.e., cell rupture) as opposed to continuous excretion from the cyanobacterial cells. Certain cyanobacteria species can release toxins (extracellular) into the water without cell rupture or death.
Delineation	The process of defining or mapping a boundary that approximates the areas that contribute water to a particular water source used as a public water supply. For surface waters, the land area usually consists of the watershed for a reservoir or stream. For ground water sources, the boundary typically approximates the surface area that contributes water to the aquifer.
Groundwater	All water obtained from sources not classified as surface water (or surface water sources), or groundwater under the direct influence of surface water.
Groundwater Under the Direct Influence of Surface Water (GUDI)	Any water beneath the surface of the ground with (i) significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as Giardia lamblia, or Cryptosporidium. It also means (ii) significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH that closely correlate to climatological or surface water conditions.
Identified Flowing Surface Source	A surface water stream that enters the ground water by flowing into a sinkhole, leaking through the bottom of a stream bed, or by other means. Tracer or other studies can verify that the surface water stream re-emerges from the ground as a spring or through a well, or which flows beneath broken rubble (which is strewn down the side of a mountain) with openings to the atmosphere and which is collected at a ”springbox.”

Potential Conduits	A pathway, such as a poorly protected or constructed drilled well, through which a contaminant could migrate from the surface to groundwater.
Source Water	A groundwater or surface water source such as a well, spring, river, lake, or reservoir used as a source of water for a waterworks.
Potential Sources of Contamination	Facilities, sites, and activities that have the potential to affect the underlying groundwater aquifers or nearby surface waters supplying to a waterworks.
Raw Water	For the purposes of this document, the term "raw water" refers to "source water" to prevent confusion with environmental sampling collected directly from surface water bodies. The term "raw water" in this document means water as it is pumped or otherwise withdrawn from a well, spring, stream, lake/reservoir, or any body of surface water (natural or impounded), and before any treatment.
Raw Water Intake	The suction intake that draws water from a surface water source for use as a public water supply.
Sensitivity	The relative ease, with which a contaminant applied near the land surface, or to the subsurface, can migrate to the delineated source water area.
Source Water Assessment	An assessment of the potential contaminant threats to the water source(s) of a waterworks and the and/or sensitivity of those sources to contamination.
Surface Water	All water open to the atmosphere and subject to surface runoff.
Susceptibility to Contamination	The classification determined by ODW of the susceptibility of a source water to contamination based on its sensitivity. This considers the presence of land use activities that could be of concern, and potential sources of contamination or potential conduits to ground water (for ground water sources only) within the assessment area. This classification is not definitive.
Watershed	A topographical area connecting the highest points uphill of a drinking water intake (known as the area of recharge) from which surface water drains toward a water supply intake. A watershed includes tidal influence and discharges within one tidal cycle downstream of the intake.

Chapter 1 – Source Water Assessment Manual

Summary

Section 1453 of the 1996 Amendments to the Safe Drinking Water Act (SDWA) requires each state to develop a Source Water Assessment Program (SWAP) that delineates the boundaries of the assessment areas, identifies contaminants, determines source susceptibility, and makes results available to the public. SWAP helps waterworks owners develop and implement a Source Water Protection Plan (SWPP), or its equivalent, which is also referred to as a 'Strategy in Place.' This chapter describes implementation procedures, and describes the deliverables associated with a SWAP.

Disclaimer

This chapter is not a regulation, it is not legally enforceable, and it does not confer legal rights or impose legal obligations on any party, including the Commonwealth, the Virginia Department of Health (VDH), or the regulated community. While VDH has made every effort to ensure the accuracy of the discussion in this chapter, the obligations of the regulated community are determined by statutes, regulations, or other legally binding requirements. The recommendations discussed are not a substitute for applicable legal requirements. In the event of a conflict between the discussion in this chapter and any statute or regulation, this chapter shall not be controlling.

1. Purpose

A SWAP identifies potential sources of contamination (PSCs), which are inventoried in available state, federal and private databases, and potential conduits to groundwater (PC's), that could impact public water supplies (both groundwater and surface water) and pose a threat to public health.

ODW supports source water protection through:

- Contract assistance with SWPP development and implementation
- GIS mapping
- SWPP templates
- Wellhead protection implementation project grants
- Source water assessments

Visit: http://www.vdh.virginia.gov/drinking-water/source-water-programs/.

2. Authority

Section 1453 of the 1996 Amendments to the Safe Drinking Water Act requires each State to develop a Source Water Assessment Program that will:

- "**delineate the boundaries of the assessment areas** in such State from which one or more public water systems in the State receive supplies of drinking water, using all reasonably available hydrogeological information on the sources of supply of drinking water in the State and the water flow, recharge, and discharge and any other reliable information as the State deems necessary to adequately determine such areas; and
- **identify the contaminants** regulated under this title for which monitoring is required under this title (or any unregulated contaminants selected by the State, in its discretion, which the State, for the purposes of this subsection, has determined may present a threat to public health), **to the extent practical**, the origins within each delineated area of such contaminants to **determine the susceptibility of the public water systems in the delineated area** to such contaminants."
- "…**make the results** of the source water assessments conducted under this subsection **available to the public**."

3. Process Overview

This chapter describes the process for ODW staff to complete a Source Water Assessment (SWA) in the Commonwealth of Virginia. The main steps are:

- Delineating the source water assessment area
- Creating the inventory of potential contamination sources
- Determining the susceptibility of the source

3.1. Source Water Assessment area delineation

ODW uses three categories of drinking water sources to delineate an assessment area: Groundwater, Groundwater under the Direct Influence of Surface Water (GUDI), and Surface water. All assessment areas are segregated into Zone 1 and Zone 2 assessment areas.

The Zone 1 assessment area is a priority zone for managing potential sources of contamination that ODW believes to pose the greatest risk. Zone 2 is a second, larger management zone where inventories of potential sources of contamination take place for long-term protection of the source.

Source Water Assessment Areas are determined as follows:

Groundwater Assessment Area

- Zone 1 = 1000-foot fixed radius around the source
- Zone 2 = 1-mile fixed radius around the source and outside of Zone 1

Surface Water Assessment Area

- Zone 1 = Watershed area within a 5-mile fixed radius of the raw water intake
- Zone 2 = Total watershed area outside of Zone 1

Groundwater Under the Direct Influence of Surface Water (GUDI)

With no identified flowing surface source:

- Zone 1 = 1000-foot fixed radius surrounding source
- Zone 2 = 1-mile fixed radius surrounding the source and outside of Zone 1

With identified flowing surface source:

- Zone 1 = 1000-foot fixed radius surrounding source
- Zone 2 = Total watershed area up gradient of the source and outside of Zone 1

3.2. Potential Sources of Contamination (PSC) *i*nventory

Once the delineation of the assessment area has been performed by ODW, ODW creates a PSC inventory. This task mainly consists of listing sites that may cause water quality degradation if not properly managed. The PSC inventory and associated mapping are included in the "SWAP Outputs" located at odwsrv1\odwshare\15-SWAP-Processing\08-SWA_Outputs.

The PSC inventory includes information on each PSC such as the facility type, expected contaminants, distance to the source, and the owner's mailing address. ODW plots PSC locations on the Zone 1 and Zone 2 maps provided in the "SWAP outputs".

There is a supplemental land use map provided in the "SWAP Outputs". This helps to identify potential non-point sources of contamination, not represented on the PSC maps or inventory. This information is not part of the susceptibility determination, but is an important tool for utilities developing Source Water Protection Plans.

Additional information on SWAP documents that are included in the "SWAP Outputs" are in the SWAP User Guide found in every GIS output folder.

In order to maximize the resources available for the SWAP, ODW relies primarily on third party information. Consequently, the accuracy of the PSC Inventory is significantly impacted by the accuracy of the information provided by third parties. ODW owns and maintains only a small portion of the PSC database; ODW collected this information during the initial assessment effort in 2002 and collects additional updates during sanitary surveys/field visits, as described later in section 4.1.

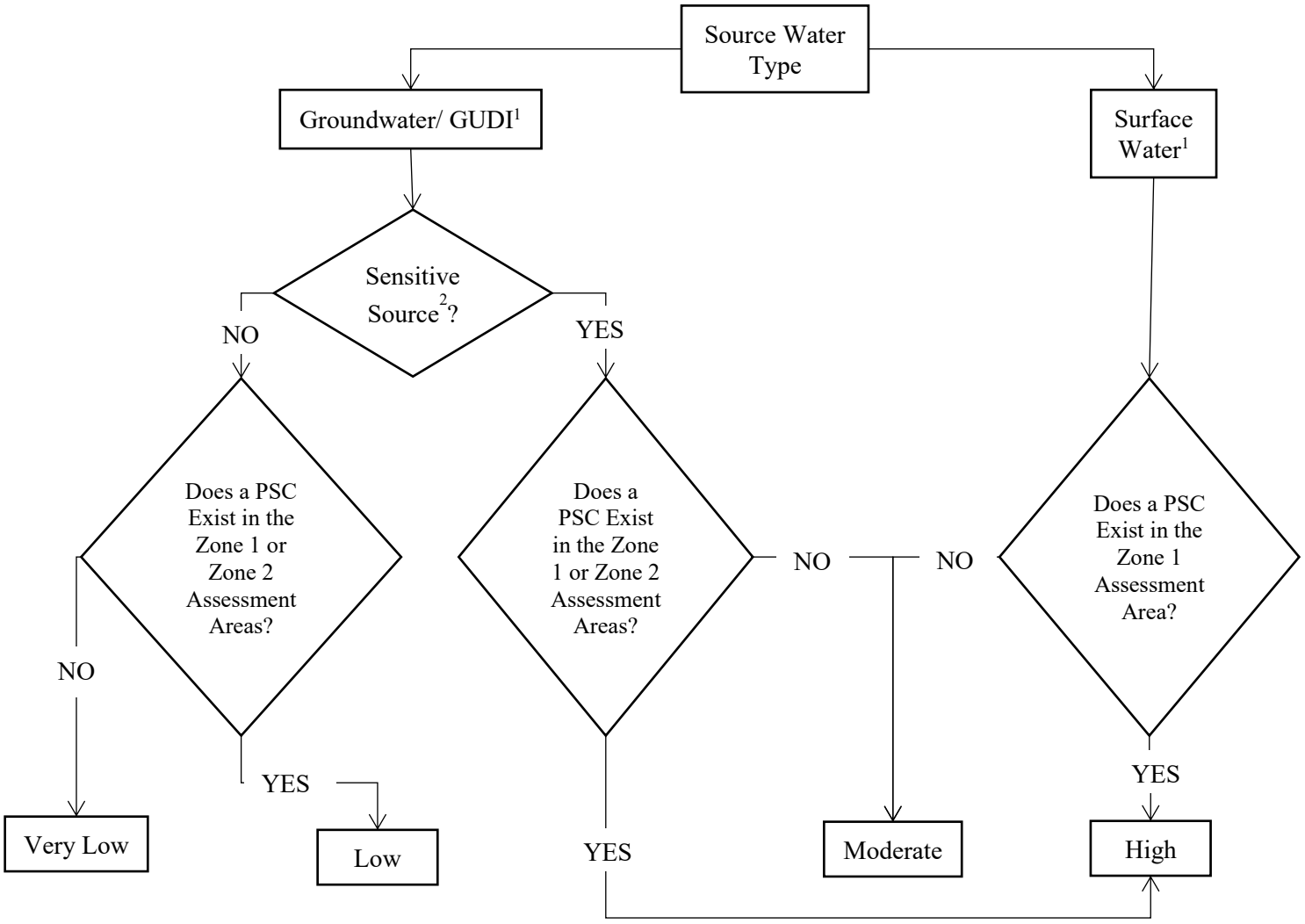
Replacement of some data layers from the initial ODW inventory effort, such as septic drain fields, with land use mapping and other third party datasets occurred to maintain the same data accuracy across the Commonwealth. These additional data layers are at \\odwsrv1\odwshare\15-SWAP-Processing\Additional_GISLayers.docx and available upon request from the GIS Technician.

Since the SWAP uses large quantities of information, frequent updates to the databases are required. The Data Bibliography included in every GIS output folder provides the sources of information, the date of the last update and a description of each database.

3.3. Susceptibility Determination

The use of the PSC inventory combined with the source type (groundwater or surface water) and sensitivity determination help to determine the source's susceptibility to contamination. The source water type, sensitivity, and number of PSCs in the Zone 1 and Zone 2 assessment area are located in the second table of the Source Water Assessment report. The source's susceptibility determination is located in the first table of the report.

The sensitivity determination is based on well construction and geological setting. A Class II B (or better) well that is constructed in accordance with the Virginia *Waterworks Regulations* and has a completed Uniform Water Well Completion Report (GW-2) that shows evidence in the driller's log that the well withdraws water from a confined aquifer is deemed to be non-sensitive. All other sources are deemed sensitive.



[1] All surface water sources and GUDI sources are sensitive sources.

[2] Only a Class II B (or better) well that is constructed in accordance with the Virginia *Waterworks Regulations* and has a completed Uniform Water Well Completion Report (GW-2) that shows evidence in the driller's log that the well withdraws water from a confined aquifer is deemed to be non-sensitive.

Flow Chart 1. *For Susceptibility determination.*

4. Deliverables

There are two different types of products that are available from a SWA, depending upon the stage in the source life cycle. The contents, templates and coordination methods associated with each "SWAP Output" product vary accordingly. The two types of "SWAP Outputs" are:

1) Preliminary Source Water Assessment (PreSWA)

Field office staff request this, when they receive a public drinking water source proposal. A PreSWA can be helpful to waterworks owners during site selection, design and construction of new source(s). It also can serve as a reference for synthetic organic chemical (SOC) monitoring waiver evaluations.

2) SWA Report

This request occurs when:

- An existing waterworks is developing or updating protection measures. These updates should be coordinated with the ODW-Division of Technical Services and the appropriate source water protection contractor; or
- A new source is permitted at a new or existing community waterworks; or
- When ODW obtains new information, such as updated GIS information obtained from other regulatory agencies or from discoveries made during ODW Sanitary Surveys, which changes the susceptibility determination of a waterworks source.

SWA Reports include "SWAP Outputs" and a letter to the owner; see section 4.2 for further information. ODW- Division of Technical Services will generate and provide each field office director with a list of waterworks with new or updated SWA Reports when available.

4.1. PreSWA and SWA Updates

SWAP Request Log

The ODW-Division of Technical Services maintains a request log for all SWAP requests which can be found at \\odwsrv1\odwshare\15-SWAP-Processing\SWAP_TrackingLog.xlsx. This log is checked multiple times daily by ODW-Technical Services Division to ensure quick turnaround. In order to make a request, please see Tables 1 and 2 and follow the instructions below:

1) Fill one row per active (SWA_Update) or proposed source (PreSWA)
2) For PreSWA requests, fill columns A through J.
   The following GIS link can be used to help determine latitudes and longitudes from aerial images:
   https://gis.vdh.virginia.gov/portal/apps/webappviewer/index.html?id=f3c2328710f74ccf844d5568c2182d8b
3) For other requests, fill columns A through G and column J.
4) If modifications are necessary, fill columns M and P.

Column P is reserved for any notes the field staff has for the ODW-Technical Services Division staff and/or any contact information for a request that originated from outside ODW. Light blue fields are reserved for ODW-Technical Services Division use only. In addition, the GIS software does not permit use of special characters e.g. " '! () - ", so avoid using these when completing an entry.

The ODW-Technical Services Division will send email confirmation that the request is complete. ODW staff use save all files on the shared drive based on the SWAP product type. Server locations for SWAP Products are as follows:

- PreSWA Outputs - \\odwsrv1\odwshare\15-SWAP-Processing\07-PreSWA_Outputs
- SWAP Outputs - \\odwsrv1\odwshare\15-SWAP-Processing\08-SWA_Outputs
- SWAP Reports - \\odwsrv1\odwshare\15-SWAP-Processing\12-SWA Reports

Source Water Assessment Reports and their corresponding outputs have been previously generated and can be accessed by staff at any time at the above folder locations. The log is used to record reports provided to waterworks so that follow-up on source water protection measures can be initiated by the ODW-Technical Services Division, or to request a change to an already created report.

Table 1. SWAP Example Request.

A	B	C	D	E	F	G	H	I	J
Deliverable Type	Requestor (First & Last)	PWSID	Waterworks Type	Waterworks Name	Source	County/City	Latitude	Longitude	Request Date
PreSWA	Tony Dongarra	4133720	C	Town of Reedville	WL003B	Northumberland	37.845800	-76.276150	12/30/2016

Field Verification

While conducting a sanitary survey/field visit, the staff shall take a copy of the Zone 1 assessment map and PSC inventory for each waterworks' source(s) and document any discrepancies between current field conditions and these SWAP documents. Staff will provide their notes to the Sourcewater@vdh.virginia.gov for corrections. Use the email template below (Table 2). A word document version of this template is also available at \\odwsrv1\odwshare\15-SWAP-Processing\PSC_Change_EmailTemplate.docx.

Table 2. PSC Change Request Email Template.

To: sourcewater@vdh.virginia.gov
Cc: Special Project Engineer

Subject: Sanitary Survey – PSC Change

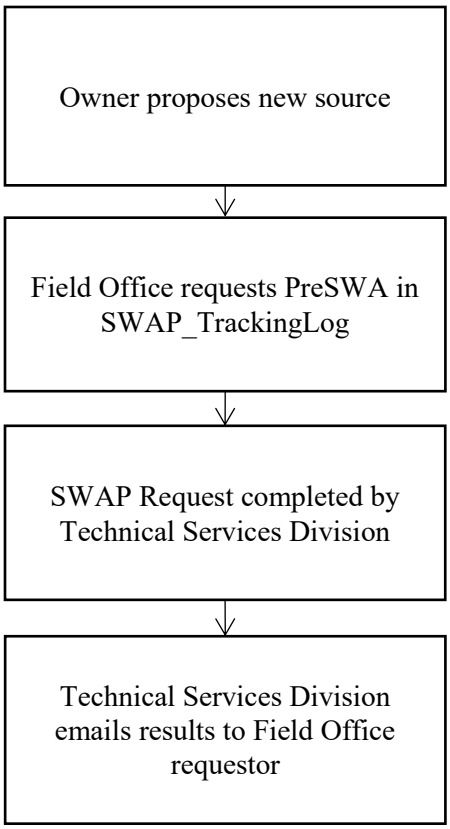
Content:
Hello,
Please see table below for an updated PSC found during a recent sanitary survey.

PSC Type	Latitude	Longitude	Comments

Thanks,
Staff Signature

The ODW-Technical Services Division will then update the source water assessments as necessary. The ODW field staff are **not required** to investigate the entire extent of the assessment area. Examples of these types of corrections are:

- watershed adjustments based on field conditions
- addition/subtraction of a PSC from the assessment area during a well site inspection or sanitary survey



Flow Chart 2. *Source Water "PreSWA" Request Flow Chart.*

4.2. SWA Report

SWA reports are requested by ODW field staff in the processing log as a SWA_Update. These reports are both automatically generated by ODW TSD on a routine basis and upon request when new information may change the susceptibility determination of a source. When generating reports, a spreadsheet located at \\odwsrv1\odwshare\15-SWAP-Processing\12-SWA Reports will be made available to ODW field office staff, indicating which waterworks have a new or updated SWA report, and the date the report was generated.

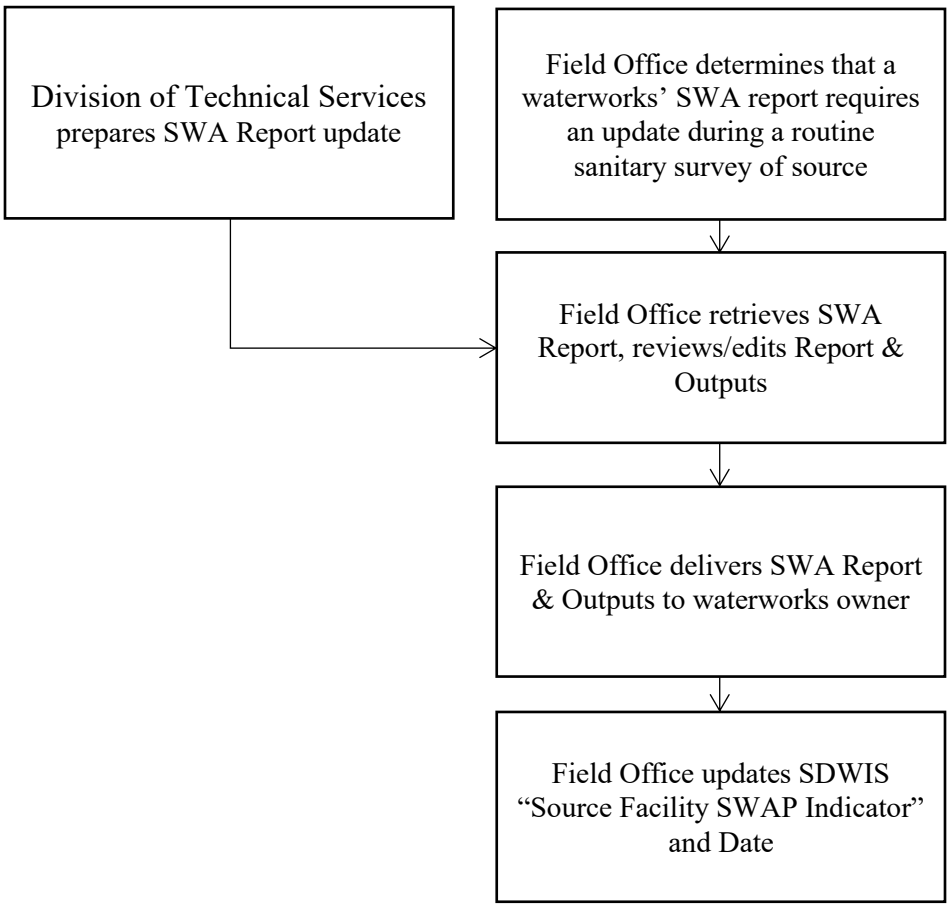
Each SWA report includes:

- Transmittal letter to the owner
- Assessment Report
- Attachment A: Source Water Assessment Delineation and Maps
- Attachment B: Source Water Susceptibility Determination
- Attachment C: Definitions

Field office staff may provide reports to each waterworks owner after a routine sanitary survey of the source if the source susceptibility determination has changed or at the discretion of the field office. Field staff can find the date of the last SWAP issuance for a source in the

"SWAP_RPT_STATUS_DT" field in SDWIS. When preparing a report for issuance, field office staff will need to review the spreadsheet to confirm that the outputs are up to date and edit the automatically generated reports prior to providing them to the waterworks. This generates a separate report for each source. Every letter will need an update to the signature block at the end of the document to include the name of the person sending the report and their office. Flow Chart 3 presents a summary of the SWA report procedure.

These reports will also be located with the spreadsheet at \\odwsrv1\odwshare\15-SWAP-Processing\12-SWA Reports. ODW will provide a blank template of the report letter addressed to the administrative contact in this folder for reference.



Flow Chart 3. *Source Water Assessment Report Flow Chart.*

Each report shall include the following GIS products in Attachment A:

1. Zone 1 Map (one for each source)
2. Zone 2 Map (one for each source)

3. Potential Sources of Contamination summary (one for each source, found in Summary Reports PDF)
4. Potential Sources of Contamination inventory (one for each source, found in the Inventory Excel .xls file)
5. Zone 2 Land Use Map (one for each source)
6. Typical Contaminants compendium
7. Data bibliography

Once staff provide the reports to the waterworks, field staff will update the "SWAP Report" indicator and "SWAP Report" date in SDWIS.

Chapter 2 – Source Water Protection Policies

Summary
This chapter describes regulations and formal policies that ODW has adopted to protect source waters. ODW does not require source water protection planning or implementation, but promotes these activities and provides assistance as described in Chapter 3.

1. Virginia *Waterworks Regulations*

1.1. 12VAC5-590-830. Surface water sources; quantity; quality; development structures.

This section of the Virginia *Waterworks Regulations* contains requirements for the protection of surface water sources. Note that this is a design regulation.

http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+12VAC5-590-830

1.2. 12VAC5-590-840. Groundwater sources.

This section of the Virginia *Waterworks Regulations* contains requirements for the protection of groundwater sources. Note that this is a design regulation.

http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+12VAC5-590-840

2. Source Water Design, Construction, and Permitting

For procedures for processing a well development request, including the use of Source Water Assessments in the approval or rejection of proposed well site(s), well construction, and testing, see Working Memo 813 at:

Y:\03-Memos\301-Active Working Memos\301.03-MSWord Active Memos\WM813 (REV 03-10-2016).doc

For information on permitting water sources, assigning source water capacities, and processing GW-2 reports, see the Project Review & Permit Procedures Manual for ODW Staff at:

Y:\13-Manuals\02-Permit Manual

3. Source Water Sampling

For procedures for evaluating groundwater source development samples for the Groundwater Rule or GUDI evaluation, or for determining a sources susceptibility to beta contamination, see the Sampling Manual at:

Y:\13-Manuals\03-Sampling Manual

4. Recreational Use of Domestic Water Supply Reservoirs

ODW recommends that all waterworks utilizing surface water reservoirs follow current guidance from AWWA for the recreational use of domestic water supply reservoirs. Source material for the revision of this policy is provided by the American Water Works Association policy statement on "Recreational Use of Domestic Water Supply Reservoirs."

Recreational Use of Domestic Water Supply Reservoirs

"The American Water Works Association (AWWA) supports the principle that water of the highest quality should be used as the source of supply for public water systems. Accordingly, the risks and potential mitigation requirements of any recreational activity on water supply reservoirs should be identified and publicly evaluated. In the evaluation, utility-, customer- and other stakeholder-determined acceptable levels of risk should be given the highest consideration. No recreation should be permitted on finished-water reservoirs under any circumstances.

Protection of public health and drinking water quality should be the highest priority in operational decisions for reservoirs used jointly for water supply and recreation. Decisions regarding recreational use of domestic water supply reservoirs should be consistent with the intent of the source water protection program developed and implemented by the utilities and other responsible parties.

Recreational uses of domestic water supply reservoirs and the land-based infrastructure necessary to support such uses can add sources of microbial, physical, and chemical contaminants to the drinking water produced from the reservoirs. Water utility decisions on permitting recreational uses of water supply reservoirs should consider the following issues: (1) the potential for water quality degradation, (2) the public health risk, (3) the acceptance of such health risk by the customers, (4) the current required level of treatment, and (5) additional treatment requirements, uncertainties, and costs that may be incurred. Recreational uses should be prohibited in those instances where a scientifically-based risk assessment, or, in the absence of a risk assessment, the best available scientific data demonstrates a probable or imminent degradation of water quality or hazard to public health that cannot be controlled or mitigated in a cost effective manner.

When considering proposals for recreational use of domestic water supply reservoirs, the water utility should work with stakeholders to develop an integrated reservoir management plan, including appropriate water quality monitoring, to evaluate and, if necessary, mitigate water quality impacts, and to minimize increased risks. Body-contact recreation (e.g., swimming, water skiing, wind surfing) and use of two-cycle gasoline engines on boats should be discouraged or prohibited. In addition, boat inspection/washing stations and restrictive use of live

bait should be considered to prevent the introduction of foreign and invasive species (such as zebra mussels or non-native algal species) that could potentially destabilize a reservoir's ecology and water quality. Where feasible, costs for monitoring, evaluations, and mitigation should be borne by those proposing or benefiting from the recreational activity, not by the utility or its customers.

If recreation already exists on a reservoir, the water utility should work or continue to work with stakeholders to develop an integrated reservoir management plan and associated implementation actions to mitigate water quality impacts and to minimize increased risks.

Practices specified in this policy statement are consistent with all other pertinent AWWA policy statements. *Adopted by the Board of Directors June 13, 1971, reaffirmed Jan. 28, 1979, and Jan. 25, 1987, revised June 23, 1996, June 13, 2004, and Jan. 25, 2009. Revised June 10, 2012. Revised January 14, 2017."*

5. Wells with Standby Generators/Fuel Tanks

ODW does not specifically address standby generator facilities utilizing liquid fuel tanks in close proximity to groundwater sources in the Virginia *Waterworks Regulations* at this time. 12 VAC 5-590-840A2c states "The horizontal distance from the well to any petroleum or chemical storage tank or pipeline or similar source of contamination shall be at least 50 feet…." It is probable that standby power generator/liquid fuel tanks to power well pumps were not the intent of this requirement; however, reasonable protection of the source is necessary and prudent. ODW encourages owners to provide standby power. The primary concern is the need to protect a groundwater source from a substantial spill from a fuel tank, fuel line, or the fuel tank filling operation. Generators proposed to power well pumps typically have 60-120 gallon fuel tanks.

ODW strongly recommends maintaining a separation distance of 50 feet. The following guidance is for when the well and fuel storage tank separation-distance is less than 50 feet:

1. Recommend propane or natural gas generators.
2. Recommend a maximum practical distance from generator/liquid fuel tank to groundwater sources and placement of the generator/liquid fuel tank downslope of the groundwater source when possible.
3. Recommend minimum fuel line distances from tank to generator and fuel fill point to tank.
4. Recommend separately housed generator/tank facility.
5. Require for liquid fuel generators/tanks:
    a. Above ground installation.
    b. A double wall tank with an inner wall leak detection alarm or a single wall tank with a concrete (or other acceptable material) full capacity containment curb/wall.
    c. Fuel line must also be above ground or provide casing.
    d. A paved and curbed parking pad at fuel fill location.

A design exception request is necessary for generator/ liquid fuel tank facilities located less than 50 feet from a groundwater source.

Chapter 3 – Promoting Source Water Protection

Summary

This chapter is an informational resource for ODW staff and waterworks owners and operators to protect groundwater and surface water source from contamination. It includes a brief overview of the value of source water protection and common source water protection strategies, information on ODW's source water protection assistance programs, and links to tools and resources.

1. Why Protect Source Water

Source water protection offers a number of potential benefits to waterworks and their customers including the following:

- Improves public health – Reduces threats or illness or injury from contaminated water exposure, particularly among vulnerable populations such as elderly, pregnant women, children, and medically vulnerable.
- Reduced water treatment costs - Better raw source water creates a better-finished product. This also results in less complex treatment requirements (lower capital costs) and reduced operation and maintenance costs.
- Additional significant cost savings - It would be far more economical to prevent pollution by protecting watersheds than to restore and/or replace water sources or install treatment to address the contamination.
- Improves skill set within water industry - Develops greater technical capacity among waterworks operators to help identify contamination risks and respond appropriately to protect source waters using the multiple barrier approach.
- Continuing community trust — Engaging the community in a proactive process to protect source water gives the community more confidence in their drinking water supply and improves public relations.
- Economic benefit – A reliable and clean water source helps attract employers and tourism and improves quality of life and home values for residents.

2. How Waterworks Can Protect Source Water

ODW recommends that waterworks implement AWWA Standard G300 – Source Water Protection to protect their source waters. This document is available to ODW staff at the link below and is available externally for purchase on the AWWA website.

\\odwsrv1\odwshare\06-Technical Resources\610-AWWA Standards\Most_Current\

Based on AWWA Standard G300 and ODW's experience, ODW recommends the following seven steps to waterworks seeking to implement source water protection:

1. Locate collaboration opportunities
2. Form a Local Advisory Committee

3. Request SWA information
4. Collect additional information
5. Develop a SWPP
6. Implement the SWPP
7. Review and update the SWPP

More information on these steps and recommended resources is on the ODW SWP Program webpage at:

http://www.vdh.virginia.gov/drinking-water/source-water-programs/source-water-protection-program/

3. How ODW Can Help

3.1. Field Office Staff

ODW field office staff play a critical role in promoting source water protection due to their relationship with waterworks owners and operators, and their time spent on location, inspecting waterworks. During the sanitary survey process, field office staff evaluate potential threats to a source water and determine if the waterworks has planned for or is implementing source water protection activities. The ODW Division of Technical Services recommends that field office staff explain the benefits of source water protection as explained in section 1 of this chapter, and refer any community waterworks interested in source water protection to the Special Projects Engineer in the Central Office.

Attachment 1 contains a flier, which field office staff may distribute to waterworks.

3.2. Central Office Staff

SWP Survey and record keeping

The ODW Central Office staff conduct routine surveys of waterworks source water protection activity, and maintains copies of waterworks source water protection plans when made available to ODW.

- Source Water Protection Survey – Results of ODW's SWP surveys are located here: Y:\01-Central Office\160-Div Tech Services\29-Source Water Programs\SWPP\SurveyTrends
  In the "survey analysis" spreadsheet for the most recent year, the "Strategy In Place" column indicates whether the waterworks has a protection plan, the "SWPP Indicator" column represents whether the plan is being implemented according to ODW's definition of implementation, and the "Survey Remarks" column provides other details.
- Copies of SWP plans are available to field office staff here: Y:\08-Documents and Data Files\805-Source Water Protection

Source Water Protection Assistance

The ODW Central Office staff maintain a number of programs to provide technical and financial assistance to aid community waterworks in protecting their source waters. Updates often occur to these programs to improve their effectiveness. For current information on these programs, see ODW's Source Water Protections Assistance and Funding Opportunities webpage at: http://www.vdh.virginia.gov/drinking-water/source-water-programs/source-water-protection-program/

Interagency Review

The ODW Central Office staff provide internal coordination for the Interagency Project and Permit Review program, and related coordination with external government agencies, frequently for DEQ and VDOT. Virginia Code Section 10.1-1192 requires this activity and supports the ODW's mission by identifying projects that may affect public water supplies through the source water.

Appendix

Attachments are located at: \\odwsrv1\odwshare\13-Manuals\06-Source Water Manual\attachments

SWM-C3-Attachment 1-SWPP Benefits Flyer for Waterworks Template

Chapter 4 – Harmful Algal Bloom Monitoring and Response

Summary

This chapter is an informational resource for ODW staff and waterworks owners and operators. It includes recommendations for waterworks using surface water to assess, monitor for, and respond to a harmful algal bloom (HAB). It also includes directions for ODW staff to support waterworks' efforts to detect and respond to HABs. This chapter recommends coordination between waterworks, ODW, and Virginia's HAB Task Force, and provides information about cyanotoxin analysis, waterworks operational changes, coordination within VDH and external state agencies, and public notification.

ODW encourages waterworks to develop site-specific plans to assess, monitor for, and respond to a HAB based on the source water history of algae blooms and the needs and treatment capabilities of the waterworks. If a waterworks has a site-specific HAB plan, the recommendations contained in this chapter will not supersede the site-specific plan.

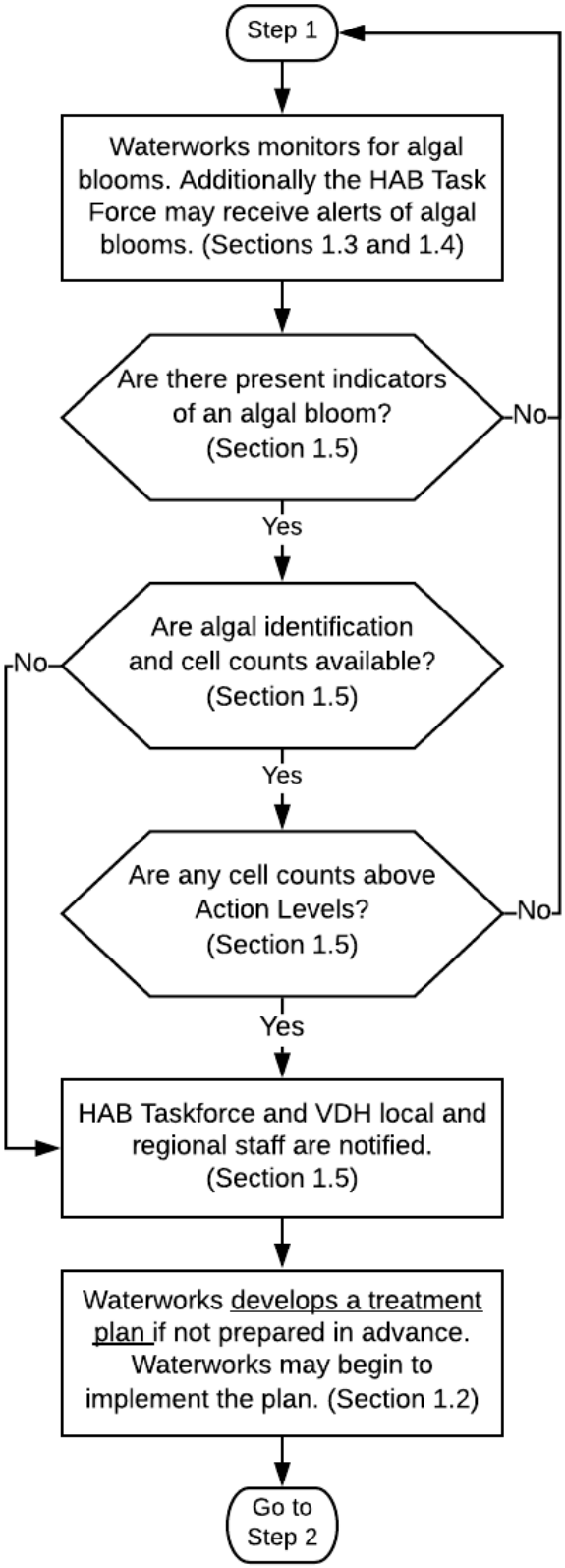
Disclaimer

This chapter is not a regulation; it is not legally enforceable; and it does not confer legal rights or impose legal obligations on any party, including the Commonwealth, the VDH, or the regulated community. While VDH has made every effort to ensure the accuracy of the discussion in this chapter, statutes, regulations, or other legally binding requirements determine the obligations of the regulated community. The recommendations discussed are not a substitute for applicable legal requirements. In the event of a conflict between the discussion in this chapter and any statute or regulation, this chapter shall not be controlling.

Although this chapter describes suggestions for managing cyanotoxin issues in raw and potable water, the recommendations may not be appropriate for all situations and alternative approaches may be applicable.

Mention of trade names or commercial products does not constitute a VDH-ODW endorsement or recommendation for use.

1. Monitor for Algae



Flow Chart 1. *Recommended Process for Step 1: Monitor for Algae.*

1.1. Introduction

Algal blooms are overgrowths of algae in a saltwater, brackish water, or freshwater environment. In fresh water, a bloom that consists of "blue-green algae" is made of cyanobacteria, a class of photosynthetic bacteria. Cyanobacteria have the ability to produce cyanotoxins, which can affect human health. Certain conditions, such as high concentration of nutrients in warm water, can allow a cyanobacterial bloom, also known as a harmful algal bloom (HAB), to form.

The EPA has not established a standard in the National Primary Drinking Water Regulations for cyanotoxins, but has issued health advisories on two cyanobacterial toxins in drinking water: microcystins and cylindrospermopsin. Health advisories provide information on the chemical and physical properties, occurrence and exposure, health effects, quantification of toxicological effects, and other regulatory standards, analytical methods, and treatment technology for drinking water contaminants. Health advisories describe concentrations of drinking water contaminants at which adverse health effects are not anticipated to occur over specific exposure durations (e.g., one-day, ten-days, several years, and a lifetime). Health advisories also contain a margin of safety to address uncertainties. Health advisories serve as informal technical guidance to assist federal, state and local officials, as well as managers of public or community water systems in protecting public health when emergency spills or contamination situations occur.

Due to the risks that a HAB can pose to humans and the potential for a HAB to form in a waterworks' surface water source, ODW has developed guidance to provide recommendations for waterworks using surface water to assess, monitor for, and respond to a HAB. It also includes direction for ODW staff to support waterworks' efforts to detect and respond to HABs.

1.2. HAB Planning and Prevention

Advanced planning for a HAB may allow a waterworks to prevent a cyanotoxin health advisory exceedance, or potentially prevent a HAB from forming. The EPA has developed a cyanotoxin management plan template and example plans that are available for use by waterworks to develop a plan to prevent or respond to HABs. A link to this template is in section 5 of this chapter. Waterworks may choose to implement source water protection or source water treatment strategies in an effort to reduce the amount of cyanotoxins present in the source water.

Source Water Protection

Source water protection measures that reduce the nitrogen and phosphorus load on a watershed have the potential to decrease the frequency and severity of HABs. The following are three categories of source water protection measures that may reduce nutrient loading:

> Public education – This can include informing residents of the need for best practices that they can perform to reduce nutrient pollution. Information about these best practices are

on the EPA's "Nutrient Pollution, What You Can Do" webpage located at https://www.epa.gov/nutrientpollution/what-you-can-do.

Agricultural and stormwater Best Management Practices (BMP)- These can include a wide variety of practices and constructed facilities such as detention and retention ponds to settle out nutrients, or conservation buffers, which are strips of vegetation along stream banks to remove nutrients before they reach the water.

Wastewater improvements – These can include improvements intended to reduce combined sewer overflows, or to improve nutrient removal at wastewater treatment plants.

The ODW can aid waterworks serving total populations less than or equal to 50,000 in developing and implementing SWP Plans through our source water protection contractors (private consultants contracted by ODW to provide assistance). ODW can also provide direct technical assistance (or aid the field office in providing direct technical assistance) to waterworks serving a total population of greater than 50,000. For more information on these programs, see ODW's Source Water Protection webpage: http://www.vdh.virginia.gov/drinking-water/source-water-programs/source-water-protection-assistance-funding-opportunities/

For general instructions on source water protection planning, ODW recommends "AWWA G300-14 Source Water Protection". ODW staff can access this document through a link in section 5.

Source Water Treatment

There are a wide variety of methods available to limit the growth of algae or remove algae from the source water. The waterworks must exercise caution in selecting a source water treatment method. Some treatment methods, such as algaecides and ultrasound, have the potential to release cyanotoxins from the cyanobacterial cells, which makes the removal of the toxins at the water treatment plant much more difficult. For further information on available source water treatment methods see the resources in section 5 of this chapter.

Water Treatment Optimization

ODW recommends that all surface water treatment plants assess their capability to remove or inactivate cyanotoxins and develop a strategy or treatment plan to optimize treatment for cyanotoxin removal. Owners may choose to implement some optimization strategies following the identification of an algal bloom, following detection of cyanotoxins, or throughout the bloom season as a precautionary measure.

The following documents provide information on optimization of water treatment for cyanotoxin removal, and links to this information are in section 5 of this chapter:

- Water Treatment Optimization for Cyanotoxins, Section 2.5 (EPA, 2016)
- Generalized Cyanotoxin Treatment Optimization Recommendations (Ohio EPA, 2016)

- Algae: Source to Treatment, AWWA Manual M57, Chapter 14 (AWWA, 2010)

1.3. State Monitoring Programs (HAB Task Force)

The Virginia Department of Health (VDH) works in cooperation with the Virginia Department of Environmental Quality (DEQ), Old Dominion University, and the Virginia Institute of Marine Science at the College of William and Mary to monitor Virginia's waters for harmful algae and to prevent illness associated with these organisms. This group is the Virginia HAB Task Force (HAB Task Force) and was formed in 1997. These primary support members coordinate and conduct surveillance in shellfish growing areas, estuaries, as well as coastal beaches and inland freshwater lakes and rivers. This group communicates routinely with a large group of secondary support members throughout the state to facilitate awareness, discussions, and to share research findings in order to protect human health. VDH has representatives on the HAB Task Force from the Office of Environmental Health Services (OEHS) and ODW. The HAB Task Force member information is in the "Commonwealth of Virginia Harmful Algal Bloom Response Plan" located at

http://www.vdh.virginia.gov/content/uploads/sites/12/2018/05/Virginia_HAB_ResponsePlan_Final_2018.pdf.

DEQ and OEHS have programs that involve sampling specific to fresh water bodies for cyanotoxins or cyanobacteria. Most of these freshwater bodies do not serve as drinking water supplies. Additionally, the OEHS monitors the HAB Hotline (1-888-238-6154) and operates the Harmful Algal Bloom Report Form (http://www.vdh.virginia.gov/environmental-epidemiology/harmful-algal-bloom-online-report-form/), a service that allows community members to report an algae bloom, fish kills, and suspected HAB-related health effects. When ODW is made aware of an algal bloom related to source water utilized by a waterworks, ODW field staff complete the Harmful Algal Bloom Report Form, or request that the waterworks complete the Harmful Algal Bloom Report Form.

When the HAB Task Force becomes aware of a potentially harmful algae bloom in a drinking water supply, the ODW HAB Task Force member shares this information with the respective ODW field office. The ODW field office contacts the potentially impacted waterworks to inform them of the condition and recommended response.

1.4. Source Water Observation and Monitoring

EPA guidelines referenced in section 5 of this chapter recommend that waterworks owners and operators that use surface water sources monitor for the following algal bloom indicators throughout the algal bloom season, typically March – November in Virginia:

Visual Indicators – Waterworks owners and operators should perform visual inspections of the water source on at least a twice per week basis during the season in which blooms typically occur. More frequent inspections may be called for during the hottest months of the year, or during hot

sunny weather following a storm. Visual indicators of a bloom can include reduced water clarity, discoloration, or surface scum formation. Surface scum is more visible early in the morning when most HAB species are near the water surface. Note that some HAB species remain distributed throughout the water column and do not produce a surface scum. Reference information for visually identifying a bloom is in section 5 of this chapter.

Other Indicators - Operators should closely watch the following parameters during algae bloom season:

- Raw water pH - The most reliable algal bloom indicator routinely monitored by waterworks is raw water pH. During an algal bloom, pH increases during daylight hours as algae grow and consume dissolved CO_2 from the water. Decreases in pH may also occur at night.
- Raw water odor – Most species of HAB can produce earthy or musty odors.
- Raw water turbidity, decreased filter run times, need for increased coagulant dose, and increased chlorine demand – These parameters can indicate an algae bloom, but are of less use because other suspended matter in the water may significantly affect them.

When possible, monitoring of the following parameters is also useful for detecting an algae bloom:

- Algae identification and counts
- Algal bio volumes
- Chlorophyll-a and phycocyanin concentrations

1.5. Is an Algal Bloom Occurring?

The determination of when to initiate raw water cyanotoxin monitoring is complicated by the variability of HAB species and further hampered by the inability of many Virginia waterworks to identify and count algae at the water treatment plant.

When observing visual or other indicators of an algal bloom:

Cyanobacteria identification and counts are useful parameters to evaluate the risk imposed by an algal bloom quickly. The World Health Organization has developed the following Cyanobacteria Cell Count Action Levels that trigger toxin sampling for raw water:

Table 1: Cyanobacteria Cell Count Action Levels

Species	**Action Level**
Microcystis spp.	2,000 cells/mL
Combination of all potentially toxic cyanobacteria species present	15,000 cells/mL

When cyanobacteria identification and counts are not available or they indicate a risk of cyanotoxin contamination, ODW recommends proceeding to section 2: "Monitor Raw Water".

If the waterworks reports indicators of an algal bloom to ODW, the ODW field office director, or designee, will inform the local health director(s) that ODW received reports of indicators of an algal bloom, and may provide a brief description of the actions that will be taken to respond to the bloom. Additionally, ODW field staff will complete the online Harmful Algal Bloom Report Form, or request that the waterworks complete the HAB Report Form located at http://www.vdh.virginia.gov/environmental-epidemiology/harmful-algal-bloom-online-report-form/.

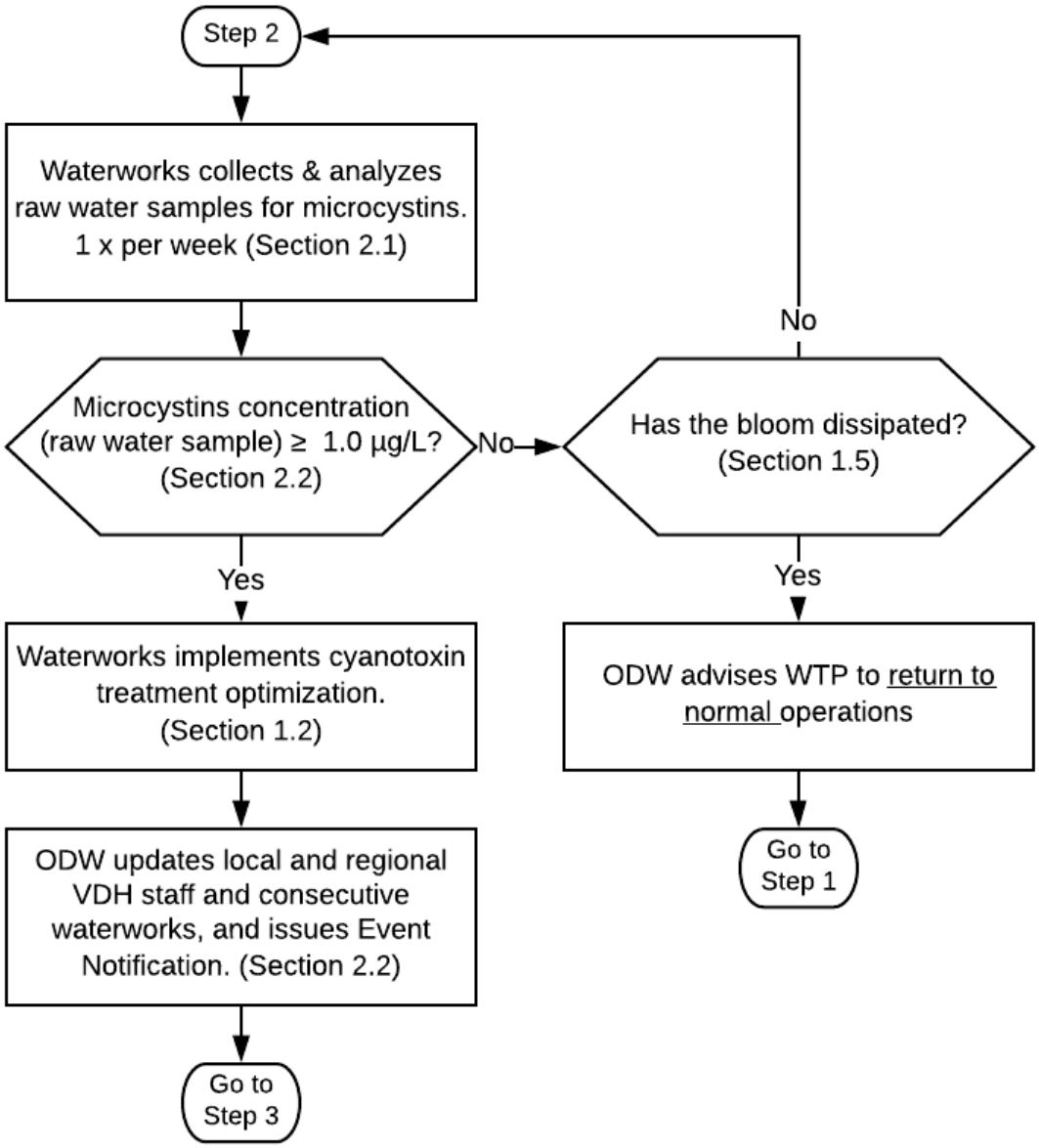
ODW field office will contact all potentially impacted waterworks and offer to coordinate with waterworks owners and operators to develop a strategy to optimize treatment for cyanotoxin removal if a cyanotoxin optimization treatment plan has not been developed as described in section 1.2.

Caution: *If the waterworks utilizes algaecides, oxidants, or other treatment methods with the potential to cause algae cell lysis (rupture of cells) prior to filtration, this may compromise the capacity of sedimentation and filtration treatment processes to remove cyanotoxins. In this case, the waterworks may choose to proceed to section 3: "Monitor Finished Water".*

When there are no visual or other indicators of an algal bloom:

Waterworks with a history of frequent HABs may perform raw water cyanotoxin monitoring throughout the season in which blooms historically occur. Otherwise, ODW recommends that waterworks continue Step 1 - Monitor for Algae.

2. Monitor Raw Water



Flow Chart 2. *Recommended Process for Step 2: Monitor Raw Water.*

2.1. Raw Water Cyanotoxin Analysis

ODW recommends that waterworks run field tests or onsite laboratory analyses for detection of cyanotoxins in the raw water following the determination of a bloom as described in section 1.5. ODW field office staff may perform field test kit raw water microcystins analysis or provide field kits to the water plant operators if the waterworks does not have the ability to perform the analysis.

When providing field kits to operators, ODW staff should remind the operator that the field tests are time and temperature-sensitive. The operator must take care to ensure that analysis of samples occurs within the required temperature range, and each step of the analysis process is accurately timed.

ODW will request that operators report test result(s) to the ODW field office immediately after completing each analysis. If the ODW field office receives monitoring results, staff will evaluate and record those results in the Cyanotoxin Results Recording Spreadsheet (link provided in section 5 of this chapter).

Waterworks should continue raw water microcystins analysis on a weekly basis until the bloom has dissipated, or a positive result triggers laboratory analysis as described in section 3 of this chapter. If ODW is providing the test kits, then the responsible ODW field office will need to order replacements through the ODW business office. Note that each field test kit contains five test strips.

2.2. Raw Water Cyanotoxin Analysis Results Evaluation & Communication

Raw water microcystins < 1.0 µg/L:

If the raw water microcystins analysis results indicate that the microcystins concentration is below 1.0 µg/L, field office staff will recommend the waterworks owner or operator continue raw water microcystins analysis on a weekly basis until the bloom has dissipated or a result of microcystins ≥ 1.0 µg/L triggers laboratory analysis.

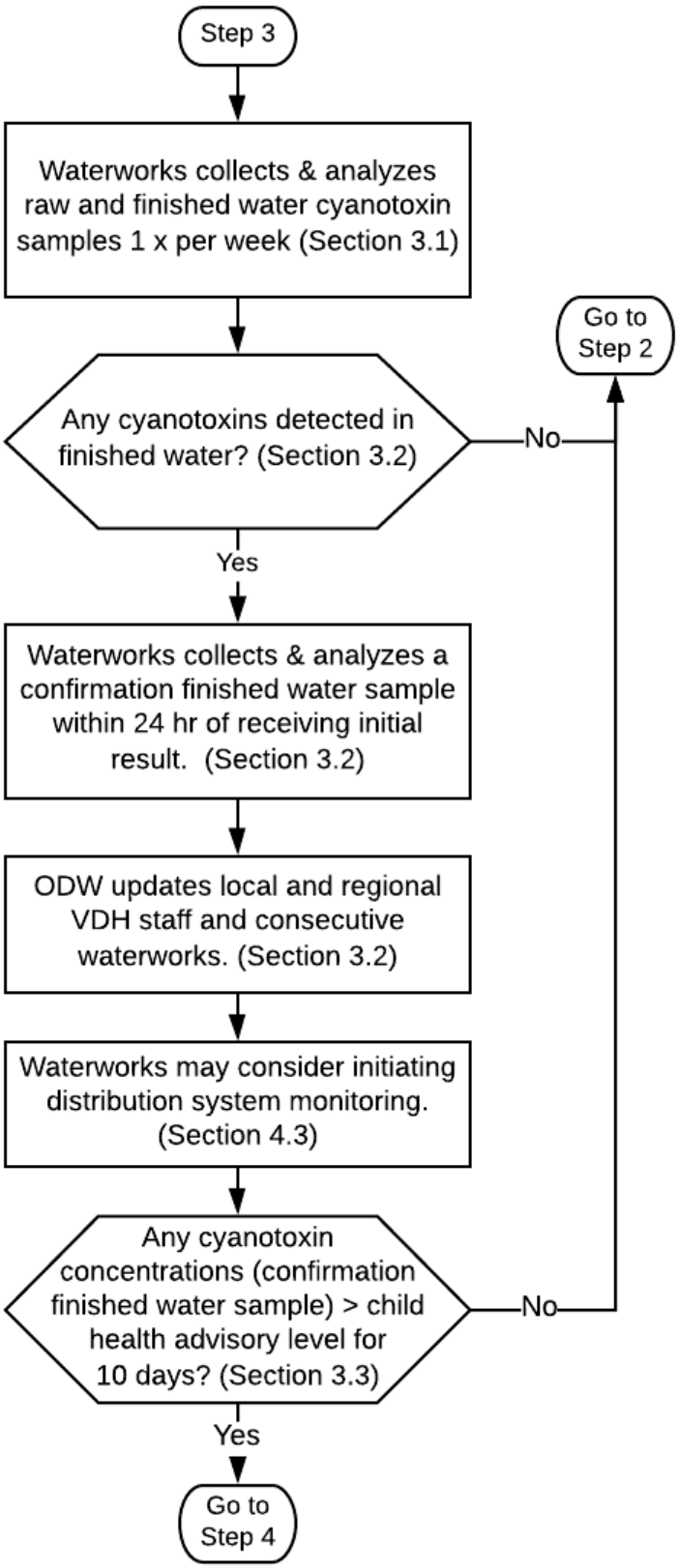
Raw water microcystins ≥ 1.0 µg/L:

If the raw water microcystins analysis results indicate that the microcystins concentration is at or above 1.0 µg/L, ODW field office will:

- Recommend to the operator the collection of raw and finished water samples for cyanotoxin analysis, as described in section 3.
- Recommend implementation of cyanotoxin treatment optimization to the operator (see section 1.2).
- Update the local and regional VDH staff, OEHS, and ODW HAB task force members. If the ability of the water treatment plant to treat the cyanotoxin is unknown, ODW will issue an Event Notification. In this case, the ODW field office will comply with the VDH Event Notification guidance document.

The ODW HAB Task Force members will inform the other members of the HAB Task Force.

3. Monitor Finished Water



Flow Chart 3. *Recommended Process for Step 3: Monitor Finished Water.*

3.1. Raw and Finished Water Cyanotoxin Analysis

Following the detection of microcystins in a raw water sample as described in section 2.2, additional sampling and analysis from the raw water and entry point, (finished water) sample taps provide information to assist the decision-making process. ODW will perform, or recommend that the waterworks perform microcystins, cylindrospermopsin, anatoxin-a, and saxitoxin analysis using laboratory enzyme-linked immunosorbent assay (ELISA), liquid chromatography– tandem mass spectrometry (LC/MS/MS), or high performance liquid chromatography–tandem mass spectrometry (HPLC/MS/MS) techniques. If the waterworks performs cyanobacteria cell counts and identification, then the analysis can be limited to the specific cyanotoxins produced by the cyanobacteria identified.

Note that laboratory cyanotoxin analysis can significantly delay a HAB response. *To ensure the timeliness of a HAB response, maintain a supply of sample bottles and dechlorination reagent, collect samples as soon as possible, contact the laboratory in advance to arrange for expedited analysis and reporting, and ship the samples via overnight delivery. It may also be advisable to collect and ship confirmation analysis samples with the initial samples. The lab can hold the confirmation analysis samples and only analyze the samples if necessary.*

The following list provides information on some laboratories available to waterworks for cyanotoxin analysis (as of October 2018):

Table 2. Laboratories.

Laboratory Name	Location	Available Techniques	Contact Information
BSA Environmental Services, Inc.	23400 Mercantile Rd. Suite 8 Beachwood, OH 44122	ELISA, HPLC/MS/MS	John R. Beaver (216) 765-0582 j.beaver@bsaenv.com
Green Water Laboratories	205 Zeagler Drive Suite 302 Palatka, FL 32177	ELISA, LC/MS/MS	Dora Griffis (386) 328-0882 info@greenwaterlab.com
EnviroScience	5070 Stow Road Stow, OH 44224	ELISA	Alex Valigosky (419) 376-0263 avaligosky @enviroscienceinc.com
Eurofins Eaton Analytical, Inc.	702 Electronic Drive Horsham, PA 19044	ELISA, LC/MS/MS	Ronald Milke (215) 499-4578 RonMilke@EurofinsUS.com Monrovia California laboratory (626) 386-1100 South Bend Indiana laboratory (574)233-4777
Northeast Ohio Regional Sewer District	3900 Euclid Ave. Cleveland, OH,44115	ELISA, LC/MS/MS	Mark Citriglia (216) 641-6000 citrigliam@neorsd.org
Wayne State University	5101 Cass Ave Detroit, MI 48202	ELISA, LC/MS/MS	Judy Westrick (313) 577-2579 westrick@chem.wayne.edu
Microbac Laboratories	One Allegheny Square, Suite 400 Pittsburgh, PA 15212	ELISA, LC/MS/MS	(412) 459-1060 info@microbac.com

In the event that the waterworks is unable to take responsibility for laboratory cyanotoxin analysis, ODW may provide for the laboratory analysis. If VDH arranges for the laboratory analyses, these laboratories may be used:

Table 3. Laboratories.

Laboratory Name	Location	Available Techniques	Contact Information	Notes
BSA Environmental Services, Inc.	23400 Mercantile Rd. Suite 8 Beachwood, OH 44122	ELISA, HPLC/MS/MS	John R. Beaver (216) 765-0582 j.beaver@bsaenv.com	Request expedited analysis prior to sample collection
Green Water Laboratories	205 Zeagler Drive Suite 302 Palatka, FL 32177	ELISA, LC/MS/MS	Dora Griffis (386) 328-0882 info@greenwaterlab.com	Request expedited analysis prior to sample collection
Old Dominion University	110 Mills Godwin Life Sciences Bldg. Norfolk, VA 23529	ELISA	Leah Gibala Smith 757-683-4994 lgiba002@odu.edu	Available to provide limited emergency analysis for VDH

ODW may utilize other laboratories if the laboratories can perform the required analysis in the required timespan and if the laboratories are in the eVa system.

Raw and finished water cyanotoxin analysis should continue on a weekly basis until microcystins results fall below the detection limit in both the raw and finished water.

3.2. Finished Water Cyanotoxin Analysis Results Evaluation/Confirmation Sampling & Communication

ODW requests that all laboratory analysis results be reported to the ODW field office by the waterworks. If ODW has arranged for laboratory analyses, the laboratory will report results to ODW directly and ODW will share the results with the owner. The ODW field office will evaluate and record the cyanotoxin results in the Cyanotoxin Results Recording Spreadsheet (link provided in section 5 of this chapter).

If any cyanotoxin concentration exceeds the detection limit in the finished water, a finished water *confirmation sample should be collected within 24 hours of receipt of results. ODW recommends that the confirmation sample be* analyzed using LC/MS/MS or HPLC/MS/MS analysis because there appears to be potential for ELISA analysis to result in a false positive result.

The ODW field office director, or designee, will inform all consecutive waterworks and the regional public information officer of the initial sample results, and that additional follow-up steps, including the decision to issue a "Do Not Drink" notice depending on the results of confirmation sampling. The ODW field office director, or designee, will issue a precautionary Event Notification in accordance with the ODW Event Notification guidance document.

3.3. Confirmation Finished Water Cyanotoxin Analysis Results Evaluation

The EPA has issued the following 10-day drinking water health advisory levels:

Table 4. EPA cyanotoxin 10-day drinking water health advisories.

Toxin	**Health advisory levels for children less than 6 years old**	**Health advisory levels for children 6 years old through adults**
Microcystins	0.3 µg/L	0.7 µg/L
Cylindrospermopsin	1.6 µg/L	3.0 µg/L

The EPA has not issued drinking water health advisory levels for anatoxin-a or saxitoxin. In the event that detection of either of these cyanotoxins occurs in the finished water, ODW field office director, or designee, will coordinate with the regional epidemiologist and the Local Health Department director to recommend a course of action for the waterworks.

<u>All entry point cyanotoxin results < child health advisory level:</u>

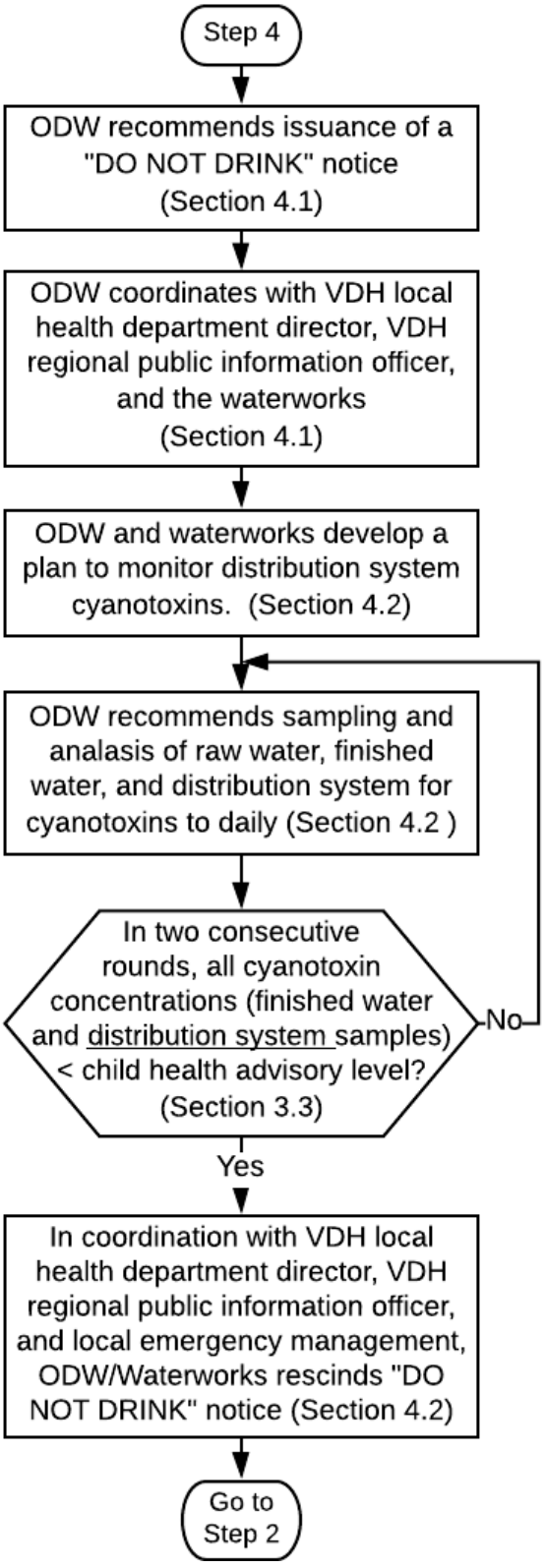
ODW will recommend continuing raw and finished water cyanotoxin analysis as described in section 3.1.

<u>Any entry point cyanotoxin result ≥ child health advisory level:</u>

The basis of health advisories is a 10-day exposure duration; ODW will recommend that the waterworks issue a "Do Not Drink" Notice, as described in section 4, within 10 days of collection of the initial sample exceeding the child health advisory level.

NOTE: There is potential for the issuing of a recreational water advisory by the OEpi - DEE and the local health department when cyanotoxin concentrations in the finished water are below the health advisory levels. In this case, ODW and the waterworks will collaborate with OEpi – DEE to develop messaging to inform the public that measures are in place to treat and monitor their drinking water.

4. Consider Issuing a "Do Not Drink" Notice



Flow Chart 4. *Recommended Process for Step 4: Issue Advisory.*

4.1. Consider issuance of a "Do Not Drink" Notice

When one or more of the health advisory levels for children < 6 years old are exceeded, the ODW field office director, or designee, will recommend issuance of a Do Not Drink notice. They will further coordinate with the local health department director and the waterworks owner to recommend immediate actions to minimize risk to public health (including the issuance of a public notice.) To avoid public confusion, the ODW does not recommend distinguishing between the health advisory levels for children < 6 years old and the health advisory levels for children ≥ 6 years old and adults.

If a waterworks issues a "Do Not Drink" notice:

The ODW field office director, or designee, will contact the ODW Emergency Preparedness and Security Coordinator and refer to the ODW Emergency Response Plan for emergency response guidance. The ODW field office director, or designee, will issue an updated Event Notification in accordance with the ODW Event Notification guidance document.

The ODW field office director, or designee, may provide the waterworks owner with a draft "Do Not Drink" notice, for distribution by the waterworks. A HAB "Do Not Drink" notice template is available in Attachment 1 of this chapter. Adequate communication between VDH and the waterworks owner is essential to ensure that everyone stays informed prior to the issuance of an advisory.

In conjunction with the issuing of a "Do Not Drink" notice, the ODW field office director, or designee, will coordinate with the VDH regional public information officer to ensure the dissemination of clear and accurate information to the public. ODW has provided a message-mapping template for this purpose in Attachment 2. ODW has also provided links in section 5 of this chapter for the EPA's Drinking Water Cyanotoxin Risk Communication Toolbox and the AWWA's Public Communications Toolkit, which provide tools and information that may aid in this process.

4.2. Distribution System Cyanotoxin Analysis

Following the issuance of a "Do Not Drink" notice, ODW recommends monitoring the distribution system for Cyanotoxins. The ODW field office should work with the waterworks owner to develop a plan to monitor and address residual cyanotoxins in the distribution system. This plan should consider water age and cyanotoxin oxidation, and determine monitoring locations and plans for flushing, if deemed necessary. The AWWA CyanoTOX© tool kit can be used to estimate the rate of cyanotoxin oxidation in the distribution system. ODW has provided a link to the tool kit in section 5 of this chapter. Note that this tool kit may overestimate cyanotoxin oxidation.

The monitoring plan should require continued cyanotoxin sampling from the finished water and from distribution system locations defined in the plan. Ideally, this sampling should occur daily

while the 'Do Not Drink" advisory is in effect. ODW recommends LC/MS/MS or HPLC/MS/MS techniques for these samples. In addition, waterworks should consider requesting expedited sample analysis and reporting.

All distribution system cyanotoxins < health advisory levels:

After two consecutive finished water samples indicate that all cyanotoxins are below all health advisory levels and all distribution system sample results indicate that all cyanotoxins are less than the health advisory level for children < 6 years old:

- ODW field office director, or designee, will notify the waterworks, consecutive waterworks, the local health department, and local emergency management of results.
- ODW field office director, or designee, will coordinate with the waterworks, the local health department, and the regional public information officer to issue a notice to rescind the "Do Not Drink" notice. The model notice includes tap flushing instructions for the public. A "Do Not Drink" rescission notice template is available in Attachment 3 of this chapter and a message-mapping template is available in Attachment 4.
- ODW will recommend that the waterworks return to raw water monitoring as described in section 2.

5. Resources

Online resources:

1. Harmful Algal Blooms webpage (VDH-OEHS)
   http://www.vdh.virginia.gov/environmental-epidemiology/harmful-algal-blooms-habs/
2. Visual Guide for Observing Blooms (CA SWAMP, 2017)
   http://www.ccamp.net/Swamp/images/3/33/SOP-Visual_Guide_to_Observing_Blooms.pdf
3. Water Treatment Optimization for Cyanotoxins, Version 1.0 (EPA, 2016)
   https://www.epa.gov/sites/production/files/2017-06/documents/water_treatment_optimization_for_cyanotoxins.pdf
4. Generalized Cyanotoxin Treatment Optimization Recommendations (Ohio EPA, 2016)
   http://epa.ohio.gov/Portals/28/documents/habs/Generalized%20Cyanotoxin%20Treatment%20Optimization%20Recommendations.pdf
5. Drinking Water Cyanotoxin Risk Communication Toolbox (EPA)
   https:/www.epa.gov/ground-water-and-drinking-water/drinking-water-cyanotoxin-risk-communication-toolbox
6. AWWA's Public Communications Toolkit
   https://www.awwa.org/resources-tools/public-affairs/communications-tools/public-communications-toolkit.aspx
7. CyanoTOX, Ver. 2.0 (AWWA)
   https://www.awwa.org/resources-tools/water-knowledge/cyanotoxins.aspx
8. Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water (EPA, June 2015)
   https://www.epa.gov/sites/production/files/2017-06/documents/cyanotoxin-management-drinking-water.pdf
9. Cyanotoxin Management Plan Template and Example Plans (EPA, 2016)
   https://www.epa.gov/sites/production/files/2017-06/documents/cyanotoxins_management_plan_template_and_example_plans.pdf
10. Control and Treatment Webpage (EPA)
    https://www.epa.gov/nutrient-policy-data/control-and-treatment
11. Public Water System Harmful Algal Bloom Response Strategy (Ohio EPA)
    https://epa.ohio.gov/Portals/28/documents/habs/2017_PWS_HAB_Response_Strategy_5-15-17-FINAL.pdf

Other resources are available to ODW staff at:

12. ODW Algae and HABs Technical Resources
    \\odwsrv1\odwshare\06-Technical Resources\670-Contaminants\Algae-HABs
13. Virginia HAB Task Force Contact List
    \\odwsrv1\odwshare\05-Incidents\511-HAB Events\VirginiaHABCONTACTLIST2017
14. Cyanotoxin Results Recording Spreadsheet

\\odwsrv1\odwshare\05-Incidents\511-HAB Events\Cyanotoxin Results Recording Spreadsheet

15. Cyanotoxin Lab Information
    \\odwsrv1\odwshare\05-Incidents\511-HAB Events\Cyanotoxin Lab Information
16. Algae: Source to Treatment, AWWA Manual M57, Chapter 14 (AWWA, 2010)
    \\odwsrv1\odwshare\06-Technical Resources\670-Contaminants\Algae-HABs\AWWA & WRF\AlgaeSourceToTreatment_M57_Ed1.pdf
17. Source Water Protection, AWWA G300-14 (AWWA, 2014)
    \\odwsrv1\odwshare\06-Technical Resources\610-AWWA Standards\Most_Current\CD Marked June 2018\G\G300-14.pdf

Appendix

Attachments are located at: \\odwsrv1\odwshare\13-Manuals\06-Source Water Manual\attachments

SWM-C4-Attachment 1-Do Not Drink Notice Template
SWM-C4-Attachment 2-Do Not Drink Notice Message Map Template
SWM-C4-Attachment 3-Do Not Drink Rescission Template
SWM-C4-Attachment 4-Do Not Drink Rescission Message Map Template

Chapter 5 – Source Water Contamination Events

Summary

This chapter provides guidance to ODW staff to respond to a reported contamination event. In the event that ODW becomes aware of a source water contamination event, field office staff will first consider the available information and determine whether an acute risk to public health can be ruled out. Based on this assessment, staff will respond as follows.

Disclaimer:

This chapter is guidance and, as such, sets forth standard operating procedures for the ODW. However, it does not mandate or prohibit a particular action not otherwise required or prohibited by law. If alternative proposals occur, a review of such proposals takes place and are accepted or denied based upon their technical adequacy and compliance with appropriate laws and regulations.

1. Initial Assessment

As an initial step after learning of a potential source water contamination event, ODW staff will contact all involved parties to collect and disseminate relevant information. These parties typically include the DEQ Pollution Response Program, the Local Health Department, the State Public Health Toxicologist, any potentially impacted waterworks, the responsible party for the contamination event, and the chemical manufacturer.

Staff should attempt to characterize the nature and extent of the contamination event by collecting as much of the following information as possible. Note that some of this information may take a considerable amount of time to collect and should not hold up communication and response efforts. Staff may travel to the site to photo document and collect information.

- Location of the contamination event, and relevant information such as ground cover and soil type
- Volume of spilled material
- Safety Data Sheets
- Constituents of the spilled material
    - Chemical names
    - Proportion of the material (percent volume or weight)
    - Available toxicity data
    - Test methods and labs capable of performing analysis
    - Environmental fate data
    - Any byproducts of environmental degradation of concern, and the above information for each
- First responder assessment (fire department or HAZMAT team), including noted impacts, such as fish kills or vegetation kills.
- Sampling and remediation actions planned by DEQ or other parties

- Potential pathways to public water supplies
    - Surface Water
        - Downstream drinking water intakes
            - Estimated hydrologic travel time from the contamination site to the intake. DEQ Pollution Response Program may be able to provide hydraulic model results.
            - Estimated dilution of the contaminant at the intake. DEQ Pollution Response Program may be able to provide hydraulic model results.
            - Are adequate alternative sources available to the waterworks?
            - Treatment capabilities of the water plant
                - Available oxidants and potential contact times
                - Available active carbon treatment, carbon type, and capacities
    - Groundwater
        - Waterworks wells and springs within a 1 mile radius
            - Location, and is a well is located in a DEQ Groundwater Management Area
            - Source Water Assessment
            - GUDI evaluation
            - Well construction information
            - Hydrologic delineations – contact the ODW Special Projects Engineer to determine if this is available
            - Are adequate alternative sources available to the waterworks?
        - Locations of potential conduits of contamination, such as wells of poor or unknown construction
        - Any available geologic or hydrologic data

Geologic maps, source locations, SWA areas, surface topography, and other relevant information is available to ODW staff on the ODW SWAP Service GIS Portal located at:

https://gis.vdh.virginia.gov/portal/apps/webappviewer/index.html?id=f3c2328710f74ccf844d5568c2182d8b

Staff will share this information with ODW leadership and the ODW Emergency Preparedness and Security Coordinator to determine if an Event Notification is required. If an Event Notification is required, issuance will be in accordance with the VDH Event Notification guidance document.

ODW staff will contact the State Public Health Toxicologist to assess the potential for acute or chronic public health impacts and for assistance in developing a plan for response effort.

2. Potential Acute Risk to Public Health

Unless ODW and VDH rule out an acute risk to public health, the situation will be treated as an emergency response, and staff will contact the ODW Emergency Preparedness and Security Coordinator and follow the ODW Emergency Response Plan and VDH Event Notification guidance document.

3. No Potential Acute Risk to Public Health

If ODW and VDH rule out an acute risk to public health, the situation requires no emergency response. Staff will work with the waterworks to determine if the situation could impact the waterworks ability to comply with the *Waterworks Regulations* in the future and provide technical assistance if needed. Staff will also provide the waterworks with information on the value of source water protection and the source water protection assistance that ODW can provide as described in Chapter 3.

4. Sampling

ODW staff will coordinate with the State Public Health Toxicologist to develop a sampling plan, which may consist of analyzing source water, raw water, or finished water samples for any contaminant parent compounds or environmental degradation byproducts that are of concern to public health. ODW will conservatively base the number and timing of the samples on the severity of the risk and the available data on contaminant travel time. Analysis methods should provide adequate detection limits to ensure public safety.

Locating labs to perform the necessary analysis may be challenging. Staff should first request this information from the chemical manufacturer, and then seek assistance from the DEQ Pollution Response Program and the State Public Health Toxicologist. Certified labs may also be located by searching for the chemical name on the A2LA Directory of Accredited Organizations search engine located here:

https://portal.a2la.org/search/

5. Decontamination

Following a contamination event, decontamination of drinking water facilities may be required. For information on this subject, see the EPA's "Learn about Decontamination for Drinking Water and Wastewater Utilities" webpage at:

https://www.epa.gov/waterutilityresponse/learn-about-decontamination-drinking-water-and-wastewater-utilities

Chapter 6 Coordination with Virginia Department of Environmental Quality (DEQ)

Summary

This chapter describes the process for coordination of permits and programs between the Virginia Department of Health (VDH) and the Virginia Department of Environmental Quality (DEQ) that affect waterworks.

Disclaimer:

This chapter is guidance and, as such, sets forth standard operating procedures for the ODW. However, it does not mandate or prohibit a particular action not otherwise required or prohibited by law. If alternative proposals occur, a review of such proposals takes place and are accepted or denied based upon their technical adequacy and compliance with appropriate laws and regulations.

1. DEQ Water Permitting and Water Planning Divisions - Permits

DEQ administers federal Clean Water Act programs and state programs, which affect both surface water and groundwater resources in Virginia. They accomplish this primarily by the issuance of permits, including:

- Virginia Pollutant Discharge Elimination System (VPDES) – individual permits and general permits
- Virginia Pollution Abatement (VPA) – individual permits and general permits
- Virginia Water Protection (VWP) permits, including Surface Water Withdrawals
- Groundwater Withdrawal (GW) permits

1.1 VPDES Permits

The federal National Pollutant Discharge Elimination System (NPDES) permit program has been delegated to DEQ, who administers it as the VPDES permit program under 9VAC25-31 (individual discharge permits) and 9VAC25-860 (general potable water treatment plant discharge permits). DEQ issues VPDES Permits for point source discharges of pollutants to surface waters. A General VPDES Permit regulates most point discharges from conventional water treatment plants.

1.2 VPA Permits

VPA Permits are administered under 9VAC25-32 and regulate pollutant management activities that are not point source discharges but have the potential to affect state waters, both groundwater and surface water.

1.3 VPDES and VPA Permits with Water Reclamation and Reuse

Reclamation and reuse of wastewater, including domestic, municipal and industrial wastewater, is regulated by DEQ under the Water Reclamation and Reuse Regulation, 9VAC25-740. DEQ implements the requirements of the regulation through its existing VPDES and VPA permit programs.

1.4 VWP Permits

VWP permits regulate impacts to state waters, including surface water withdrawals. Administration of permits occurs under 9VAC25-210. VWP permits may authorize raw water withdrawals, dredging and filling, and impacts to wetlands and streams from a variety of activities. DEQ reviews VWP permits through the Joint Permit Application process, which involves DEQ, the U.S. Army Corps of Engineers, the Virginia Marine Resources Commission, and Local Wetlands Boards. During the permit application review, DEQ coordinates with other stakeholders such as the Virginia Institute of Marine Science, the Virginia Department of Game and Inland Fisheries, the Department of Conservation and Recreation, the United States Fish and Wildlife Service, the Environmental Protection Agency and VDH.

1.5 Groundwater (GW) Permits

DEQ issues GW permits for withdrawals that occur within designated Groundwater Management Areas (GWMAs) and administers them under 9VAC25-600 and 9VAC25-610. The two GWMAs encompass Virginia's Coastal Plain east of I-95, including the Eastern Shore (Accomack and Northampton counties).

2. DEQ Water Permitting and Water Planning Divisions - Permit Coordination Procedures

2.1 VPDES Permits

New issuance, major modification, and re-issuance applications for individual permits go directly to the appropriate ODW field office for review. These include municipal and industrial (with or without sewage) permit types. Ordinarily, VDH does not review draft and final permits, unless specifically requested otherwise. ODW may request to review the draft permit; this is at the discretion of the ODW field office.

DEQ will transmit the application with the map(s) but most likely without other attachments. After receiving the application, ODW may request the attachments, if necessary for review. In the case of industrial permit applications, these attachments may be several hundred pages.

After receipt of the VPDES permit application, the ODW field office shall forward a copy of the application to the local health department for review if needed. Approximately 95% of VPDES applications are for the re-issuance of existing permits. If there are no proposed changes in the

discharge activity in the application, input from local health districts may not be needed. Notification to local health districts must occur for all new discharges.

Applications directed to Local Health for review go to the attention of the local Environmental Health Manager. Interagency communication may be by fax, e-mail or regular mail, whichever method is most expedient and acceptable to the respective offices. ODW shall include Local Health comments with ODW's response to DEQ.

ODW shall respond within 14 days, unless DEQ requests more time in their communication. Transmission of the review response may occur by fax, e-mail or regular mail to DEQ, whichever method is most expedient and acceptable to the DEQ Regional Office and the ODW Field Office. Use the example response memorandum in Attachment 1.

2.2 VPA Permits

ODW will send all individual VPA permit applications directly to DEQ and concurrently to the appropriate ODW Field Office and the VDH Local Health District with jurisdiction over the location of the proposed pollutant management activity or project for review. ODW shall respond within 14 days, unless DEQ requests more time in their communication. Transmission of the review response may occur by fax, e-mail or regular mail to DEQ, whichever method is most expedient and acceptable to the DEQ Regional Office and the ODW Field Office. Use the example response memorandum in Attachment 1.

2.3 VPDES and VPA Permits with Water Reclamation and Reuse

DEQ Regional Offices will provide the following documents to the appropriate ODW Field Office for each water reclamation and reuse proposal, depending upon the type of permit and action involved:

- Issuance or reissuance of a VPDES or VPA Permit that will include water reclamation and reuse:
    - VPDES or VPA permit application;
    - Water Reclamation and Reuse Addendum to an Application for a VPDES or VPA Permit (Application Addendum); and
    - Cumulative Impact Analysis (CIA) results summary, if applicable.
- Modification (major or minor) of a VPA permit to include water reclamation and reuse:
    - Permit modification application;
    - Application Addendum; and
    - CIA results summary, if applicable.

DEQ may also issue an administrative authorization or an emergency authorization for water reclamation and reuse associated with an existing VPDES or VPA permit, in accordance with DEQ's regulations. In these cases, DEQ Regional Offices will provide the following documents to the appropriate ODW Field Office:

- Administrative authorization associated with an existing VPDES permit to include water reclamation and reuse:
    - Existing VPDES permit;
    - Application Addendum; and
    - CIA results summary, if applicable.
- Emergency authorization associated with an existing VPDES or VPA permit to include water reclamation and reuse:
    - Existing VPDES or VPA permit;
    - Application for an Emergency Authorization to Produce, Distribute or Reuse Reclaimed Water (Emergency Authorization Application) or the Application Addendum including an Emergency Authorization Application; and
    - CIA results summary, if applicable.

Cumulative Impact Analysis (CIA)

Only new or expanding water reclamation and reuse projects having the potential to reduce the VPDES permitted wastewater treatment works discharge to surface waters may require a CIA. This includes emergency authorizations. The DEQ Office of Water Supply (DEQ-OWS) performs the CIA for a prospective applicant, and completed prior to submittal of the Application Addendum and/or Emergency Authorization Application.

When a CIA is required for a water reclamation and reuse project, DEQ-OWS will coordinate with ODW much the same way it does regarding a VWP permit application for a surface water withdrawal. DEQ-OWS provides a summary of the CIA results to the applicant, and the applicant must provide this information with the Application Addendum and/or Emergency Authorization Application to the DEQ Regional Offices. Consequently, ODW Field Offices may see the water reclamation and reuse project twice – during the CIA, if required for the project, and again with the Application Addendum and/or Emergency Authorization Application.

ODW response shall be within 14 days, unless DEQ requests more time in their communication. Transmission of the review response may occur by fax, e-mail or regular mail to DEQ, whichever method is most expedient and acceptable to the DEQ Regional Office and the ODW Field Office. Use the example response memorandum in Attachment 1.

2.4 VWP Individual Permits

DEQ will email all individual VWP applications, including new issuances, major modifications and re-issuances, to ODW Central Office via odwreview@vdh.virginia.gov, or directly to the ODW field office. If the ODW Central Office receives a VWP application, the Central Office will forward the documents to the field office. VWP applications may be for water withdrawal projects or other permitted activities, such as dredging, filling and other land clearing activities. In some cases, DEQ may refer to this permit application material as a Joint Permit Application or JPA.

DEQ will invite ODW staff to attend VWP permit pre-application meetings for public water supplies; participation by ODW field staff is strongly encouraged. ODW will invite DEQ staff to preliminary engineering conferences for projects that include new or modified surface water intakes.

During the review of waterworks' withdrawal projects, the ODW field staff shall, at a minimum:

- Check historic water use records for at least the past 12 months; and
- Verify if there has been any change in waterworks capacity as compared to their existing operations permit.

ODW response shall be within 14 days, unless DEQ requests more time in their communication. Transmit the review response by e-mail to DEQ. Use the example response memorandum in Attachment 2.

DEQ will provide a copy of the final VWP permit to ODW Central Office for waterworks withdrawals only via odwreview@vdh.virginia.gov. ODW Central Office will save the permit in the corresponding field office folder at \\odwsrv1\odwshare\08-Documents and Data Files\807-VWP Permits (DEQ) and will notify the ODW field office director of its availability. Other VWP permits, including surface water withdrawals from industry, agriculture, etc., must be requested by ODW.

2.5 GW Permits

DEQ will email a copy of all draft new/revised GW permits affecting waterworks to ODW Central Office via odwreview@vdh.virginia.gov.

NOTE: *DEQ may issue GW permits to existing users because of a GWMA expansion, based on historic water use. DEQ will issue these permits without ODW's review. GW Permits may affect waterworks operations permit capacity. Consequently, the operations permit requires review at this time, and the permit status shall be updated in "R&R" as needed.*

DEQ will take the lead in permitting new withdrawals in GWMAs and will coordinate with ODW on a joint GW permit pre-application meeting / preliminary engineering conference related to waterworks wells. Coordination of well site inspections for proposed wells should also be included in the meeting. Refer to the ODW *Project Review and Permit Procedures Manual* for further procedures related to well development and construction permits.

During the review process, the ODW field office shall, at a minimum:

- Check historic water use records for at least the past 12 months; and
- Compare the maximum monthly and annual historic consumption with DEQ's permit values.

ODW response shall be within 14 days, unless DEQ requests more time in their communication. Transmit the review response by e-mail to DEQ. Use the review form and the example response memorandum in Attachments 3 and 4, respectively.

DEQ-OWS will provide a copy of all final GW permits to ODW Central Office for waterworks withdrawals only via odwreview@vdh.virginia.gov. ODW Central Office will save the permit in the corresponding field office folder at \\odwsrv1\odwshare\08-Documents and Data Files\808-GW Permits (DEQ) and will notify the ODW field office director of its availability. ODW must request other GW permits, including groundwater withdrawals from industry, agriculture, etc.

3. Other DEQ Programs

DEQ also administers other programs, which may require input or interaction with ODW's field staff. The following four programs are the most likely to engage the ODW field offices.

3.1 Groundwater Characterization Program (GCP)

The Groundwater Characterization Program collects, evaluates and interprets technical information necessary to manage the commonwealth's groundwater resources. DEQ staff works to support resource management decisions, water supply planning activities, assess groundwater availability, facilitate drought monitoring, and support the expansion or creation of Groundwater Management Areas.

ODW assists the DEQ-OWS Groundwater Characterization program by providing well site approval letters and other well information, including legacy or new Water Well Completion Reports (Form GW-2), well yield, drawdown and recovery test reports, well lot plats or location maps, and all water characterization test results. It is important to label the documents with the following information:

- PWSID number (if established, otherwise use the field office number and Locality Code followed by 000; for example: 6107000 for new well - Culpeper Field Office, Loudoun County);
- SDWIS Facility Code for the well, if established (by example: WL001); and
- Well latitude and longitude coordinates and datum, when possible.

3.2 Water Supply Planning Program

The DEQ-OWS administers the Water Supply Planning Program under 9VAC25-780. The regulation requires all counties, cities and towns in the Commonwealth to prepare and update local or regional water supply plans, which DEQ uses in the development of a comprehensive statewide water supply plan. Objectives for this planning process are to:

- Ensure that adequate and safe drinking water is available to all citizens of the Commonwealth;

- Encourage, promote and protect all other beneficial uses of the Commonwealth's water resources; and
- Encourage, promote and develop incentives for alternative water sources, including, but not limited to desalinization.

Local and Regional Water Supply Plans were submitted to DEQ-OWS by November 2, 2011, and reviewed by ODW. VDH's anticipates participation in the program to be once every ten years, per 9VAC25-780 E. However, there may be instances in which ODW might be required to assist on a more frequent basis pursuant to 9VAC25-780 D (no later than five years after a compliance determination by the State Water Control Board). Development of Interagency review procedures occurs as the need arises.

3.3 Environmental Impact Review

The DEQ Office of Environmental Impact Review coordinates the commonwealth's responses to environmental documents for proposed state and federal agency projects as well as federally permitted and federally funded projects, except for some Virginia Department of Transportation (VDOT) projects. VDOT roadway projects are coordinated through a separate review program called the State Environmental Review Process, managed by VDOT. The ODW Central Office responds to these directly. DEQ EIR staff distributes documents to the appropriate state agencies, planning districts and localities for their review and comment. Upon consideration of all comments, DEQ prepares a single state response.

The ODW Central Office will coordinate the processing of documents originating from DEQ's Office of Environmental Impact Review. ODW Central Office will be the primary point of contact for DEQ through the odwreview@vdh.virginia.gov email address. Processing of all requests will occurs according to the ODW Central Office standard operating procedures.

The ODW Central Office may request input from field offices and other Central Office programs (e.g. Office of Environmental Health Services and Office of Radiological Health). It is very important that comments be returned to the ODW Central Office prior to the end of the comment period indicated. Comments should specifically address impacts to waterworks sources and capacity concerns. An e-mail response from the field office reviewer directly to the Central Office requestor is preferred.

3.4 Solid & Hazardous Waste Regulation

DEQ's Division of Land Protection & Revitalization manages several programs, including permitting of solid waste and hazardous waste transportation, treatment and disposal facilities.

ODW Central Office will coordinate the processing of documents originating from DEQ's Division of Land Protection & Revitalization in a similar manner as those from the DEQ's Office of

Environmental Impact Review. These requests occur directly to ODW Central Office through the odwreview@vdh.virginia.gov email address for coordinated VDH review.

4. Records Management Procedures

Records of all review-related materials, such as memos, letters, emails, draft permits and attachments, and maintained in accordance with ODW records retention policies.

5. Useful links

Location and contact information for DEQ Regional Offices is available at the following location: http://www.deq.virginia.gov/Locations.aspx.

The main webpage for DEQ's Groundwater Withdrawal Permitting Program is:

http://www.deq.virginia.gov/Programs/Water/PermittingCompliance.aspx

It contains information about related regulations, staff contact information, GWMA maps, permit fees, forms, public notices and permits issued after January 1, 2014.

Appendix

Attachments are located at: \\odwsrv1\odwshare\13-Manuals\06-Source Water Manual\attachments

SWM-C5-Attachment 1-VPDES and VPA Permit Review Response Memorandum
SWM-C5-Attachment 2-VWP Permit Review Response Memorandum
SWM-C5-Attachment 3-Draft GW Permit Review Form
SWM-C5-Attachment 4-Draft GW Permit Response Memorandum

Source Water Protection Benefits

Cost of groundwater remediation can be **30 to more than 200 times** the cost of a protection program. This level of savings is possible for surface water systems as well.

Improves Public Health – Reduces threats or illness or injury from contaminated water exposure, particularly among vulnerable populations such as elderly, pregnant women, children, and medically vulnerable .

Reduced Water Treatment Costs - Better raw source water creates a better finished product. This also results in less complex treatments and reduced operation and maintenance costs.

Additional Significant Cost Savings - It would be far more economical to prevent pollution by protecting watersheds than to restore and/or replace water sources.

Improves Skill Set within Water Industry - Develops greater Technical Capacity among water system operators about contamination risks and appropriate measures to protect source waters using the multiple barrier approach as recommended by AWWA.

Continuing Community Trust —Being proactive in protecting source water gives the community more confidence in their drinking water supply and improves public relations.

Economic Benefit – A reliable and clean water source helps attract employers and tourism and improves quality of life for residents.

VIRGINIA DEPARTMENT OF HEALTH, OFFICE OF DRINKING WATER

Email:
sourcewater@vdh.virginia.gov

Web address:
http://www.vdh.virginia.gov/drinking-water/source-water-programs/

Source Water Protection Plan technical assistance is covered through funding from VDH—ODW and is offered at **NO COST TO YOUR SYSTEM**.

VDH VIRGINIA DEPARTMENT OF HEALTH
Protecting You and Your Environment
www.vdh.virginia.gov
Office of Drinking Water
Safe Drinking Water for a Healthy Virginia

SWM-C4-Attachment 1: Do Not Drink Notice Template
Instructions: Complete the italicized text. Modify as required for the specific incident.

Notice to Customers of *Name of Waterworks* Waterworks

Este informe contiene información muy importante sobre su agua potable.
Tradúzcalo o hable con alguien que lo entienda bien.

DO NOT DRINK TAP WATER

Failure to follow this advisory could result in illness.

The Virginia Department of Health in conjunction with the *Local Health Department Name* Health Department, and *Name of Waterworks* are advising residents to only use bottled water for drinking and cooking purposes as a safety precaution. This precaution is necessary because *Cyanotoxin name*, a toxin produced by cyanobacteria (formerly known as blue-green algae) was detected in the drinking water from *Name of Waterworks* on *date*.

Only bottled water should be used for drinking, beverage and food preparation, making infant formula, brushing teeth, and making ice until further notice.

The tap water is safe to use for washing dishes and clothes, cleaning, flushing toilets, and bathing. However, infants and young children under the age of six should be supervised while bathing and during other tap water-related activities to prevent accidental ingestion of water.

Do not drink tap water that you have boiled. Boiling water will not remove the contamination.

Potable water is available at the following locations: *Provide locations where bottled water is available, and any special instructions.*

We will inform you when your tap water is safe to drink. We are *describe corrective actions*. We anticipate resolving the problem within *provide estimated days/date*.

For more information, call:
Waterworks contact: *contact name, address, phone*

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

Date: *Date of notice*

*SWM-C4-**Attachment 2: Do Not Drink Notice Message Map Template***

Instructions: Complete the italicized text. Modify as required for the specific incident.

SCENARIO/CONCERN: "DO NOT DRINK" NOTICE ISSUED

STAKEHOLDER: GENERAL PUBLIC, MEDIA

KEY MESSAGE 1 ⟶	**KEY MESSAGE 2** ⟶	**KEY MESSAGE 3**
Cyanotoxin name, a toxin produced by cyanobacteria, was detected in the drinking water from *Name of waterworks* on *date*.	Customers of *Name of waterworks* are advised to only use bottled water for drinking and cooking purposes as a safety precaution.	The Virginia Department of Health is working with the *Name of waterworks* to resolve this issue and will inform you when the water is safe for drinking and cooking purposes.
Support Point 1.1	**Support Point 2.1**	**Support Point 3.1**
Cyanotoxin name was detected in the drinking water at a concentration exceeding the U.S. Environmental Protection Agency's national drinking water Health Advisory of *concentration*.	Potable water is available at the following locations: *Provide locations where bottled water is available, and any special instructions.*	The *Name of waterworks* has made appropriate treatment adjustments, to minimize the breakthrough of harmful toxins into the final drinking water produced.
Support Point 1.2	**Support Point 2.2**	**Support Point 3.2**
The *Cyanotoxin name*, is the result of a harmful algal bloom in the *waterbody name*.	Do not drink tap water that you have boiled. Boiling water will not remove the contamination.	The *Name of waterworks* will continue testing the drinking water produced *testing frequency*, until they have confirmed that the water is safe to drink.
Support Point 1.3	**Support Point 2.3**	**Support Point 3.3**
	The tap water is safe to use for washing dishes and clothes, cleaning, flushing toilets, and bathing. However, infants and young children under the age of six should be supervised while bathing and during other tap water-related activities to prevent accidental ingestion of water.	The Virginia Department of Health and the *Name of waterworks* will issue an alert when it has been determined that the water is safe to drink.

*SWM-C4-Attachment 3**: Do Not Drink Rescission Template***

Instructions: Complete the italicized text. Further modifications may be required specific to each incident.

DRINKING WATER PROBLEM CORRECTED

Customers of *Waterworks name* were notified on *date of original notice* of a problem with our drinking water, and were advised to only use bottled water for drinking and cooking purposes as a safety precaution. We are pleased to report that the problem has been corrected and that it is no longer necessary to only use bottled water for drinking and cooking purposes as a safety precaution. We apologize for any inconvenience and thank you for your patience.

Samples collected from *Name of waterworks* on *dates* show *Cyanotoxin name* in the drinking water at *concentration range*, which is less than the U.S. Environmental Protection Agency's national drinking water Health Advisory of *concentration*.

Because *Cyanotoxin name* may still be present within household plumbing, your taps should be flushed as a safety precaution prior to use of water for drinking and cooking purposes. Allow the water to run at each tap for 5 minutes before using it for drinking or cooking. If hot water is to be used for drinking or cooking, first drain the water heater according to the manufacturer's instructions, and then allow hot water to run at each tap for 30 seconds to 2 minutes before using it for drinking or cooking.

As always, you may contact *name* at *phone number* or *address* with any comments or questions.

do this by posting this notice in a public place or distributing copies by hand or mail. Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can

This notice is being sent to you by *Waterworks name*

Date *Insert date*

SWM-C4-Attachment 4: Do Not Drink Rescission Message Map Template

Instructions: Complete the italicized text. Further modifications may be required specific to each incident.

SCENARIO/CONCERN: "DO NOT DRINK" RESCISSION ISSUED

STAKEHOLDER: GENERAL PUBLIC, MEDIA

KEY MESSAGE 1 ⟶	**KEY MESSAGE 2** ⟶	**KEY MESSAGE 3**
The problem has been corrected.	Household taps should be flushed as a safety precaution prior to use of water for drinking and cooking purposes *(if applicable)*.	*If applicable:* A recreational advisory remains in place for the *waterbody name.*

Support Point 1.1	**Support Point 2.1**	**Support Point 3.1**
Samples collected from *name of waterworks* on *dates* show *cyanotoxin name* in the drinking water at *concentration range*.	*Cyanotoxin name* may still be present within household plumbing.	*Contact Office of Environmental Epidemiology-Division of Environmental Epidemiology for supporting points*
Support Point 1.2	**Support Point 2.2**	**Support Point 3.2**
These detected levels are less than the U.S. Environmental Protection Agency's national drinking water Health Advisory of *concentration*.	Allow the water to run at each tap for 5 minutes before using it for drinking or cooking *(if applicable)*.	*Contact Office of Environmental Epidemiology-Division of Environmental Epidemiology for supporting points*
Support Point 1.3	**Support Point 2.3**	**Support Point 3.3**
It is no longer necessary to only use bottled water for drinking and cooking purposes as a safety precaution.		*Contact Office of Environmental Epidemiology-Division of Environmental Epidemiology for supporting points*

{Field Office Letterhead}

DATE: *month day, year*
FROM: *Authorized Respondent Name and Title*
TO: *Permit Writer Name*
DEQ *Regional Office Name*
Street Address or *P.O. Box*
City, State, Zip
CITY/COUNTY:
APPLICANT:
PERMIT TYPE: *Choose one:* VPDES / VPA *Add as necessary:* with water reclamation and reuse
APPLICATION TYPE: *Choose one:* Issuance (New) / Re-Issuance (Existing)
PROJECT:
SUBJECT: Review response for DEQ's permit application #_____

Our office has reviewed the application for *{describe discharge and the related water reclamation and reuse activity, when applicable, and the location}.*

Select from the following statements, as applicable
The nearest downstream raw water intake is located approximately ___ miles from the discharge point/area. The name of the facility is _____ and operates under PWSID _____.

The nearest upstream (under tidal influence) raw water intake is located approximately ___ miles from the discharge point/area. The name of the facility is _____ and operates under PWSID _____.

No public raw water intakes in Virginia were found downstream (or upstream *(if under tidal influence)*) from the discharge point/area.

The following wells were found within a 1-mile radius from the discharge:

PWSID	Facility Name	SDWIS Facility Code

We are concerned the discharge may jeopardize the ability of the waterworks mentioned above to maintain compliance with the SDWA and its amendments because _____.

For reviews including water reclamation and reuse, use the following statement when applicable
We have identified the following risks which may have an impact on public health, as a result of the proposed water reclamation and reuse: _____.

If needed, use/incorporate other comments below
Please forward a copy of the [*Choose one:* draft permit / final permit] for our files.

cc: VDH, ODW – Central Office
VDH, Local Health Dept.
Applicant

Optional: Potentially Impacted Waterworks

{Field Office Letterhead}

DATE: *month day, year*
FROM: *Authorized Respondent Name and Title*
TO: *Permit Writer Name*
DEQ *Regional Office Name*
Street Address or *P.O. Box*
City, State, Zip
CITY/COUNTY:
APPLICANT:
PERMIT TYPE: VWP
APPLICATION TYPE: *Choose one:* Issuance (New) / Re-Issuance (Existing)
PROJECT:
SUBJECT: Review response for DEQ's permit application #_____

Our office has reviewed the application for *{describe activity and location}*.

If the VWP Permit is for a waterworks
We are aware that the following modifications have been made to the waterworks: _____. The changes [*Choose one:* increase / decrease] the waterworks capacity, as compared to their existing Waterworks Operation Permit.

The waterworks' service area [*Choose one:* remains the same / has increased / has decreased].

If the VWP Permit is for other than a waterworks; match the following statements, as applicable
The nearest downstream raw water intake is located approximately ___ miles from the {*activity*} area. The name of the facility is _____ and operates under PWSID _____.

The nearest upstream (under tidal influence) raw water intake is located approximately ___ miles from the {*activity*} area. The name of the facility is _____ and operates under PWSID _____.

No public raw water intakes were found, in the commonwealth, downstream (or upstream *if located within one tidal cycle*) from the *{activity}* area.

cc: VDH, ODW – Central Office
VDH, Local Health Dept.
Applicant
Optional: Potentially Impacted Waterworks

DATE: *month day, year*
PREPARED BY: *Authorized Reviewer Name and Title*
CITY/COUNTY:
APPLICANT:
PERMIT TYPE: GW
APPLICATION TYPE: *Choose one:* Issuance (New) / Re-Issuance (Existing)
SUBJECT: Review form for Draft DEQ GW Permit #: GW _____

LOCATION OF WELL(s)[1]:

VDH WELL ID	DEQ WELL ID	LATITUDE	LONGITUDE

SUMMARY:

WATERWORKS REVIEW	RESULTS
Average daily water usage for the past 12 months, gpd	
Maximum monthly withdrawal during the past 12 months, gallons	
Total annual withdrawal during the past 12 months, gallons	
Draft DEQ Permit maximum yearly withdrawal limit, gallons	
Draft DEQ Permit maximum monthly withdrawal, gallons	

WELL ID #[2]			
Total well depth, ft			
Current pump intake setting, ft			
Date of last Yield and Drawdown Test			
Stabilized water level based on last Yield and Drawdown Test, ft			
Draft DEQ Permit maximum well pump setting, ft			

Use additional sheets if there are more than three (3) wells.

[1] *Use VDH collected coordinates whenever available (DEQ's should only be used as an alternative). If DEQ coordinates are used, use '*' next to latitude and longitude values to indicate this.*
[2] *Assign VDH Well IDs whenever available (DEQ's should only be used as an alternative).*

{Field Office Letterhead}

DATE: *month day, year*
FROM: *Authorized Respondent Name and Title*
TO: *Permit Writer Name*
DEQ Groundwater Withdrawal Permitting Program
Street Address or *P.O. Box*
City, State, Zip
CITY/COUNTY:
APPLICANT:
PERMIT TYPE: GW
APPLICATION TYPE: *Choose one:* Issuance (New) / Re-Issuance (Existing)
PROJECT:
SUBJECT: Review response for Draft DEQ GW Permit #: GW _____

Our office has reviewed the draft Groundwater Withdrawal permit for *{describe location of withdrawal}*.

The reported maximum water usage for the past ___ months is within the capacity defined in the Waterworks Operations Permit.

When applicable, use the following statement
We are aware that the following modifications have been made to the waterworks: _____. The changes [*Choose one:* increase / decrease] the waterworks capacity, as compared to their existing Waterworks Operation Permit.

The waterworks' service area [*Choose one:* remains the same / has increased / has decreased].

Choose one of the following paragraphs
1) The requirements indicated in the draft Groundwater Withdrawal Permit are <u>not</u> more restrictive than the historical monthly or annual withdrawal for the past ___ months. If final permit remains consistent with the draft, no further action is necessary by the waterworks owner.

2) The requirements indicated in the draft Groundwater Withdrawal permit are more restrictive than the capacity of the [*Use all that apply:* historical monthly withdrawal and/or annual withdrawal] for the past ___ months. If final permit remains consistent with the draft, the waterworks operations will be impacted.

When applicable, use the following statement
[The waterworks owner will be required to conduct a pump test on each well to assess the impact of the new well pump setting(s) indicated in the draft Groundwater Withdrawal permit. Based on the pump test results and the maximum water usage data, the permitted capacity of this waterworks will be re-evaluated, per Waterworks Regulations.]

If DEQ determines that an Aquifer Test will be required, the ODW will be contacted for coordination on the possibility to perform the Aquifer Test in conjunction with the Pump Test.

Attachment: GW Permit Review Form

cc: VDH, ODW – Central Office
VDH, Local Health Dept.
Applicant