

SUMMARY OF KEY REQUIREMENTS FOR



SURFACE WATER IDENTIFICATION PROTOCOL



COMMONWEALTH OF PENNSYLVANIA
Department of Environmental Protection

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Water Supply and Wastewater Management

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Title: Summary of Key Requirements for Surface Water Identification Protocol (SWIP)

Authority: Pennsylvania's Safe Drinking Water Act (35 P.S. §721.1 *et seq.*) and regulations at 25 Pa. Code Chapter 109.

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Minor changes were made on pages i and 5 (March 1, 2002)

Policy: Department of Environmental Protection (DEP) staff will follow the guidance and procedures presented in this document to direct and support implementation of Surface Water Identification Protocol under the drinking water management programs.

Purpose: The purpose of this document is to establish a rational and reasonable basis for staff decisions which will promote quality, timely and consistent service to the public and regulated community.

Applicability: This guidance will apply to surface water identification of public water supplies' groundwater sources.

Disclaimer: The guidance and procedures outlined in this document are intended to supplement existing requirements. Nothing in this document shall affect more stringent regulatory requirements.

The guidance and procedures herein are not an adjudication or a regulation. There is no intent on the part of DEP to give this document that weight or deference. The guidance and procedures merely summarize how and on what basis DEP will administer and implement its responsibilities with respect to implementing the surface water identification protocol. DEP reserves the discretion to deviate from the guidance and procedures in this document if circumstances warrant.

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Definitions: See 25 Pa. Code Chapter 109

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OVERVIEW

During the 1970s and into the 1980s, Pennsylvania and other states experienced numerous waterborne giardiasis outbreaks. This prompted Pennsylvania to pass regulations in March of 1989 known as the “Surface Water Treatment Rule” (SWTR), which requires all surface water sources serving public water systems to be filtered as well as disinfected. The federal SWTR “Special Primacy Requirements” requires states to determine which community and noncommunity public water systems are under the direct influence of surface water by June 29, 1994 and June 19, 1999, respectively. To address the identification of such sources, DEP has implemented the Surface Water Identification Protocol (SWIP).

SWIP monitoring is conducted at groundwater systems which meet the criteria for questionable groundwater sources. Upon completion of monitoring, DEP determines if the source is under the direct influence of surface water based on a statistical evaluation of raw monitoring data, source construction and microscopic particulate analysis (MPA) results.

Why is DEP evaluating groundwater sources?

The definition of surface water changed in 1989 under the Surface Water Treatment Rule to include “water directly influenced by surface water, which may include springs, infiltration galleries, cribs or wells.” It was recognized that groundwater sources near streams or those subject to rapid recharge could be contaminated by *Giardia lamblia* cysts or other pathogenic cysts, and pose a public health threat if not treated as a surface water source.

What is the “direct influence of surface water?”

The direct influence of surface water occurs when a groundwater source is susceptible to contamination by *Giardia lamblia* or other pathogenic cysts. This condition can be identified by rapid shifts in water quality characteristics due to precipitation, or by the identification of microscopic particles and organisms indicative of surface water.

How are sources being identified?

The evaluation of DEP’s groundwater sources is a multi-step process. Certain sources are considered protected while other sources, because of their potential for MCL violations and potential health hazards, are considered questionable. The sources are considered questionable based upon the source’s depth, geology, location, construction and/or type. If the source meets the criteria of a questionable source, DEP will notify the water supplier to conduct special monitoring of the raw water source. The results of the monitoring will be evaluated to determine if the source is being influenced by nearby surface water or by precipitation and rapid infiltration. If it is, DEP will conduct a microscopic particulate analysis of a raw water sample. The microscopic particulate analysis results will be used in conjunction with the statistical data and source characteristics to determine whether the direct influence of surface water is occurring.

CRITERIA

Certain types of groundwater sources are susceptible to direct surface water influence. Various criteria have been established based on source protection from direct surface water influence. Special SWIP source monitoring may be required at community water systems that do not meet one or more criteria. There may be circumstances where other criteria may be used to require special monitoring. These may include an outbreak of a disease that may be waterborne or water quality results indicative of surface water.

What are questionable groundwater sources?

All springs, infiltration galleries, ranney wells and crib intakes are types of sources that are considered potential sources for the direct influence of surface water and will be required to conduct the special monitoring.

If the source is a well:

IS THE WELL LOCATED...

- YES NO **in a carbonate aquifer with static water elevation < or = 100 feet below ground level?**
- YES NO **in an unconfined aquifer with static water elevation < or = 50 feet below ground level?**
- YES NO **in a confined aquifer which is located < or = 50 feet below ground level?**
- YES NO **< or = 200 feet from a surface water body? (Note: Not applicable to confined aquifer or unconfined aquifer where static water elevation > 100 feet below ground level.**

If the answer to any of the above questions on wells is **YES**, the source will probably be required to conduct the special monitoring.

If the answer to all the above questions on wells is **NO**, further evaluation is normally not necessary. However, DEP may require evaluation of the source at any time based upon the source water quality, construction, siting or possible involvement in a waterborne disease outbreak.

PERMITTING

A community water system (CWS) which submits a construction permit from the regional DEP office for completion of a new groundwater source must answer questions regarding the above SWIP criteria. If the groundwater source meets any of the SWIP criteria, a special six-month SWIP monitoring program, by condition of the permit, may be conducted to determine if the source is under the direct influence of surface water.

All springs, infiltration galleries, ranney wells, and crib intakes must conduct the special six-months SWIP monitoring prior to submitting a construction permit. A condition on the operating permit allows use of the source during this period; this operating condition for SWIP monitoring is terminated if monitoring data results show no direct surface water influence after six months of monitoring. For a well, an MPA must be collected and analyzed during the new source sampling of the well to determine that the source does not indicate the direct influence of surface water. A source determined to be under the direct influence of surface water will be classified as a surface water source and must comply with the surface water filtration procedures.

The Bureau of Water Supply Management in each regional office is responsible for identifying existing CWS groundwater sources that do not meet SWIP criteria. Systems that meet SWIP criteria will be requested to conduct the six-month SWIP monitoring.

SPECIAL SWIP MONITORING

What is required for special monitoring?

The water system must submit a monitoring plan which addresses the requirements described below based upon the particular location, design and construction of the source and the system. The SWIP monitoring guidance for PWSs provides a step-by-step procedure to develop this plan. All construction deficiencies which would affect the sampling must be identified in the plan by the water supplier, and major, accessible problems remediated prior to the sampling. The plan will be reviewed by DEP's regional office (or the county health department, where appropriate). Monitoring shall not begin until the operator has approval of the monitoring plan.

Sampling is to be taken from the source or the collection system as close as is practical and prior to treatment. If the groundwater is being pumped from the aquifer, the samples must be collected at production pumping rates and during times when pumping conditions are established in the groundwater flow system.

The water system must take a daily sample from the approved sampling point and take measurements of turbidity, pH, specific conductance (or total dissolved solids) and temperature. Daily measurements must be made of the flow and/or water level from the source. The water level from a well can be either static or pumping water level; however, all future readings must be of the same type. Weekly total and, if positive, fecal coliform samples must be taken in accordance with the standard methods from the approved sample point. All sampling procedures are to be described in the monitoring plan.

Monitoring shall be conducted for six months and include both a traditionally high flow period (April to June or October to December) and low flow period (July to September) of the year. Monitoring results shall be submitted monthly within 30 days of the end of the month on forms provided by DEP or one of equivalent format.

All applicable quality assurance measures are to be taken by the sampler in accordance with standard methods and/or equipment manufacturer's directions. All meters are to be properly calibrated and maintained, and records of calibration maintained for inspection. All readings and analysis results are to be kept on forms approved by DEP and initialed daily by the sampler.

Daily measurements and/or recordings must be made of precipitation and local surface water conditions (river stage or flow). If information from a local rain gauge is not available (<20 miles), the operator must install and maintain one. Snowfall events are difficult to read on a rain gauge; therefore, arrangements should be made with a local radio or TV station to acquire precipitation amounts under these conditions. The National Weather Service receives information from rain gauges across the state and can provide location and gauge data for each site. Likewise, the United States Geological Survey (USGS) has installed and maintains gauges on most of the major creeks and rivers in the state. However, if the nearest surface water body is not gauged, the operator will install and maintain a method to measure its flow.

When is the microscopic particulate analysis done?

A microscopic particulate analysis will be conducted by DEP if the results of the special monitoring show a relationship between the raw source water quality and precipitation or surface water conditions. In addition, the special monitoring results will be used to target a sampling period to best represent the direct influence of surface water for microscopic particulate evaluation. If the results of the analysis show the presence of surface water organisms or organic debris, the source will be defined as groundwater under the direct influence of surface water.

When is a statistical analysis conducted?

Upon completion of the six-month special monitoring, a multiple regression model is run on the daily monitoring data to determine if a statistical correlation exists between groundwater parameters and precipitation events. For example, the relationship between raw water turbidity and a specific precipitation event is evaluated. If a moderate to high correlation exists, DEP staff will conduct a microscopic particulate analysis at the source.

What if the source is under the direct influence of surface water?

If the source is under the direct influence of surface water, the supplier will be required to be in compliance with the Surface Water Treatment Rule within 48 months as specified under DEP's rules and regulations. A water system can correct identified deficiencies in the source construction which may have resulted in the surface water contamination and were noted prior to sampling. However, considerable cost may be incurred and the problem not solved if a solution is not obvious or does not work. The water supplier can abandon the source or install adequate treatment.

SWIP MONITORING GUIDANCE FOR PUBLIC WATER SUPPLIES

Prior to submitting a SWIP monitoring plan to your regional DEP office for review and approval, it is recommended that the regional hydrogeologist be contacted to discuss proper monitoring protocol applicable to your source. Quality control and compliance issues should be reviewed at this item.

The SWIP monitoring plan must include the following:

1. A schematic of the system in plan view from the treatment system back to the source showing the location of the sample point and the source being sampled and/or the sources being represented. Refer to Appendix A. Combined source sampling can only be considered if it can be demonstrated that one source can be representative of all or several similar sources. Submit a cross section of the spring showing construction of the springhouse.
2. Source construction details, such as for a springhouse or well; if another type of source, please explain construction. Refer to Appendix B.
3. A 7.5-minute quad sheet or portion thereof showing the location of the sample point, the rain gauge and the stream staff gauge. Enlarge that portion of the map, if necessary, to show details. Identify route number of nearest road to source. Also, indicate nearest surface water bodies. Locate and explain obvious sources of contamination such as nearby underground storage tanks, feedlots, and industrial/commercial land use zones. Discuss how the rainfall data will be collected. If the rainfall data is not to be collected by the system, provide the sources of the information and their addresses.
4. The instruments and services to be used to monitor static or pumping water level and/or discharge from free flowing sources and other parameters required under the monitoring protocol. A description of the calibration and maintenance of the equipment to be used must be included. Temperature is recorded in degrees centigrade. Refer to Appendix C.
5. A discussion of the monitoring plan including: who will be responsible for collecting and reporting the data; why the observation and monitoring points were selected; the schedule for the six months of monitoring which should commence within three months of the submitted plan; and descriptions of other studies to be conducted. Monitoring will include both a traditionally high flow period (April to June or October to December) and low flow period (July to September) of the year.

Surface water flow in the drainage basin(s) that contain your springs must be characterized. Provide enough flow level data, by use of staff gauges, to describe the surface flow and possible relationship with the spring.

Regional hydrogeologists will conduct inspections of the monitoring to provide some quality control for the data with duplicate measurements of samples. Monitoring results shall be submitted monthly within 30 days of the end of the month. Evidence of falsification of data on the part of the system shall be evaluated for submittal to the Office of Attorney General for further investigation.

For your convenience, attached is a blank SWIP Monthly Monitoring Report Form, Appendix D, to be used for recording monitoring data. Please make sufficient copies to cover the duration of the monitoring. Include on the report form in the comment column an explanation of any anomalous events which may impact daily monitoring results. Examples are stream turbidity from an upstream rainfall event, barge traffic, and changes in groundwater quality caused by nearby construction, blasting, and mining activities.

If you have any additional questions regarding SWIP monitoring, call your regional DEP office.

LIST OF REGIONAL DEP OFFICES AND COUNTIES SERVED

SOUTHEAST REGIONAL OFFICE

PA DEP - WSM Southeast Field Operations
Suite 6010, Lee Park
555 North Lane
Conshohocken, PA 19428
Telephone: (610) 832-6060

Bucks, Chester, Delaware, Montgomery and Philadelphia

NORTHEAST REGIONAL OFFICE

PA DEP - WSM Northeast Field Operations
2 Public Square
Wilkes-Barre, PA 18711-0790
Telephone: (570) 826-2511

Carbon, Lackawanna, Lehigh, Luzerne, Monroe, Northampton, Pike, Schuylkill, Susquehanna, Wayne and Wyoming

SOUTHCENTRAL REGIONAL OFFICE

PA DEP - WSM Southcentral Field Operations
909 Elmerton Avenue
Harrisburg, PA 17110
Telephone: (717) 705-4708

Adams, Bedford, Berks, Blair, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Mifflin, Perry and York

NORTHCENTRAL REGIONAL OFFICE

PA DEP - WSM Northcentral Field Operations
208 West Third Street, Suite 101
Williamsport, PA 17701
Telephone: (570) 327-3636

Bradford, Cameron, Centre, Clearfield, Clinton, Columbia, Lycoming, Montour, Northumberland, Potter, Snyder, Sullivan, Tioga and Union

SOUTHWEST REGIONAL OFFICE

PA DEP - WSM Southwest Field Operations
400 Waterfront Drive
Pittsburgh, PA 15222-4745
Telephone: (412) 442-4217

Allegheny, Armstrong, Beaver, Cambria, Fayette, Greene, Indiana, Somerset, Washington and Westmoreland

NORTHWEST REGIONAL OFFICE

PA DEP - WSM Northwest Field Operations
230 Chestnut Street
Meadville, PA 16335-3481
Telephone: (814) 332-6899

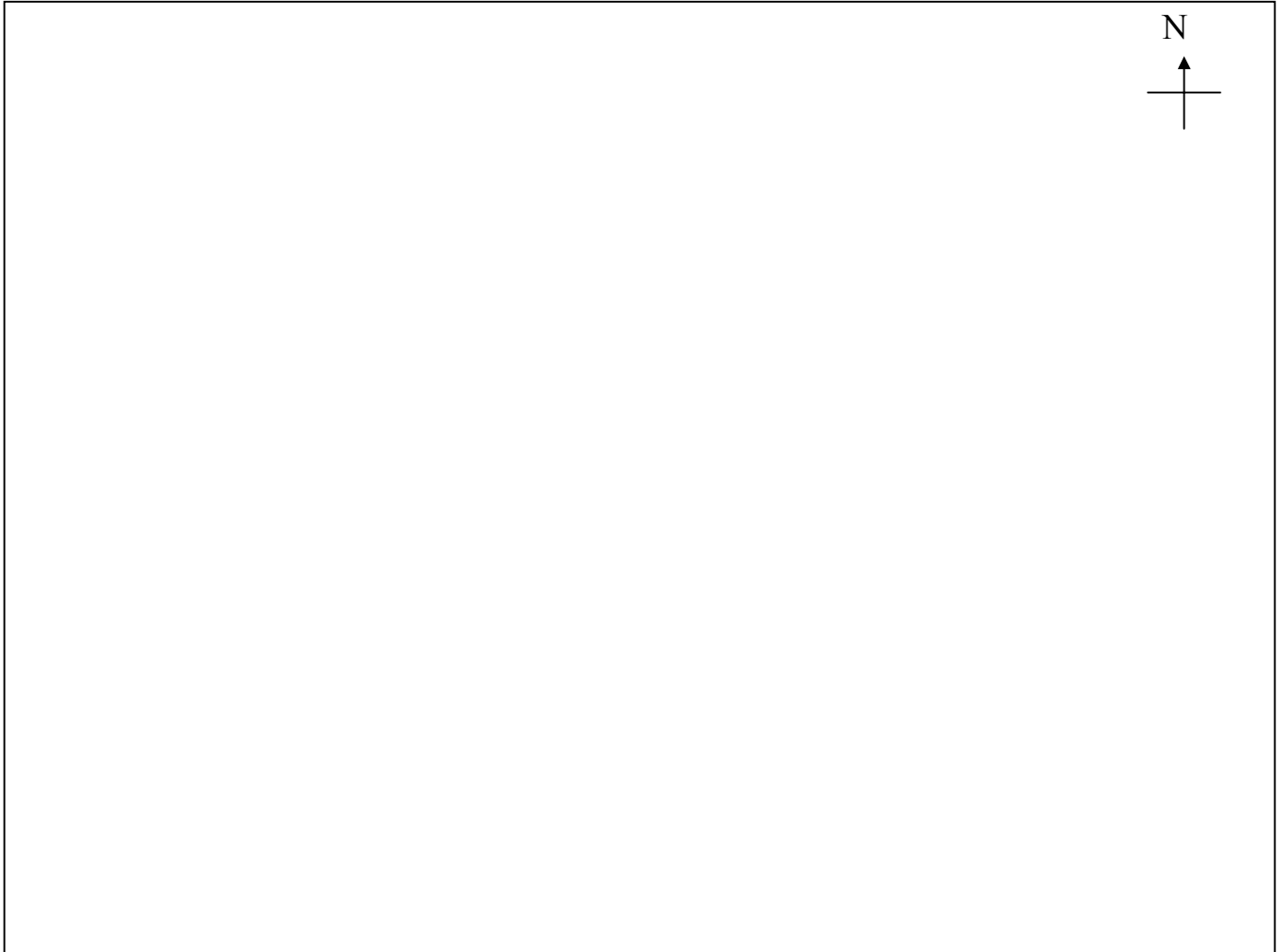
Butler, Clarion, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Venango and Warren

PA DEP - Bureau of Water Supply and Wastewater Management
Division of Drinking Water Management
P.O. Box 8467
Harrisburg, PA 17105-8467
Telephone: (717) 772-4018

Out-of-State Bottled Water

APPENDIX A

Provide a schematic of the system:



T = Treatment Building

W = Well House

S = Spring House

= Spring

= Well

NOTE: Include rain gauge and stream staff gauge if on premises of facility.

APPENDIX B

Source Construction Details

Public Water Supply Identification Number: _____

Source Location (Lat/Long): _____

Well:

Distance to nearest surface water: _____

Static or pumping water level depth: _____

Casing depth: _____

Well screen interval: _____

Depth of grouting: _____

Discharge (GPM) + time pumped daily: _____

Name of aquifer: _____

Spring:

Discharge (GPM): _____

Name of aquifer: _____

NOTE: Attach as-built cross section stated in item #2 of plan.

APPENDIX C

SWIP INSTRUMENTATION

	INSTRUMENT	RANGE (UNITS)	CALIBRATION PERIOD
pH			
Temperature			
Conductivity			
Turbidity			

Identify method of coliform analysis: _____

Method and instrumentation for measuring water level in well: _____

Method and instrumentation for measuring spring discharge: _____

Name Phone () _____

Signature Address: _____

APPENDIX D

MONTHLY SURFACE WATER IDENTIFICATION MONITORING REPORT

PWSID: _____ County: _____

Permittee Name: _____

Source Code: _____ Source Name: _____

_____, 19__ Monitoring Began _____, 19__ to _____, 19__
For the month of _____ Will End

This report is to be completed for each source in question and returned every month to the appropriate DEP regional office. Daily and weekly, raw water monitoring results are to be recorded on this report for the surface water identification monitoring. Daily results are to be recorded by the person conducting the measurements and the report must be signed by the person submitting the form. Sampling and analysis must be conducted in accordance with the permittee's approved monitoring plan. Bacteriological samples must be analyzed by a DEP certified laboratory.

Print Name and Person Completing Form

Signature

Weekly Raw Water Coliform Sampling Results (Actual Densities)

DATE	TOTAL COLIFORM*	¹ FECAL COLIFORM*	INITIALS**

¹If total positive

* #/100 ml

** Initials of person logging results

Abbreviations for Daily Monitoring

¹pH<0.1 Unit

²COND = Conductivity, μ S/cm

³TURB = Turbidity, NTU

⁴TEMP = Temperature in degrees <0.1, (specify C or F)

⁵PREC = Precipitation <0.01 inches or in mm (specify)

⁶blanks = Surface water conditions (specify)

⁷INT = Initials of person making field measurements

DAILY MONITORING

DATE	pH¹	COND²	TURB³	TEMP⁴	PREC⁵	6	6	INT⁷
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
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www.GreenWorks.tv - A web space dedicated to helping you learn how to protect and improve the environment. The site features the largest collection of environmental videos available on the Internet and is produced by the nonprofit Environmental Fund for Pennsylvania, with financial support from the Pennsylvania Department of Environmental Protection, 877-PA-GREEN.

**Bureau of Water Supply and Wastewater Management
P.O. Box 8467
Harrisburg, PA 17105-8467**

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