

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Water Supply Management

Document Number: 383-3500-106

Title: Guidance for Surface Water Identification Protocol

Effective Date: February 17, 2001

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

Policy: This document contains the guidance and procedures developed to direct and support staff implementation of the requirements for the surface water treatment rule under the drinking water management programs.

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

Applicability: This guidance will apply to public water systems as defined under the Pennsylvania Safe Drinking Water Act.

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 explain how and on what basis DEP will administer and implement its responsibilities with respect to the surface water treatment rule. DEP reserves the discretion to deviate from the guidance and procedures in this document if circumstances warrant.

Page Length: 34 pages

Location: Volume 20, Tab 03

Definitions: See 25 Pa. Code Chapter 109

Guidance for Surface Water Identification Protocol

TABLE OF CONTENTS

Section I - Surface Water Identification Protocol	1
Introduction.....	1
Procedure.....	1
Monitoring Protocol	2
Evaluation of Public Water Sources	5
Attachments.....	6
Section II - Aquifer Confinement	15
Section III - SWIP Guidelines for Statistical Analyses	17
Section IV - Interpreting the Microscopic Particulate Analysis	18
Introduction.....	18
Technique.....	18
Categorization.....	18
Scoring	19
Classifying a Source.....	19
Section V - Surface Water Identification Protocol Enforcement Guidance	23
Attachments.....	25

SECTION I

SURFACE WATER IDENTIFICATION PROTOCOL

INTRODUCTION

There are over 3,200 groundwater sources used for community water systems (CWS) and over 7,500 noncommunity water systems (NCWS) almost exclusively using groundwater sources in Pennsylvania. These systems vary in their construction and design from deep wells and well fields to infiltration galleries. The definition of "surface water" in 25 Pa. Code Chapter 109.1 includes sources previously identified as groundwater sources which show direct influence of surface water by physical and water quality variation in response to precipitation events and/or by microscopic particulate analysis for identification of surface water particles. These sources will be required to meet "surface water" treatment requirements.

The Final Federal Surface Water Treatment Rule 142.16 "Special Primacy Requirements" requires states to determine which community and noncommunity public water systems use groundwater under the direct influence of surface water by June 29, 1994 and June 29, 1999 respectively. EPA envisions the determinations will be made in conjunction with related activities such as sanitary surveys and vulnerability assessments. Pennsylvania has developed a Surface Water Identification Protocol (SWIP) to address the evaluation of groundwater sources under the direct influence of surface water.

This guidance is for evaluation of PWS sources which are proposed or permitted as a groundwater source to determine the applicability of the surface water treatment requirements of the Safe Drinking Water Regulations. A schedule for determining which sources are under the direct influence of surface water is to be followed by the regional staff in accordance with the program plan to meet the regulated deadline. Determinations of direct surface water influence on sources for permit applications, and any PWS using a groundwater source which exhibits surface source water quality problems, a possible MCL violation, a potential health hazard or supplies a community experiencing an outbreak of a waterborne illness should be conducted on a priority basis.

PROCEDURE

It is recognized that groundwater sources are located and designed to minimize the water quality problems associated with surface water but maximize the quantity benefits of inducing infiltration or the economic benefits of using a shallow supply. Certain types of systems with collection systems which are located to induce infiltration, take advantage of shallow groundwater conditions or solution channeling are considered to be questionable as to their protection from the direct influence of surface water. Obviously, springs and infiltration galleries are a primary concern since they are most likely to be experiencing direct surface water influences. Certain types of groundwater sources with collection systems which are suitably located, and properly constructed and maintained are protected from direct influence of surface water and associated water quality problems.

In the interest of efficient use of drinking water staff and to limit the economic burden of monitoring on PWS, groups of groundwater sources will be evaluated at a time by criteria based on the source's degree of protection from the direct influence of surface water. The deeper the source and the more competent the geologic material to protect the aquifer from the direct influence of surface water, the more the source will be considered protected. If, however, sources in the protected group show water quality trends associated with the direct influence of surface water, the source will be evaluated as a questionable source. The degree of concern for the protection of these questionable sources which are already permitted is reflected in the schedule for that group's evaluation. The results of the evaluation procedures and special studies of protected groups will be used to periodically reevaluate the criteria for these groups.

The sanitarians are responsible for gathering information, and the identification and notification of the public water systems which have sources that obviously fall within the groups to begin monitoring. The regional hydrogeologist will track the groundwater source evaluations, and will identify and notify PWS which have sources that require more detailed analysis. The regional hydrogeologist will sample those systems that require a microscopic particulate analysis (MPA). The public water supplier is responsible for conducting the source monitoring in accordance with DEP requirements. The regional staff must conduct spot inspection and monitoring to offer some quality assurance for monitoring data. The Division provides sample notification letters, forms for recording evaluations and monitoring, sample permit conditions and assists in data evaluation. The regions are to conduct required MPA sampling, make final determinations of source status, notify water suppliers of the results and compliance requirements.

Criteria

The following are criteria to select evaluation approaches which can be applied to existing sources and to proposed sources for community water systems where minimal information is available on the source. In cases where detailed hydrogeologic information and/or studies are available to demonstrate the potential for the direct influence of surface water, evaluation approaches can be required specific to that potential.

1. **Water System Type and Aquifer Condition:** Includes the type of water source and collection system for the PWS listed by the degree of inherent risk posed by the potential passage of pathogenic protozoans for that type source.

TYPE	GO TO
Infiltration Gallery	- Monitoring Protocol
Ranney well or Crib	- Monitoring Protocol
Spring	- Monitoring Protocol
Well	- Well Criteria

Well Criteria: Hydrogeologic conditions which could pose a potential for a high rate of infiltration of surface water for communication with a production aquifer. Distances are below ground level.

AQUIFER	GO TO
Carbonate Aquifer: static water \leq 100 ft	- Monitoring Protocol
static water >100 ft	-2. Surface Water Separation
Unconfined Aquifer: static water \leq 50 ft	- Monitoring Protocol
static water >50 and \leq 100	-2. Surface Water Separation
static water >100 ft	-3. Source Integrity
Confined Aquifer: aquifer \leq 50 ft	-2. Surface Water Separation
aquifer >50 ft	-3. Source Integrity

2. **Surface Water Separation:**

IF	GO TO
Recharge Boundary (aquifer test)	- Monitoring Protocol
\leq 200 feet to Surface Water Body	- Monitoring Protocol
None of the Above	-3. Source Integrity

3. **Integrity Criteria:** Include those conditions that may allow the passage of pathogenic protozoans in the earth materials or the well by allowing rapid (<61 days) infiltration of surface water to the well.

Topography or depth of weathering exposes aquifer (\leq 200 feet)	- Monitoring Protocol
Man-made features which expose aquifer (\leq 200 feet) i.e., poorly constructed or abandoned wells, road cuts	- Monitoring Protocol
Well construction deficiencies which lead to water quality problems	- Require Correction
None of the above	- determined <u>not</u> to be under the direct influence of surface water

MONITORING PROTOCOL

The monitoring of all parameters except the microscopic particulate analysis (MPA) is to be conducted by the water system. The authority for requiring the monitoring is provided under 35 P.S. Section 721.7(J) and described in the regulations under "Special Monitoring Requirements" 109.302(a)&(b). However, the provisions of 109.302(d) requiring DEP to provide a schedule, instructions for sampling methods and handling samples, and analytical procedures to be followed must be satisfied. The sanitarian and/or regional hydrogeologist will periodically review the monitoring program in progress, and will conduct duplicate monitoring.

The monitoring includes measurement, sampling, and analysis of those parameters which would be expected to show the direct influence of surface water. Deterministic parameters are as stated in 109.1 "Surface Water": (i) "Significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity or pH (which may also change in groundwater but at a much slower rate) which closely correlate to climatological or surface water conditions." Or (ii) "The presence of insects and other microorganism, algae, organic debris or large-diameter protozoans such as *Giardia lamblia*." Unique surface water quality characteristics existing or induced as in the case of a tracer test would also be considered applicable under certain circumstances. In addition, total coliform and, if positive, fecal coliform analysis of the raw water will be included in the monitoring, and the results considered in the interpretation. Other information that the water system may wish to submit such as stable isotope studies will be considered with the monitoring and microscopic particulate analysis.

The water system must submit a SWIP Monitoring Plan (Attachment 1) which addresses the requirements of the protocol based upon the particular location, design and construction of the source and the system. The SWIP Monitoring Plan will be reviewed by the regional hydrogeologist. Monitoring shall not begin until the operator has a plan approved by the regional office.

The SWIP Monitoring Plan must include the following:

1. A schematic of the system 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. Combined source sampling can only be considered if there is no alternative. One source shown to be representative of all or several similar sources can be considered.
2. A map showing the location, and a description of the rainfall gauge and surface water monitoring point. If the data is not to be collected by the system, the sources of the information and their address must be provided.
3. The instruments and services to be used to monitor the various parameters required under the monitoring protocol. A description of the calibration and maintenance of the equipment to be used must be included.
4. A discussion of the SWIP 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 monitoring which should commence within 3 months of the submitted plan, and descriptions of other studies to be conducted.

Monitoring will be conducted for 6 months and include both a traditionally high flow period (April - June or October - December) and low flow period (July - September) of the year. The Region will conduct inspections of monitoring to provide some quality control for the data with duplicate measurements and 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 Attorney General's Office for further investigation.

Sampling

The water system must take a daily grab sample from the approved sampling point and measure turbidity, pH, specific conductance (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 coliform and, if positive, fecal coliform samples must be taken in accordance with Standard Methods from the approved sample point. All sampling procedures are to be described in the monitoring plan.

Sampling is to be taken from the source or the collection system as close to the source as practical and prior to treatment. If the groundwater is being pumped from the aquifer, the samples must be collected at production pumping

rates and when pumping conditions are established in the groundwater flow system. Pumping only to collect a sample is not acceptable. It is preferable for a sample to be taken from a continually pumped well; however, if the well has not been pumping immediately prior to sampling (<12 hours), field measurement of indicator parameters such as temperature, pH, specific conductance, dissolved oxygen, and Eh(oxidation potential) should be used as the criteria for determining the amount of water to purge and when to sample a well.

To collect the sample for field measurements of pH, specific conductance, and temperature, a 500 ml sample bottle or larger should be used. The sample bottle should be dedicated to a single source and be identified by source on the bottle. The bottle, and instruments to be put into the sample, must be rinsed with the water to be sampled three times before the sample is collected for measurement. For turbidity analysis and some pH kits, use the vial provided and follow the manufacturers directions. Follow methods 906A and 906B of *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, 16th edition for the collection and handling of weekly coliform samples.

Water Quality Measurements and Analysis

Only analytical methods specified in this document or otherwise accepted by the Bureau should be used for this monitoring. Measurements of pH, turbidity, conductivity (or total dissolved solids), and temperature are described in *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, 16th edition, methods 423, 214A, 205 (or 209B), and 212, respectively. Measurements of total and fecal coliform must be conducted by a certified laboratory. If the total coliform analysis is positive, fecal coliform must also be measured.

All applicable quality assurance measures are to be taken by the sampler and analyst 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. A sample form for water quality monitoring data and coliform data are included in Attachment 2.

Climatological and Surface Water Monitoring

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. The National Weather Service receives information from rain gauges across the state and can provide location and gauge data for each site. Likewise, the 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 should install and maintain a method to monitor changes in flow. A staff gauge marked to a 1/100 of a foot and fixed to a secure station may be sufficient.

Interpretation

The regional hydrogeologist will evaluate the climatological and/or surface water conditions in relationship to groundwater quality and quantity over the time of the monitoring program. Relationships, or the lack of relationships, can be interpreted from the graphical presentation as to the degree of surface water influence. Further interpretation can be accomplished with statistical analysis of the data. If a correlation is demonstrated in the data, a microscopic analysis for surface water influence will be conducted on a schedule based on the demonstrated correlation.

Microscopic Particulate Analysis for Surface Water Influence

Microscopic particulate analysis (MPA) sampling will be conducted by the regional hydrogeologist. Sampling equipment and procedures for MPA samples are equivalent to the "Giardia Sampling Instructions" found in the Surface Water Treatment Binder. However, the sample must come from the same sample point or its equivalent as the monitoring point and use of the pump should be minimal. A form for MPA sampling for surface water identification analysis is included as Attachment 3.

In addition to the collection of the MPA sample, staff is to collect a sample for total and fecal coliform analysis. Legal seals should be used for raw groundwater samples submitted to DEP's laboratory for analysis. Field data must be collected for pH, turbidity, specific conductance (total dissolved solids), temperature, flow or water level, and climatological or surface water conditions.

The microscopic particulate analysis for surface water influence consists of the identification and count of the types of microscopic particles representative of surface water present in the groundwater. The basic procedure is described in the EPA's *Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water*.

EVALUATION OF PUBLIC WATER SOURCES

To meet the federal requirements for evaluating CWSs in the state for the direct influence of surface water, the following strategy is to be followed. The strategy is based upon the permitting status of the system and the type of source.

Groundwater Source Permitting

Those systems seeking permits for groundwater sources will be evaluated within the permitting process and by use of special conditions. A checklist for the permit applicant to complete to determine the applicability of the protocol to the subject groundwater source is included as Attachment 4. For springs and free flowing sources, the applicant will implement the monitoring protocol prior to submittal and will submit the monitoring data with the application. Wells sited within the criteria for evaluation under the above described procedure, and cribs, infiltration galleries and ranney wells will be conditioned to implement the monitoring under 35 P.S. Section 721.7(J) of the act and 109.302(a)&(b) of the regulations. A sample condition requiring implementation of the monitoring protocol is included as Attachment 5. Initially, the well shall be sampled for a MPA as part of the new source sampling to make a preliminary evaluation of the groundwater source. The regional hydrogeologist will conduct the MPA sampling; and, until a laboratory certification program can be implemented, DEP's laboratory will analyze the samples.

If sampling and analysis determine the groundwater source is under the direct influence of surface water, the source will have to meet the treatment requirements of a surface water source. It would be expedient to have any previously permitted groundwater sources of a public water system evaluated and monitored concurrently with the proposed groundwater source.

Permitted Groundwater Sources

EPA has mandated as a condition of primacy for the Surface Water Treatment Rule that all groundwater sources under the direct influence of surface water must be identified by June 29, 1994. The order in which sources will be evaluated will be based on the potential health risk posed by the untreated source. Those sources most likely to be under the direct influence of surface water should be given priority for evaluation. In general, springs, infiltration galleries, crib intakes and ranney wells will be the first priority. Wells in limestone strata near surface water and/or near surface water would be the next priority.

If at anytime a groundwater source is considered a source for a giardiasis or other similar illness outbreak, a MPA should be conducted for the source water and, if the results of the MPA are negative, the monitoring requirements should be imposed.

To best use regional staff time, the sanitary surveys must include evaluation of the groundwater sources in accordance with the protocol. A Surface Water Identification Protocol Survey form is included as Attachment 5 for a systematic and consistent evaluation of the source. The sanitarian should put "Y" in the "SWIP" block on the form for those sources which will obviously be required to activate the monitoring protocol. The regional hydrogeologist must use the form to track the sources being evaluated and to make a decision on those sources which are questionable as to whether the monitoring protocol should be required. The priority for evaluation of the sources should be decided by the sanitarians and the regional hydrogeologist.

The regional hydrogeologist will receive and review the SWIP Monitoring Plan for each PWS required to monitor. Any problems with the plan should be corrected and the plan approved as soon as possible. The SWIP Monitoring Plan must provide that the monitoring data will be representative of the source or sources, and will be usable for evaluation.

The regional hydrogeologist will interpret and evaluate the monitoring data to determine if and when a source should be sampled for an MPA. Sampling for the MPA will be conducted by the hydrogeologist based upon climatic conditions and responses in source water quality. The regional hydrogeologist will notify those PWS which will require no additional evaluation or action.

If the results of the MPA are positive for the direct influence of surface water, the regional hydrogeologist will notify the sanitarian, and the other members of the region's enforcement staff. PADWIS must be updated to reclassify the source as groundwater under the direct influence of surface water. The PWS will have 48 months to correct the problem with the source. Correction would include abandonment, treatment or reconstruction. By the source being reclassified as groundwater under the direct influence of surface water, the PWS would be in violation of Chapter 109.202. Immediate threats to public health and safety must be addressed and appropriate action must be taken.

ATTACHMENT 1

Page 1 of 2

SURFACE WATER IDENTIFICATION PROTOCOL (SWIP) MONITORING PLAN

System Name: _____ PWSID: _____

Source Name: _____

Source Location (Lat/Long) or show location on topo map): _____

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.

SWIP Instrumentation

	Instrument	Range (units)	Calibration Period
pH			
Temperature			
Conductivity			
Turbidity			

Identify method for coliform analysis: _____

Method and instrumentation for measuring water level in well: _____

Method and instrumentation for measuring spring discharge: _____

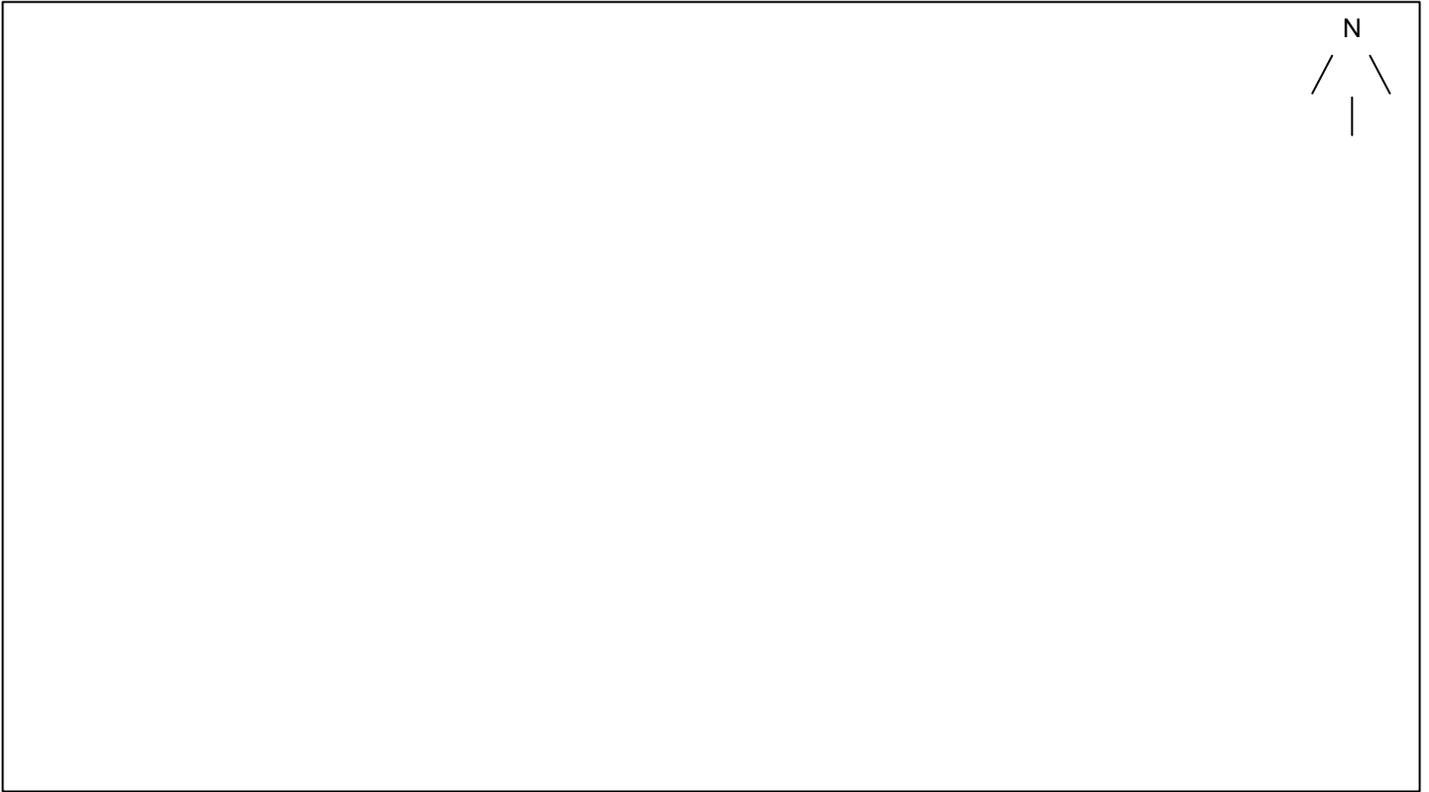
Collector Name: _____ Phone: _____

Address: _____

ATTACHMENT 1

Page 2 of 2

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.

ATTACHMENT 2

Page 1 of 2

MONTHLY SURFACE WATER IDENTIFICATION PROTOCOL MONITORING REPORT

PWSID: _____ County: _____

Permittee Name: _____

Source Code: _____ Source Name: _____

_____(date)_____; _____(date)_____; _____(date)_____
for the month of monitoring began 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 of person completing form

Signature

WEEKLY RAW WATER COLIFORM SAMPLING RESULTS (ACTUAL DENSITIES)

DATE	TOTAL COL.*	¹ FECAL COL.*	INT**

¹If total positive

* #/100 ml

** Initials of person logging results

ABBREVIATIONS FOR DAILY MONITORING

- 1 Ph <0.1 UNIT
- 2 COND. = Conductivity, uS/cm
- 3 TURB. = Turbidity, NTU
- 4 TEMP. = Temperature in degrees <0.1, (specify C or F)
- 5 PREC. = Precipitation <0.01 inches or in mm (specify)
- 6 blanks = surface water conditions (specify)
- 7 INT = Initials of person making field measurements

ATTACHMENT 2

Page 2 of 2

DATE	Ph	COND.	TURB.	TEMP.	PREC.			INT
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								

ATTACHMENT 3

SURFACE WATER IDENTIFICATION PROTOCOL Request for Microscopic Particulate Analysis

Public Water Supply _____ ID # _____

Source Name _____

Date Collected _____ Time Collected _____ to _____ Gallons _____

Temperature (°C) _____ Conductivity (umhos/cm) _____

pH _____ Total Dissolved Solids (mg/L) _____

Turbidity (ntu) _____ Other _____

Collector _____ Sample Number _____

Sample Collection Site (if using a portable pump to collect samples, indicate the exact location of the end of the hose).

Weather conditions prior to sampling (24 hours, week)

Does the site indicate susceptibility to surface water? _____

Comments _____

Laboratory Use Only

Date and Time Received _____

Analysis Determined by _____

Date of Analysis _____

ATTACHMENT 4

Page 1 of 2

SURFACE WATER IDENTIFICATION PROTOCOL FOR COMMUNITY WATER SYSTEM PERMITS -- GROUNDWATER SOURCE APPLICABILITY --

Chapter 109.1 of DEP's rules and regulations defines surface water as including groundwater under the direct influence of surface water. The following checklist is to be used to determine the applicability of the groundwater source to further evaluation for the potential of being under the direct influence of surface water. The completed checklist must be submitted with a permit application for a groundwater source with a discussion of the vulnerability of the source to the direct influence of surface water. Upon a full review of the permit information, DEP may require, at its' discretion, evaluation of any groundwater source for the direct influence of surface water.

- | Yes | No | <u>IS SOURCE A</u> |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Spring? If YES, the source must be monitored before the application is submitted.
see MONITORING -----> |
| <input type="checkbox"/> | <input type="checkbox"/> | Infiltration Gallery, Ranney Well, Crib Intake? If free flowing, the source must be monitored before the application is submitted.
see MONITORING ----->
If non-flowing, the source must be sampled for microscopic particulate analysis during new source sampling.
see PERMITTING -----> |

**FOR A WELL:
IS THE WELL LOCATED**

- | | | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | < or = 200 feet from a surface water body? |
| <input type="checkbox"/> | <input type="checkbox"/> | in a carbonate aquifer with static water elevation < or = 100 feet below ground level? |
| <input type="checkbox"/> | <input type="checkbox"/> | in a unconfined aquifer with static water elevation < or = 50 feet below ground level? |
| <input type="checkbox"/> | <input type="checkbox"/> | in a confined aquifer which is located < or = 50 feet below ground level? |

If the answer to any of the above questions on wells is **YES**, the source will probably need to be sampled for microscopic particulate analysis during new source sampling.
see **PERMITTING** ----->

If the answer to all of the above questions on wells is **NO**, further evaluation is normally not necessary.

ATTACHMENT 4

Page 2 of 2

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 plan will be reviewed by the regional office. Monitoring shall not begin until the operator has the approval of the regional office.

Monitoring shall be conducted for 6 months and include both a traditionally high flow period (April - June or October - December) and low flow period (July - 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.

SAMPLING

The water system must take a daily sample from the approved sampling point for measurement of turbidity, pH, specific conductance (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 Standard Methods from the approved sample point.

Sampling is to be taken from the source or the collection system as close to the source as practical and prior to treatment. If the groundwater is being pumped from the aquifer, the samples must be collected at production pumping rates and when pumping conditions are established in the groundwater flow system. Pumping only to collect a sample is not acceptable. All sampling procedures are to be described in the monitoring plan.

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. The water supplier is required to install a rain gauge. Likewise, the 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 should install and maintain one.

PERMITTING

If the groundwater source is not free flowing, monitoring will have to be done under pumping conditions. The sources being permitted will be evaluated within the permitting process and by use of special conditions. Permits for wells sited within the criteria for evaluation, if otherwise issuable, will be conditioned to require monitoring as described above within the first year of operation. Initially, the well shall be sampled for an MPA as part of the new source sampling to make a preliminary evaluation of the groundwater source. Until a laboratory certification program can be implemented, these samples will be taken and analyzed by DEP.

If sampling and analysis determine the groundwater source is under the direct influence of surface water, the source will have to meet the treatment requirements of a surface water source as described under DEP's rules and regulations.

ATTACHMENT 5

Page 1 of 2

SURFACE WATER IDENTIFICATION PROTOCOL SURVEY

SWIP MONITORING []
WELLS []
SPRINGS []
INFILTRATION GALLERIES []
OTHER []

Public Water Supply _____ ID # _____

Source Name _____

Collector: _____ Inorganic Sample #: _____
Collector: _____ Coliform Sample #: _____

Raw Water Sample Collection Site: (attach sample results)

Field Measurements:
PH _____ S.C. _____ TEMP. _____ TURB. _____ CL _____

Construction and Site Characteristics - Wells:

Depth of Well (FT) _____
Depth of Static Water Level (FT) _____ Depth to Pumping Water Level (FT) _____
Depth of Well Grouted (FT) _____

Construction and Site Characteristics - Springs, etc.:

Flow: _____ GPM Spring Description: _____
Sediment at Bottom of Spring: _____ (IN) Last Cleaning _____
How Often Cleaned? _____ Is Source Open? _____
If Not is it Securely Covered? _____

Distance (Feet) to the Nearest Surface Water _____
Describe: _____

Describe Source and Condition: _____

ATTACHMENT 5

Page 2 of 2

Provide a Schematic of the Source: (Please include treatment building, well house, spring, well other source) _____

U.S.G.S. 7.5' Quad: _____

Description of Watershed: (Describe the immediate area surrounding the source and the watershed, include terrain, soil, vegetation, and geomorphic features. Identify possible sources of contamination, include abandoned or active wells)

Geology: (Describe the geology at the PWS source. Include aquifer formation name and lithology.) _____

What is the turbidity and coliform history of the source (raw or treated water)? Describe past MCL or treatment technique violations or waterborne diseases associated with the source. _____

Describe any customer complaints within 5 years related to the source. _____

How does source turbidity respond to heavy rainfall or drought? _____

Source Susceptibility: (Describe site characteristics, including watershed and/or geologic factors which indicate that the source may be susceptible to surface water influence) _____

Form completed by: _____ Date: _____

SECTION II AQUIFER CONFINEMENT

To determine if source monitoring is required under the Surface Water Identification Protocol, it is necessary to distinguish confined from unconfined aquifers serving public water supplies. The following are some methods and sources of information to aid in making the distinction.

1. Review the lithologic descriptions from the drillers log for low permeability units (i.e. consolidated shales, clays) and note depths of saturated zones on log. Review available geologic reports for units known as confining beds and compare to log. Utilize State Water Resource Reports and USGS Hydrogeologic Reports to obtain geologic and aquifer data. Hydrogeologic Investigation Reports prepared by consultants regarding groundwater contamination cases may be applicable for specific areas in the state.
2. Determine if artesian conditions exist in the wellbore. A static water level within or above a low permeability unit overlying the primary aquifer may indicate confined conditions. When multiple aquifers are open to the wellbore or major fracturing is present, static water elevations in the wellbore may be above the primary aquifer; however, the aquifer may not be confined.

Continuous water level measurements for a period of time can be used to evaluate confinement conditions. Daily, cyclical changes of water level occur in confined aquifers due to diurnal and other changes in barometric pressure. Furthermore, dramatic changes in water levels can occur in confined aquifers due to fractures and other point sources of leakage in the vicinity of the well. Of course, this situation would be considered a semi-confined condition and, therefore, should be so evaluated on its potential to be under the direct influence of surface water. Many limestone wells may act as a confined aquifer but dissolution conduits can provide direct access to the surface.

3. Evaluate drawdown response to water level elevations in nearby shallow monitor or domestic wells during test pumping of the standard (i.e. 48 hr.) aquifer test. A low permeability unit overlying the aquifer serving a CWS will significantly reduce changes in groundwater elevation in the shallow aquifer above it, indicating the pumped aquifer is a confined aquifer. Characteristic drawdown curves from the aquifer test data, which can be found in the suggested references, can indicate a confined aquifer.
4. If available, storativity and leakage values will indicate aquifer conditions. Storativity values in the range of 10^{-3} to 10^{-5} indicate confined conditions. Likewise, leakage values in the range of 10^{-2} or less are considered confined conditions. Semi-confined leakage values are in the range 10^{-2} to 10^2 .
5. The analysis of oxygen-18 concentrations can be used to trace the origins and paths of water contributing to a watershed. The oxygen-18 concentrations of groundwater, surface water and precipitation are often distinctive, allowing the recognition of separate component flows. A confined aquifer should, therefore, have a unique oxygen-18 signature that can be traced to its recharge area. Fast-acting groundwater sources can also be evaluated by noting the change in oxygen-18 concentrations during a precipitation event.
6. The element tritium can also be used as an indicator of groundwater age. Tritium is an unstable radioactive isotope of hydrogen which entered the earth's atmosphere in elevated amounts as a consequence of atmospheric testing of nuclear weapons beginning in 1953. Atmospheric tritium levels reached a maximum about 1963.

Age dating of tritium can be used for the purpose of determining if an aquifer is confined. Generally, groundwater in a confined aquifer is pre-1953 and would not contain detectable tritium. Shallow unconfined groundwater aquifers, however, should contain tritium if recharge was post 1953. A surface water body that received atmospheric tritium and contributed water to a groundwater system causing a tritium detection, permits an estimate of groundwater flow velocity. A study conducted by the Wisconsin Geologic Survey indicated horizontal groundwater velocities based on the tritium results are consistent with velocities based on hydraulic calculations.

It is recognized that not all of these items can be addressed at a particular source; however, it is important that all available information be utilized in the determination. The following are suggested references regarding confined aquifers:

EPA: Wellhead Protection Strategies for Confined Aquifer Settings

EPA: Delineation of Wellhead Protection Areas in Fractured Rocks

Groundwater and Wells, Driscoll, Fletcher, & Co.

If confinement cannot be determined, the PWS may provide data to support why the six month monitoring requirements should be waived for their system. The regional hydrogeologist will make the determination with input from the sanitarian/engineer.

SECTION III

SWIP GUIDELINES FOR STATISTICAL ANALYSES

Statistical analyses of the six months SWIP monitoring data provides a means to evaluate relationships between dependent variables and independent variables. The dependent variables are normally river stage and precipitation. The independent variables include pH, temperature, conductivity, turbidity and possibly others specific to a source. The strength of the relationship between two variables is expressed by the Pearson Product Moment correlation coefficient (denoted by r).

To conduct a correlation analysis, five-day averages are computed to try to satisfy the statistical requirement of independent observations (i.e., to minimize the effect that one day's event may have on the next day's event). A five-day average appears to be optimum; greater averages reduce the number of statistical observations to unsatisfactory levels while smaller averages increase the day to day effect.

The five-day averages are run through a multiple regression model (varying time from 0 to 10 time lags; each time lag represents a five-day average) to determine what time lag provides the best fit model using stage and precipitation as dependent variables. Simple correlation statistics are generated for the best model. The model displays the best (r) value using the Pearson Correlation Coefficient at a given lag time.

A decision whether or not to conduct a microscopic particulate analysis (MPA) is based, in part, on the Pearson Correlation Coefficient values from the best fit model. The following indicates the strength, shown as a (r) value, of the relationship between two variables.

-0.40 to +0.40	weak relationship
-0.40 to -0.75 and +0.40 to +0.75	moderate relationship
-0.75 to -1.00 and +0.75 to +1.00	strong relationship

Values less than -0.40 and greater than +0.40 are considered to have a moderate relationship and should be the minimum for requiring an MPA. When reviewing the strengths of correlation coefficients it is important to note which variables yield the best fit.

Strong correlation coefficients may be misleading if variables have no variance over time. If, for example, river stage were to remain constant over time, it is apparent that stage vs. temperature and stage vs. pH would yield strong, but misleading, relationships. To avoid this pitfall, the hydrogeologist must be aware of factors which cause no variance.

Professional judgment should be used to weight the importance of the strongest relationship. For example, the variables precipitation vs. turbidity are normally more relevant than precipitation vs. temperature or precipitation vs. pH. All SWIP parameters are naturally important; however, those which best represent the potential for the direct influence of surface water on groundwater at the source should be weighted more heavily.

The statistical analysis should compliment data from the sanitary survey in deciding whether an MPA should be conducted. The physical condition and integrity of the springhouse and/or well construction should be investigated. Manmade and natural hydrogeologic conditions within the PWS's groundwater watershed may include such features as mines, quarries, fractures, faults, and carbonate terrain. These should be evaluated for their potential to allow direct communication of surface water into groundwater serving a PWS.

Total and fecal coliform data (weekly samples from SWIP monitoring) from a groundwater source should be correlated with precipitation events. Elevated coliform counts following a precipitation event may be an indicator that groundwater is under the direct influence of surface water. A positive coliform count should, therefore, be used in conjunction with correlation analysis results for an MPA determination.

Some groundwater sources, particularly in carbonate aquifers, are classified as "fast acting" when a source reacts quickly, (usually within hours to one day) to a precipitation event and responds by rapid changes in turbidity, flow and other monitoring parameters. When monitoring fast acting sources, it may be advantageous to take numerous turbidity readings or use an inline turbidimeter because a turbidity spike may occur too quickly to be recorded by daily monitoring.

Special attention to monitoring should occur before, during, and following a precipitation event, taking care to record all pertinent variables at a frequency compatible with changes in water quality over time.

SECTION IV

INTERPRETING THE MICROSCOPIC PARTICULATE ANALYSIS

INTRODUCTION

The Microscopic Particulate Analysis (MPA) involves the identification, sizing and population estimates of microorganisms and organic or inorganic debris found in water. If applied properly, the analysis is an excellent tool for assisting an evaluator in identifying groundwater systems that are potentially under the direct influence of surface water. To initiate an MPA, at least two samples should be collected at different times of the year, each representing periods of contrasting weather events: one following a period of heavy rainfall and one after an extended period of little or no rainfall. The samples are collected by passing water through a cartridge filter with an effective pore size of one micrometer (μm). In the laboratory, organisms and particles trapped on the cartridge filter are washed from the filter, concentrated to a small volume, and observed at 100 to 1,000 magnification using light microscopy. The MPA can also be used to assess the effectiveness of a surface water treatment plant in removing *Giardia* cysts and cyst-sized material.

In assessing whether or not a groundwater source is under the direct influence of surface water, an evaluator should conduct an on-site survey of the groundwater collection system as well as the recharge area adjacent to the source. The evaluator uses a multitude of information to establish a source classification, including:

- a systematic construction evaluation and sanitary survey of the groundwater collection system.
- historical water quality data from the source during a specific six month time period, including, but not limited to, turbidity, pH levels, specific conductance (or total dissolved solids), temperature and total and/or fecal coliform counts.
- correlations of water quality fluctuations with localized climatic conditions such as precipitation events and possibly river stage or flow. This correlation is also used in timing the MPA sample collection.
- aquifer characteristics and direction of groundwater flow
- results of the Microscopic Particulate Analysis.

The laboratory analysis is therefore only one component of an evaluator's classification system and should not be the sole determinant of surface water influences on groundwater sources. In most cases, microscopic analysis of a groundwater source will be a helpful tool in supporting observations made during a site investigation of the source.

TECHNIQUE

DEP, Bureau of Laboratories, employs two experienced microbiologists who have analyzed numerous MPA samples collected from a variety of surface water and groundwater sources. The MPA assessments are *not restricted* by limited experience, and all samples are analyzed from a perspective with a consistent point of reference for scoring the categories.

To maintain consistency from one groundwater source to another, laboratory staff remove a sub-sample representing 100 gallons from the sample. As a result, the *total number* of gallons collected in samples from each site does not require standardization. The microscopist always examines the standard 100 gallon sub-sample for particle identification and quantification.

One focus of the MPA is the identification and confirmation of *Giardia* cysts. The *Giardia organism*, a common intestinal parasite in humans, is recovered in the cyst form from *high-volume* water samples. The microscopist uses an immunofluorescent technique to assist in locating the cysts among the debris in the samples. The microscopist verifies proper cyst identification with light microscopy to confirm at least 2 of the 3 internal structures. *Giardia* cysts are considered viable unless they have been properly disinfected.

CATEGORIZATION

Not all of the particles and organisms in a MPA sample are identified and sized. Specific categories have been selected for these observations because they contribute more pertinent information about the susceptibility of a groundwater source. The general significance of each category is described below:

Sediment and Amorphous Debris. Includes all particulate matter in a sample, including pieces of silica, decaying vegetation, microorganisms and unrecognizable debris with a wide size range. Since this material is non-specific and ubiquitous in all water sources, it is not a good indicator of direct surface water contamination.

Rotifers. Microscopic organisms (70 to 500 um) that occur in a variety of habitats and require food sources originating in surface water. Generally, rotifers are good indicators of surface water influence, but a few species do not require light or have nutritional requirements that may be satisfied by food sources other than those associated with surface water. Therefore, some species may not be good indicators.

Crustaceans. Large microorganisms ranging in size from 250 um to greater than 500 um, with eggs from 50 to 150 um in size. Since they live in many types of surface water sources, they are good indicator organisms.

Insects/Insect Parts. This category includes insects, insect parts, larvae and eggs. Since many insects live in or near surface water, they can be evidence of direct surface water contamination, especially those that spend a portion of their life cycle in water.

Diatoms. A particular type of algae that contain silica in their cell walls. Whereas diatoms with internal cellular material are a good indication of surface water contamination, those that are fossilized (silica skeletons) are not.

Algae. Comprises a large group of microorganisms with a variety of sizes and shapes. Only photosynthesizing algae with chlorophyll-containing cells (i.e. those found in water exposed to sunlight and the atmosphere) are considered good indicator organisms of surface water contamination.

Coccidian Oocysts. Host-specific parasites found in humans, animals and fish, including *Cryptosporidium* oocysts. They range in size from less than 1 to 30 um and are excellent indicator organisms.

Cellular Plant Debris. These are pieces of vegetation characteristic of undigested feces of some *Giardia* hosts, such as beavers or muskrats. When distinguished from root material and fungi, plant debris is an excellent indicator organism of surface water influence.

Giardia. This protozoan ranges in size from 6 to 19 um. The organism is transmitted by beavers, muskrats, dogs, humans and other mammals. In the cyst form, the organism is fairly resistant to environmental conditions and disinfectants. *Giardia* cysts are excellent indicators of surface water influence.

SCORING

After preparing a slide of the 100 gallon sub-sample, laboratory staff identify and quantify the bio-indicators. The number of organisms found within each appropriate category is then compared to Table 1. The category is assigned one of five concentration codes ranging from “extremely heavy” (EH) to “not found” (NF). In Table 2, the code is matched with the indicator organism group, resulting in an assigned numerical value. The values for the organism groups are added together, resulting in a presence or absence rating as follows:

<u>Total of All Values (from Table 2)</u>	<u>Rating</u>
10 or more	Present
9 or less	Absent

CLASSIFYING A SOURCE

The laboratory’s “Surface Water Identification Report” (Figure 1) is made available to the water supplier along with all appropriate analysis of construction, hydrogeologic and water quality data. Referring to the laboratory report form, note that *when the total values of all surface water indicator organisms equal 10 or more, a check mark is made under the present column, and conversely when indicators are assigned a value of 9 or less, a check mark is made under the absent column.* The presence of surface water indicators can help support conclusions the source is susceptible to direct surface water influence, but *only* if other source location data supports the vulnerability assessment.

In summary, the Microscopic Particulate Analysis for surface water identification proceeds as follows:

1. Compare source water quality data to climatological events and decide when (if at all) the source is most vulnerable to surface water contamination.
2. Collect at least one sample after a period of heavy rainfall, using the water quality data to determine source response to precipitation or river flow fluctuations; and collect at least one other sample after an extended period of little or no rainfall.
3. From the sample, laboratory staff prepare a 100 gallon sub-sample and count the number of surface water bio-indicators in specific organism categories.
4. Based on the count within each category, one of five concentration codes is chosen, ranging from "extremely heavy" (EH) to "not found" (NF). Refer to Table 1.
5. Using the codes, a numerical value is determined for each of the organism categories. Refer to Table 2.
6. If the values from Table 2 total 10 or more, then the category is check-marked under the "present" column on the Surface Water Identification Report (refer to Figure 1). If the values total 9 or less, then the category is check-marked under the "absent" column.
7. One or more categories marked as "present" suggest that the source is under the direct influence of surface water.

Table 1
Numerical Range of Each Bio-Indicator Based on Numbers
Counted per 100 Gallons Filtered Water ¹

Indicators of Surface Water	EH ²	H	M	R	NS
Giardia ¹	>30	16-30	6-15	1-5	0
Coccidia ¹	>30	16-30	6-15	1-5	0
Diatoms	>150	41-149	11-40	6-10	0-5
Other Algae	>300	96-299	21-95	6-20	0-5
Insect/Crustacea	>100	31-99	16-30	1-15	0
Rotifers	>150	61-149	21-60	1-25	0
Plant Debris	>200	71-200	26-70	1-25	0

- If *Giardia* cysts or other coccidia are found in any sample, irrespective of volume, score as above.
- Key = EH - extremely M - moderate NS - not significant
 H - heavy R - rare

Table 2
Values Associated With Scoring of Bio-Indicators
Present During MPA of Subsurface Water Sources

Indicators of Surface Water ¹	Relative Risk Factor ³				
	EH ²	H	M	R	NS
Giardia	40	30	25	20	0
Coccidia	35	30	25	20	0
Diatoms	16	13	11	6	0
Other Algae	14	12	9	4	0
Insect/Crustacea	9	7	5	3	0
Rotifers	4	3	2	1	0
Plant Debris	3	2	1	0	0

- According to EPA "Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources", March 1991 ed.
 - Refer to Table 1 for range indicators counted per 100 gallons under 100x.
- Key = EH - extremely M - moderate NS - not significant
 H - heavy R - rare

FIGURE 1 SURFACE WATER IDENTIFICATION REPORT

Public Water Supply: _____

Name: _____ Address: _____

Source Identification: _____

Collected By: _____ Collection Date: _____ Sample #: _____

Received (Date/Time): _____

Gallons Collected: _____ Total Sediment Vol.: _____ Chlorine: _____

Surface Water Indicators

Indicators	Present	Absent
Rotifers		
Crustaceans		
Insects/Insect Parts		
Diatoms (Living)		
Algae (Surface)		
Coccidian Oocysts		
Cellular Plant Debris		
<i>Giardia</i>		
Other		

Comments: _____

Analyzed By: _____ Date: _____

SECTION V

SURFACE WATER IDENTIFICATION PROTOCOL ENFORCEMENT GUIDANCE

From the standpoint of enforcing the SWIP program, there are two major areas where enforcement action may be needed. Requiring a public water system to conduct the special monitoring to initially evaluate the source is the first hurdle. Upon evaluating the special monitoring results and determining the source is surface water influenced, the next step is to require the system to maintain a 2.5 mg/L chlorine residual (or DEP approved equivalent) at the entry point to the distribution system. A feasibility study which indicates how the system plans to comply with the Surface Water Treatment Rule also is required.

Water suppliers have up to one year to submit a feasibility study from the time DEP determines the source is directly influenced by surface water. The feasibility study must include a schedule for completion of one of two alternatives:

- 1) Permanent filtration treatment facilities, or
- 2) Abandonment of the unfiltered surface source.

For a system to abandon an unfiltered surface source, the system must provide one of the following:

- 1) Permanent interconnection with another water supplier,
- 2) Permanent treatment facilities utilizing groundwater as a source of supply, or
- 3) provision for adequate supply from existing sources.

Systems which propose to reconstruct a source determined to be under the influence of surface water may do so and may have that source reclassified as groundwater provided follow-up SWIP monitoring indicates the reconstructed source is no longer influenced by surface water. This follow-up SWIP monitoring may vary in length and parameters depending on the type of source and any previous SWIP monitoring results.

A system may complete the reconstruction before the feasibility study due date and not be required to submit a feasibility study, or a system may submit a feasibility study proposing reconstruction of the source to comply with the Chapter 109 Surface Water Treatment Rule requirements within 48 months. Although a system technically has 48 months to comply with the Surface Water Treatment Rule requirements, water suppliers should be encouraged to agree to the shortest schedule possible in case of unforeseen problems. Be sure to update the PADWIS inventory to reflect the change from a surface water source to a groundwater source.

While the Chapter 109 regulations allow a surface water system 48 months to comply with the Surface Water Treatment Rule requirements, the federal Surface Water Treatment Rule requires a surface source to comply within 18 months. EPA has agreed not to take action against those systems which are on schedule with DEP requirements (e.g., feasibility study submitted within one year, on schedule with time frames in feasibility study, compliance with Surface Water Treatment Rule requirements within 48 months), or those systems where DEP has issued an enforcement action for failure to comply with regulation or feasibility study deadlines.

For systems that admit or agree to be considered surface water influenced, documentation is needed from the water supplier as to why the water supplier believes the source is directly influenced by surface water before we allow a system to eliminate Surface Water Identification Protocol (SWIP) monitoring. This documentation should include information as to the degree of inherent risk as outlined on pages 3 and 4 of Section I entitled Surface Water Identification Protocol.

This documentation may include information on a spring, infiltration gallery, ranney well, crib intake, or wells with questionable hydrogeologic conditions as outlined in the Surface Water Identification Protocol. Suppliers unwilling to provide such documentation should be required to conduct the SWIP monitoring. In addition, documentation must be provided to the water supplier indicating the source has been reclassified as a surface water source based on information available to DEP. The standard appeal paragraph should be included with this notice.

Water suppliers should be initially notified when special source water monitoring, 2.5 mg/L chlorine residual, feasibility study, etc., is required. An example of a notification letter requiring special monitoring can be found in Attachment 1. An example of a notification letter informing the supplier to maintain a 2.5 mg/L chlorine residual and to submit a feasibility study can be found in Attachment 2.

For those instances where a system fails to conduct special monitoring or submit a feasibility study, examples of compliance orders can be found in Attachments 3 and 4.

Because of the concern that the required special monitoring and possible reclassification from groundwater to surface water may lead to a higher than normal level of appeals. Regulatory Counsel has recommended that *further enforcement actions beyond the initial monitoring request letter be prioritized between the regional program staff and the regional assistant counsel.*

The Division of Drinking Water Management agrees with this recommendation. Therefore, be sure to consult with your assistant counsel *before* issuance of any SWIP notification letters and/or compliance orders which may be appealable. It also is recommended that all correspondence regarding SWIP be sent to the system via certified mail. Each of these documents may be customized to fit the particular circumstances surrounding the incident. Portions of the documents may indicate specific information to insert, or that a particular paragraph is optional.

It is recommended that the initial notification letters be signed and sent by the regional hydrogeologists, *after conferring with the sanitarian supervisor in the district where the system is located*, since they are most familiar with the technical aspects of the SWIP monitoring. In some instances, it may be more appropriate for the sanitarian supervisor, environmental protection compliance specialist or regional environmental protection manager to sign the initial notification letter.

If a system fails to comply with the SWIP requirements, a request for enforcement action (such as a compliance order, consent order and agreement, etc.) should be referred to the regional environmental protection compliance specialist for follow up. Any additional actions beyond the initial notification letter should be coordinated between the sanitarian supervisor, regional hydrogeologist, environmental protection compliance specialist, and the regional environmental protection manager. Again, compliance orders will need attorney pre-approval, although the time for approval should be decreased by using the attached compliance order formats.

Suppliers that fail to comply with a compliance order to conduct monitoring or submit a feasibility study should be handled in a similar manner as systems which have failed to comply with orders in the past. Civil penalties and/or a petition to enforce in Commonwealth Court may be enacted.

ATTACHMENT 1

[PWS Name and Address]

Dear :

The Surface Water Treatment Rule requires that the Department of Environmental Protection (DEP) evaluate all groundwater sources serving public water systems for the direct influence of surface water on those sources. Direct influence occurs when a groundwater source is susceptible to contamination by pathogenic protozoans.

The evaluation of the state's groundwater sources is a process involving several steps. Certain sources are considered protected from potential health hazards while other sources are considered questionable based upon the source depth, geology, construction and type of source. Your source, (source name), is questionable for direct influence of surface water. Therefore, you are required to conduct special monitoring in accordance with 721 .7(J) of the Pennsylvania Safe Drinking Water Act, and Section 109.302 of DEP's rules and regulations.

The results of this monitoring will be used to evaluate the relationship of the source quality to climatic and surface water conditions. If a relationship is indicated by the source evaluation and/or the water quality monitoring, DEP will conduct sampling of the source to perform a microscopic particulate analysis. A final determination of the potential for the direct influence of surface water on the source will be made based upon all available information. If the source is under the direct influence of surface water, the supplier will need to correct any deficiencies in the source or will be required to meet the treatment requirements for a surface water source .

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in Braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

A plan detailing this monitoring must be submitted to the (regional office) by (30 days) for revision and/or approval.

If you have any questions, please contact me at the above address or telephone number.

Sincerely,

Regional Manager
Bureau of Water Supply Management

ATTACHMENT 2

CERTIFIED MAIL

[Name and address]

Re: Groundwater Source Under the Direct
Influence of Surface Water
PWSID []

Dear :

Based on the results of the special monitoring conducted at [source(s) name] during the period of [date] through [date] [add any other supporting data], the Department of Environmental Protection (DEP) has determined that [source(s) name] is under the direct influence of surface water. The following lists the basis of this determination:

[List criteria used to make influence of surface water determination]

Because [source(s) name] has been determined to be influenced by surface water, [name of system] is required, under §109.02(c)(1)(vi), to maintain a minimum residual concentration of 2.5 mg/L free chlorine (or its equivalent as approved by DEP) in the water delivered to the distribution system prior to the first customer.

In addition, [name of system] is required to submit to DEP by [date] a feasibility study which must specify the means by which [name of system] will comply with the requirement under §109.202(c)(1)(vi) to provide continuous filtration and disinfection of [name of source(s)] by [date 48 months after surface water influence determination].

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in Braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

[Prior to submission of a feasibility study, DEP may require special performance monitoring. The parameters to be monitored may be based on the results of the previous six months special monitoring and/or microscopic particulate analysis (MPA) results.]

Should you have any questions, please contact me at the above address or telephone number.

Sincerely,

Regional Hydrogeologist

ATTACHMENT 3

Commonwealth of Pennsylvania Department of Environmental Protection

In the Matter of:

[supplier] : Violation of the Pennsylvania Safe
[address] : Drinking Water Act and Regulations
[PWSID] : Regarding Monitoring to Evaluate the
Direct Influence of Surface Water
Upon a Source of Supply

Compliance Order

NOW, this [date] _____, the Commonwealth of Pennsylvania, Department of Environmental Protection (Department) makes and determines the following Findings of Fact and enters the following Order:

FINDINGS

1. The Department is the executive agency with the duty and authority to administer and enforce, *inter alia*, the Pennsylvania Safe Drinking Water Act of May 1, 1994, P.L. 206, 35 P.S. §721.1 *et seq.* ("Safe Drinking Water Act"); Section 1917-A of the Administrative Code, Act of April 9, 1929, P.L. 177, *as amended*, 71 P.S. §510-17 ("Administrative Code"), and the Rules and Regulations promulgated pursuant thereto.
2. [supplier] ("[short title]") is a [type of business]
3. [short title] is a "person" and a "public water supplier" as those terms are defined by Section 3 of the Safe Drinking Water Act, 35 P.S. §721.3. and Section 109.1 of the Safe Drinking Water Regulations, 25 Pa. Code §109.1.
4. [short title] owns and operates a "community water system", as that term is defined by Section 3 of the Safe Drinking Water Act, 35 P.S. §721.3, pursuant to Public Water Supply Permit Number [public water supply permit number].
5. The community water system owned and operated by [short title] consists of [type of facilities] facilities, which serve a population of approximately [number of people served] individuals year-round. The system uses [type of sources] sources of water, including [name(s) of all sources] .
6. Section 109.302(g) of the Safe Drinking Water Regulations, 25 Pa. Code §109.302(g), provides that to enable the Department to determine if a public water supplier is using a source directly influenced by surface water, the

Department may require a public water supplier to conduct monitoring to evaluate the direct influence of surface water upon the source of the supply .

[]. On [date notification letter received], [short title] received notification from the Department to commence special monitoring at [source(s)] in accordance with Section 109.302 of the Department's Rules and Regulations.

[]. As of the date of this Compliance Order, [short title] has failed and continues to fail to submit a monitoring plan to the Department for approval.

[]. As of the date of this Compliance Order, [short title] has failed and continues to fail to conduct special monitoring in accordance with Section 109.302 of the Department's Rules and Regulations.

ORDER

NOW, THEREFORE, pursuant to its authority under Sections 5 and 12 of the Safe Drinking Water Act, 35 P.S. §§721.5, 721.12, and Section 1917-A of the Administrative Code, 71 P.S. §510-17, the Commonwealth of Pennsylvania, Department of Environmental Protection hereby enters the following order:

[Short title] shall undertake the following acts on the following schedule in order to achieve compliance with the requirements of the Pennsylvania Safe Drinking Water Act and Regulations:

[]. Within 30 days receipt of this Order, [short title] shall submit to the Department for approval a monitoring plan for [all source name(s)] to:

Regional Hydrogeologist
Bureau of Water Supply Management
[office name] Regional Office
[address]

[]. Upon Department approval of the monitoring plan, [short title] shall commence monitoring to evaluate the direct influence of surface water upon the [name(s) of all source(s)]. Monitoring shall be conducted for a minimum of six months to include both wet and dry periods of the year. Samples shall be taken from the collection facilities of raw water before treatment, and measurements shall include the following:

1. Daily field measurement of temperature, pH, specific conductance and turbidity.
2. Daily measurement of water level, or flow, and precipitation necessary to establish climatic conditions.
3. Weekly measurements for total coliform.

4. [Other measurements as required by the department to evaluate the direct influence of surface water upon the source of the supply].

[]. Upon Department approval of the monitoring plan, [short title] shall commence to submit monthly monitoring results to the regional hydrogeologist at the address in Paragraph B. Monthly monitoring results shall be submitted to the Department within 10 days following the end of the month in which the monitoring was performed.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, (717) 787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, (800) 654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of the written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at (717) 787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

FOR THE COMMONWEALTH OF PENNSYLVANIA,
DEPARTMENT OF ENVIRONMENTAL PROTECTION:

Regional Manager
Bureau of Water Supply Management

ATTACHMENT 4

Commonwealth of Pennsylvania Department of Environmental Protection

In the Matter of:

[supplier] : Violation of the Pennsylvania Safe
[address] : Drinking Water Act and Regulations
[PWSID] : Regarding Submittal, of Feasibility
Study

Compliance Order

NOW, this [date] _____, the Commonwealth of Pennsylvania, Department of Environmental Protection (“Department”) makes and determines the following Findings of Fact and enters the following Order:

FINDINGS

1. The Department is the executive agency with the duty and authority to administer and enforce, *inter alia*, the Pennsylvania Safe Drinking Water Act of May 1, 1994, P.L. 206, 35 P.S. §721.1 *et seq.* (“Safe Drinking Water Act”); Section 1917-A of the Administrative Code, Act of April 9, 1929, P.L. 177, *as amended*, 71 P.S. §510-17 (“Administrative Code”), and the Rules and Regulations promulgated pursuant thereto.
2. [supplier] (“[short title]”) is a [type of business]
3. [short title] is a “person” and a “public water supplier” as those terms are defined by Section 3 of the Safe Drinking Water Act, 35 P.S. §721.3, and Section 109.1 of the Safe Drinking Water Regulations, 25 Pa. Code §109.1.
4. [short title] owns and operates a “community water system”, as that term is defined by Section 3 of the Safe Drinking Water Act. 35 P.S. §721.3, pursuant to Public Water Supply Permit Number [public water supply permit number].
5. The community water system owned and operated by [short title] consists of [type of facilities] facilities, which serve a population of approximately [number of people served] individuals year-round. The system uses [type of sources] sources of water, including [name(s) of all sources].
6. Section 109.202(c)(vi) of the State Drinking Water Regulations, 25 Pa. Code §109.202(c)(vi), provides that for a source including springs, infiltration galleries, cribs or wells permitted for use by the Department prior to May 16, 1992, and determined by the Department to be directly influenced by surface water, the public water supplier shall:

a) Maintain a minimum residual disinfectant concentration in the water delivered to the distribution system prior to the first customer in accordance with Section 109.202(c)(1)(iii)(A) of the Safe Drinking Water Regulations, 25 Pa. Code §109.202(c)(1)(iii)(A).

b) Provide continuous filtration and disinfection in accordance with Section 109.202(c) of the Safe Drinking Water Regulations, 25 Pa. Code §109.202(c), within 48 months after the Department determines the source of supply is directly influenced by surface water.

c) Submit to the Department for approval a feasibility study within one year after the Department determines the source of supply is directly influenced by surface water.

7. On [date of surface-water influence notification], [short title] was notified by the Department that [source(s)] was determined to be under the direct influence of surface water.

[]. On [date notified to maintain residual], [short title], was notified by the Department to maintain a minimum residual concentration of 2.5 mg/L free chlorine (or its equivalent as approved by the Department) in the water delivered to the distribution system prior to the first customer.

[]. On [date notified to submit feasibility study], [short title] was notified to submit a feasibility study to the Department which specifies the means by which [short title] will comply with the requirement to provide continuous filtration and disinfection of [name of source(s)] by [date 48 months after surface water influence determination].

[]. As of the date of this Compliance Order, [short title] has failed and continues to fail to maintain a minimum residual concentration of 2.5 mg/L free chlorine (or its equivalent as approved by the Department) in the water delivered to the distribution system prior to the first customer.

[]. As of the date of this Compliance Order, [short title] has failed to submit a feasibility study which specifies the means by which [short title] will comply with the requirement to provide continuous filtration and disinfection of [name of source(s)] by [date 48 months after surface water influence determination].

ORDER

NOW, THEREFORE, pursuant to its authority under Sections 5 and 12 of the Safe Drinking Water Act, 35 P.S. §§721.5, 721.12, and Section 1917-A of the Administrative Code, 71 P.S. § 510-17 the Commonwealth of Pennsylvania Department of Environmental Protection hereby enters the following order:

[Short title] shall undertake the following acts on the following schedule in order to achieve compliance with the requirements of the Pennsylvania Safe Drinking Water Act and Regulations:

[]. By [date], [short title] shall maintain a minimum residual concentration of 2.5 mg/L free chlorine (or its equivalent as approved by the Department) in the water delivered to the distribution system prior to the first customer.

[]. By [date], [short title] shall submit to the Department for approval a feasibility study which shall specify the means by which [short title] shall achieve compliance with the requirements to provide continuous filtration and disinfection of [name of source(s)] by [date 48 months after surface water influence determination]. The feasibility study shall be directed to:

Regional Environmental Protection Manager
Bureau of Water Supply Management
[office name] Regional Office
[address]

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, (717) 787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, (800) 654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of the written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at (717) 787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

FOR THE COMMONWEALTH OF PENNSYLVANIA,
DEPARTMENT OF ENVIRONMENTAL PROTECTION:

Regional Manager
Bureau of Water Supply Management