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INITIAL DISTRIBUTION SYSTEM EVALUATION GUIDANCE MANUAL

FOR THE FINAL STAGE 2 DISINFECTANTS AND DISINFECTION BYPRODUCTS RULE

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Note on the Initial Distribution System Evaluation Guidance Manual for the Final Stage 2 Disinfectants and Disinfection Byproducts Rule

Purpose:

The purpose of this guidance manual is solely to provide technical information for water systems and states to assist them in complying with the Initial Distribution System Evaluation (IDSE), a component of the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR). This guidance is not a substitute for applicable legal requirements, nor is it a regulation itself. Thus, it does not impose legally-binding requirements on any party, including EPA, states, or the regulated community. Interested parties are free to raise questions and objections to the guidance and the appropriateness of using it in a particular situation. Although this manual describes many methods for complying with IDSE requirements, the guidance presented here may not be appropriate for all situations, and alternative approaches may provide satisfactory performance. The mention of trade names or commercial products does not constitute endorsement or recommendation for use.

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Acronyms

CBI	Confidential Business Information
CWS	Community water system
DBP	Disinfection byproduct
DBPR	Disinfectants and Disinfection Byproducts Rule
EPA	U.S. Environmental Protection Agency
EPS	Extended period simulation
FOIA	Freedom of Information Act
GIS	Geographic information system
GWUDI	Ground water under the direct influence of surface water
HAA	Haloacetic acid
HAA5	The sum of five HAA species
HPC	Heterotrophic plate count
ICR	Information Collection Rule
IDSE	Initial distribution system evaluation
IPMC	Information Processing and Management Center
LRAA	Locational running annual average
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
MCL	Maximum contaminant level
M-DBP	Microbial and disinfection byproduct
NOM	Natural organic matter
NPDWR	National Primary Drinking Water Regulation
NTNCWS	Nontransient noncommunity water system
PWS	Public water system
PWSID	Public water system identification number
SDWA	Safe Drinking Water Act
SSS	System-specific study
STEP	Simple Tools for Effective Performance
SUVA	Specific ultraviolet absorbance
SWTR	Surface Water Treatment Rule
TCR	Total Coliform Rule
THM	Trihalomethane
TOC	Total organic carbon
TNCWS	Transient noncommunity water system
TTHM	Total trihalomethanes
TTHMFP	Total trihalomethane formation potential
UV	Ultraviolet light
VSS	Very small system

Definitions

Aquifer: a geological formation composed of rock, gravel, sand, or other porous material that yields water to wells or springs.

Biodegradation: a biological process where HAA5s are broken down into smaller compounds by microbes.

Booster disinfection: the practice of adding disinfectant in the distribution system to maintain disinfectant residual concentration throughout the distribution system.

Combined distribution system: the interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive finished water. 40 CFR 141.2

Community water system: a public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents. 40 CFR 141.2

Consecutive system: a public water system that receives some or all of its finished water from one or more wholesale systems. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems. 40 CFR 141.2

Disinfectant: any oxidant, including but not limited to chlorine, chlorine dioxide, chloramines, and ozone added to water in any part of the treatment or distribution process, that is intended to kill or inactivate pathogenic microorganisms. 40 CFR 141.2

Disinfectant residual concentration: the concentration of disinfectant that is maintained in a distribution system. Disinfectant could be free chlorine (the sum of the concentrations of hypochlorous acid (HOCl) and hypochlorite (OCl^-)) or combined chlorine (chloramines). It is used in Surface Water Treatment Rule as a measure for determining CT.

Disinfection: a process which inactivates pathogenic organisms in water by chemical oxidants or equivalent agents. 40 CFR 141.2

Disinfection byproduct (DBP): compound formed from the reaction of a disinfectant with organic and inorganic compounds in the source or treated water during disinfection and distribution.

Dual Sample set: a set of two samples collected at the same time and same location, with one sample analyzed for TTHM and the other sample analyzed for HAA5. Dual sample sets are collected for the purpose of conducting an IDSE under subpart U and determining compliance with the TTHM and HAA5 MCLs under subpart V. 40 CFR 141.2

Entry Point: the point(s) where finished water first enters the distribution system from one or more sources. Samples taken at these points represent minimum residence time in the distribution system.

Finished Water: water that is introduced into the distribution system of a public water system and is intended for distribution and consumption without further treatment, except as treatment necessary to maintain water quality in the distribution system (e.g., booster disinfection, addition of corrosion control chemicals). 40 CFR 141.2

GAC10: granular activated carbon filter beds with an empty-bed contact time of 10 minutes based on average daily flow and a carbon reactivation frequency of every 180 days, except that the reactivation frequency for GAC10 used as a best available technology for compliance with subpart V MCLs under §141.64(b)(2) shall be 120 days. 40 CFR 141.2

GAC20: granular activated carbon filter beds with an empty-bed contact time of 20 minutes based on average daily flow and a carbon reactivation frequency of every 240 days. 40 CFR 141.2

Ground water system: public water systems that use ground water only or purchase ground water from other systems (40 CFR 141.2). For the purposes this guidance manual, ground water systems refers to the subset of systems that disinfect their water, or purchase disinfected ground water, even if they do not apply any additional treatment.

Ground water under the direct influence of surface water (GWUDI): any water beneath the surface of the ground with significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia*, or *Cryptosporidium*, or significant and relative rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions. Direct influence must be determined for individual sources in accordance with criteria established by the State. The State determination of direct influence may be based on site-specific measurements of water quality and/or documentation of well construction characteristics and geology with field evaluation. 40 CFR 141.2

Haloacetic acid (HAA): one of the family of organic compounds named as a derivative of acetic acid, wherein one to three hydrogen atoms in the methyl group in acetic acid are each substituted by a halogen atom (namely, chlorine and bromine) in the molecular structure.

Haloacetic acids (five) (HAA5): the sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition. 40 CFR 141.2

Heterotrophic plate count (HPC): a procedure for estimating the number of heterotrophic bacteria in water, measured as the number of colony forming units per 100 mL.

Information Processing and Management Center (IPMC): a receiving, processing, and mailing facility with a web-based data management system that allows EPA and states to access, track, and respond to IDSE submissions.

Influence zone: the portions of the distribution system supplied with water from a particular source of supply.

Locational running annual average (LRAA): the average of sample results taken at a particular monitoring location during the previous four calendar quarters. 40 CFR 141.2

Maximum contaminant level (MCL): the maximum permissible level of a contaminant in water which is delivered to any user of a public water system. 40 CFR 141.2

Maximum contaminant level goal (MCLG): the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. Maximum contaminant level goals are nonenforceable health goals. 40 CFR 141.2

Mixing Zone: an area in the distribution system where water flowing from two or more different sources blend.

Monitoring site: the location where samples are collected.

Non-community water system: a public water system that is not a community water system. A non-community water system is either a “transient non-community water system (TNCWS)” or a “non-transient non-community water system (NTNCWS) 40 CFR 141.2

Non-transient non-community water system (NTNCWS): a public water system that is not a community water system and that regularly serves at least 25 of the same persons over 6 months per year. 40 CFR 141.2

Population served: the retail number of people served by a water system. Systems typically work with their State to determine population served for compliance purposes. Note that IDSE and Stage 2 compliance monitoring requirements (e.g., number of samples and sampling frequency) are based on the population served by the water system. IDSE and Stage 2 compliance monitoring schedules, however, are based on the largest population served by systems in the combined distribution system. If you do not know the population of your system, ask your state.

Public water system (PWS): a system for the provision to the public of water for human consumption through pipes or, after August 5, 1998, other constructed conveyances, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year. Such term includes: any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system; and any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. Such term does not include any “special irrigation district.” A public water system is either a “community water system” or a “noncommunity water system. 40 CFR 141.2

Residence time: the time period lasting from when the water is treated to a particular point in the distribution system. Also referred to as water age.

Residual disinfection: also referred to as "secondary disinfection." The process whereby a disinfectant (typically Chlorine or Chloramines) is added to finished water in order to maintain a disinfection residual in the distribution system.

State: the agency of the State or Tribal government which has jurisdiction over public water systems. During any period when a State or Tribal government does not have primary enforcement responsibility pursuant to Section 1413 of the Safe Drinking Water Act, the term "State" means the Regional Administrator, U.S. Environmental Protection Agency. 40 CFR 141.2

Subpart H systems: public water systems using surface water or ground water under the direct influence of surface water as a source that are subject to the requirements of 40 CFR 141.2 (H). 40 CFR 141.2

Surface water: all water which is open to the atmosphere and subject to surface runoff. 40 CFR 141.2

Total chlorine residual: the sum of combined chlorine (chloramine) and free available chlorine residual.

Total trihalomethanes (TTHM): the sum of the concentration in milligrams per liter of the trihalomethane compounds (trichloromethane [chloroform], dibromochloromethane, bromodichloromethane, and tribromomethane [bromoform]), rounded to two significant figures. 40 CFR 141.2

Tracer study: a procedure for estimating hydraulic properties of the distribution system, such as residence time. Where more than one water source feeds the distribution system, tracer studies can be used to determine the zone of influence of each source.

Transient Non-Community Water System (TNCWS): a non-community water system that does not regularly serve at least 25 of the same persons over six months per year. 40 CFR 141.2

Trihalomethane (THM): one of the family of organic compounds named as derivatives of methane, wherein three of the four hydrogen atoms in methane are each substituted by a halogen atom in the molecular structure. 40 CFR 141.2

Water distribution system model: a computer program that can simulate the hydraulic, and in some cases, water quality behavior of water in a distribution system.

Wholesale system: a public water system that treats source water as necessary to produce finished water and then delivers some or all of that finished water to another public water system. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems. 40 CFR 141.2

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1.0 Introduction

This chapter covers:

1.1 Getting Started (*Read this Section First*)
1.2 Overview of IDSE Options
1.3 IDSE Schedule
1.4 Early Implementation Process
1.5 Changes to IDSE Requirements Since the Proposed Stage 2 DBPR

The Administrator of the EPA signed the Stage 2 Disinfectants and Disinfection Byproducts Rule (DBPR) on December 15, 2005, and it was published in the Federal Register on January 4, 2006 (71 FR 388). This rule applies to all community and non-transient noncommunity water systems that provide disinfected water (other than water disinfected only by Ultraviolet [UV] light) to their customers. The rule has two primary sections. Subpart U is referred to as the Initial Distribution System Evaluation (IDSE) section. The requirements of this part of the rule are discussed in this manual. Subpart V, the Stage 2 Disinfection Byproducts Requirements, is referred to as Stage 2 Compliance Monitoring in this guidance manual. Stage 2 Compliance Monitoring Requirements are an extension of the Stage 1 DBPR. Note that systems that are exempt from the IDSE portion of the rule may not be exempt from the Stage 2 Compliance Monitoring section.

EPA developed this **Initial Distribution System Evaluation Guidance Manual** to help systems meet the IDSE requirements of the Stage 2 DBPR. System personnel should start by reading Section 1.1 to answer basic questions about the IDSE, select the appropriate guidance materials to meet IDSE requirements, and get instructions on how to use this manual.

1.1 Getting Started

Read this Section First

1.1.1 What is the IDSE? What is its purpose?

IDSEs are an important part of the Stage 2 DBPR. They are one-time studies conducted by water systems to identify distribution system locations with high concentrations of trihalomethanes (THMs) and haloacetic acids (HAAs). Water systems will use results from the IDSE, in conjunction with their Stage 1 DBPR compliance monitoring data, to select compliance monitoring locations for the Stage 2 DBPR.

1.1.2 Do I have to conduct an IDSE?

You are subject to the IDSE requirements of the Stage 2 DBPR if you meet the following criteria:

- You use a primary or residual disinfectant other than ultraviolet light (UV), or you are a consecutive system that delivers water that has been treated with a primary or residual disinfectant other than UV.

AND

- You are a community water system (CWS) of any size, or you are a non-transient non-community water system (NTNCWS) that serves $\geq$ 10,000 people.

IDSE requirements do not apply to NTNCWSs serving fewer than 10,000 people, although these systems have other requirements under the Stage 2 DBPR. Transient non-community water systems (TNCWSs) *are not* subject to any part of the Stage 2 DBPR.

There are **four options** systems can use to comply with the IDSE requirements of the Stage 2 DBPR:

- Qualify for a Very Small System (VSS) Waiver
- Meet 40/30 Certification requirements
- Conduct a System Specific Study (SSS) using existing monitoring results or a distribution system hydraulic model
- Conduct Standard Monitoring

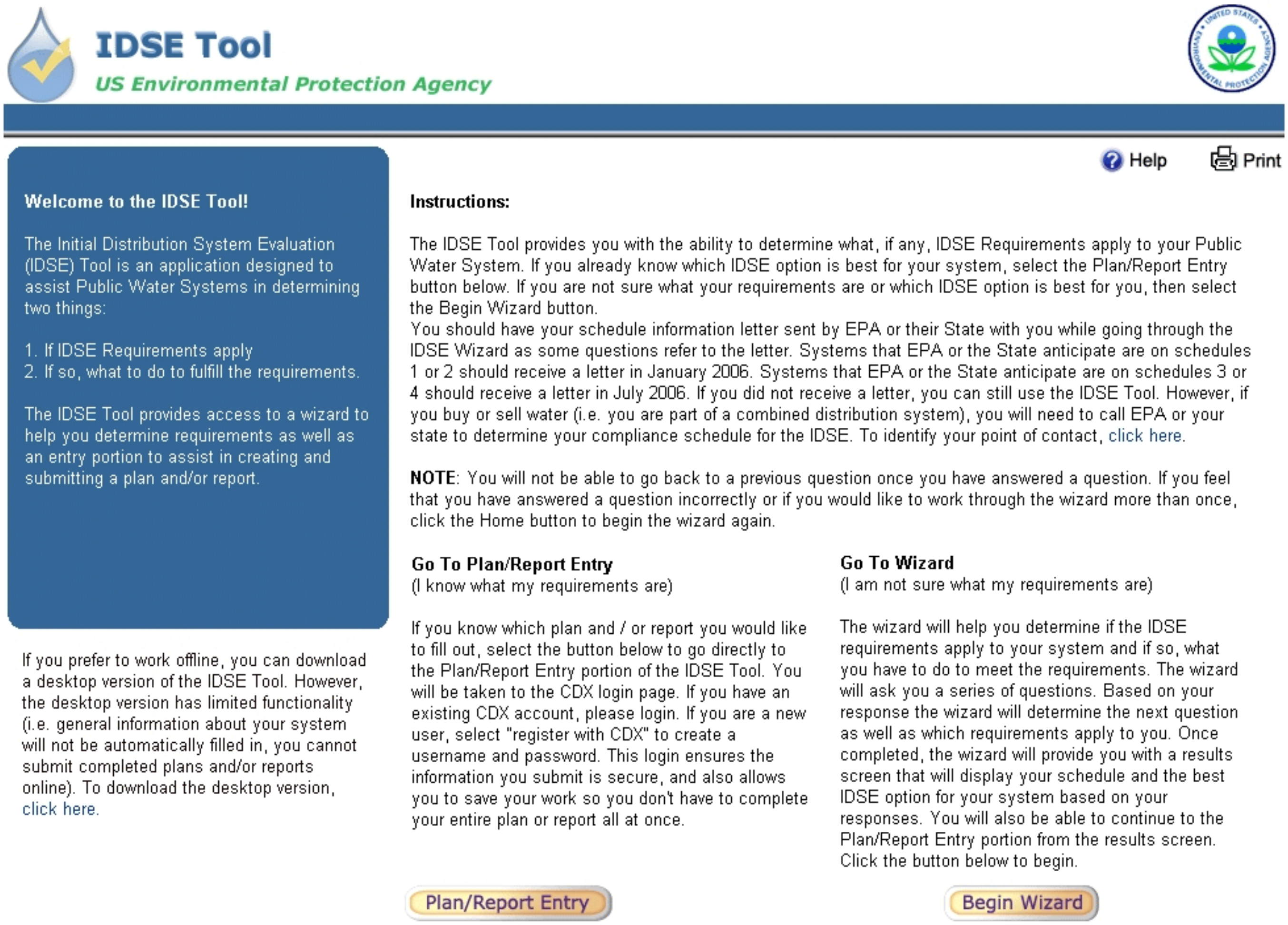
The four options are described briefly in Section 1.2 of this chapter, with further details provided in the remainder of this guidance manual.

1.1.3 What guidance materials are available for the IDSE?

EPA has developed two guidance manuals and an on-line tool to help you comply with the IDSE requirement. This manual is comprehensive and includes IDSE requirements and technical guidance for all system sizes and types and all IDSE options, designed for easy access to specific modules. The second manual, entitled the *Initial Distribution System Evaluation Guide for Systems Serving < 10,000 People*, is targeted to smaller systems and focuses on information they are most likely to use. It provides examples to help smaller systems as they proceed with satisfying IDSE requirements. It does not, however, discuss the IDSE SSS options.

EPA has also developed the **IDSE Tool,** available on-line at http://www.epa.gov/safewater/disinfection/stage2 and on CD. The IDSE tool walks systems through the entire IDSE process, and it can be used in place of the IDSE guidance manuals. It contains a **Wizard** you can use to determine your requirements and select the best IDSE option for your system. The tool then creates **Custom Forms** for your system size and type that can be submitted electronically for EPA or state review. See Section 1.4 for more information. Exhibit 1.1 shows the IDSE Tool home page.

Exhibit 1.1 IDSE Tool Home Page



The *IDSE Guidance Manual*, the *IDSE Guide for Systems Serving < 10,000 People*, and the IDSE Tool address only IDSE requirements and DO NOT cover other provisions of the Stage 2 DBPR. For additional guidance on implementing the Stage 2 DBPR, you can refer to the following EPA materials:

- *The Stage 2 DBPR Quick Reference Guide*
- *Stage 2 Disinfectant and Disinfection Byproducts Rule: Small Entity Compliance Guide – One of the Simple Tools for Effective Performance (STEP) Guide Series (draft version)*

EPA will be releasing draft versions of additional Stage 2 DBPR guidance manuals soon, including *The Consecutive Systems Guidance Manual, The Simultaneous Compliance Guidance Manual*, and *The Operational Evaluation Guidance Manual.* Your state may have additional, state-specific materials to assist you in complying with the Stage 2 DBPR.

1.1.4 How can I get copies of EPA guidance materials?

- You can download guidance manuals and fact sheets from EPA's Web site at http://www.epa.gov/safewater/disinfection/stage2.

- You can call the Safe Drinking Water Hotline at 1-800-426-4791

- You can call the National Service Center for Environmental Publications at 1-800-490-9198 or visit their Web site at http://www.epa.gov/ncepihom.

Also, you may wish to contact your state drinking water program office for additional guidance.

1.1.5 How do I use this guidance manual?

To help you find information quickly, EPA has designed this manual in a **modular format**. While Chapters 1 and 2 contain information for all systems, Chapters 3, 4, 5, 6 and 7 each contain comprehensive requirements for a specific IDSE option. Appendices are organized similarly. The first three appendices include general information for all systems. Appendix D addresses consecutive and wholesale system issues. Appendices E through H provide examples for specific IDSE options. Exhibit 1.2 shows which chapters and appendices you should use for the different IDSE options.

EPA recommends that once you have read the introductory materials in Chapter 1, you use the **flowchart in Chapter 2** to determine the best IDSE option for your system. Then you can go to the chapter and appendices addressing your IDSE option and skip the rest of the manual. If you are accessing this guidance manual electronically, you can download only those chapters and appendices that you need to build a custom manual for your system.

Remember that **the IDSE Tool does these steps for you**. The IDSE Tool Wizard asks questions about your system and, based on your answers, extracts the appropriate requirements summary sheet and guidance manual material.

IDSE Tool

Chapter 2 contains **requirements summary sheets** for each IDSE option and compliance schedule. These sheets contain compliance deadlines for IDSE submissions and other important information. EPA recommends that you make a copy of your requirements summary sheets (or if you are accessing the manual electronically, print them out) and keep them handy throughout the IDSE process.

Exhibit 1.2a IDSE Guidance Manual Chapters and Appendices

Chapters

1 Introduction

2 Determining Your IDSE Schedule and Option

3* Very Small System Waiver

4* 40/30 Certification

5* System Specific Study Using Existing Monitoring Results

6* System Specific Study Using a Distribution System Hydraulic Model

7* Standard Monitoring

Appendices

A Factors Affecting DBP Formation

B Stage 2 DBPR and LT2ESWTR Compliance Schedule

C TTHM and HAA5 Sampling Protocol

D Consecutive and Wholesale System Issues

E Example System Specific Study using Existing Monitoring Results for a Surface Water System Serving 40,000 People

F Example System Specific Study Using a Hydraulic Model for a Surface Water System Serving 55,000 People

G Complex Modeling Analysis Example for a System with Multiple Sources

H Example IDSE Standard Monitoring Plan and Report for a Surface Water System Serving 160,000 People

I Example IDSE Standard Monitoring Plan and Report for a Ground Water System Serving 200,000 People

* You need **one** of these Chapters for the IDSE

Exhibit 1.2b Building a Custom IDSE Guidance Manual for Your System

All Systems	Chapter 1 Chapter 2 Appendix A Appendix B

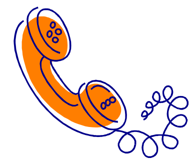
PLUS

Systems qualifying for the VSS Waiver	Chapter 3
Systems qualifying for 40/30 Certification	Chapter 4
Systems conducting an SSS using existing monitoring results	Chapter 5 Appendix E
Systems conducting an SSS using a model	Chapter 6 Appendix C Appendix F Appendix G
Systems conducting standard monitoring	Chapter 7 Appendix C Appendix H Appendix I

PLUS

Consecutive and wholesale systems only	Appendix D

1.1.6 Whom do I call with questions?



Because compliance activities begin soon after the Stage 2 DBPR is finalized, EPA and states will be working together to implement the IDSE. In some cases, EPA will be your main point of contact during the first phases of the IDSE. In other cases, your state will be your main point of contact.

To identify your point of contact for the IDSE, visit EPA's website at http://www.epa.gov/safewater/disinfection/stage2. The website contains a list of contact numbers for the IDSE by state. You can also call the EPA SDWA hotline at 1-800-426-4791 for this information. Refer to Section 1.4 of this chapter for more information on how the IDSE will be implemented.

1.2 Overview of IDSE Options

There are four options available to systems to meet IDSE requirements. Your option will depend on your technical resources, existing monitoring results, size, and preference. The four options are described briefly below, with further details provided in the remainder of this guidance manual.

- **Very Small System (VSS) Waiver**. Systems serving fewer than 500 people that have TTHM and HAA5 data automatically receive the VSS waiver unless they are notified by EPA or their state that they must conduct an IDSE. Systems receiving the VSS waiver have no further IDSE requirements.

- **40/30 Certification**. Systems can fulfill the IDSE requirements by certifying that all individual TTHM and HAA5 monitoring results for compliance with the Stage 1 DBPR are less than or equal to 0.040 mg/L for TTHM and 0.030 mg/L for HAA5 during a prescribed 2-year time period. In addition, the system must not have had any Stage 1 DBPR monitoring violations for TTHM and HAA5 during the same period. The system must submit the required 40/30 certification and, unless told otherwise by EPA or their state, they have no further requirements under the IDSE.

- **System Specific Study (SSS)**. Systems can meet IDSE requirements using existing monitoring results or a distribution system hydraulic model if their data or model meet certain minimum criteria. Systems conducting an SSS must prepare an SSS plan and IDSE report. Existing monitoring requirements were developed to be equivalent to standard monitoring.

- **Standard Monitoring**. Any system can choose to conduct standard monitoring, even if they receive a VSS, qualify for the 40/30 certification, or have enough data to conduct an SSS. Standard monitoring entails 1 year of distribution system monitoring at multiple locations (in addition to Stage 1 DBPR monitoring). The required sampling frequency and minimum number of sample locations depend on population served and source water type. Systems conducting standard monitoring must prepare a standard monitoring plan and IDSE report.

1.3 IDSE Schedule

IDSE activities begin soon after the Stage 2 DBPR is finalized. Appendix B provides the overall schedule for the Stage 2 DBPR and Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) to show how the IDSE fits into the overall compliance schedule for both rules. Exhibit 1.3 shows a more detailed schedule for IDSE activities only. Note that the schedule is staggered by system size, and that the schedule for **consecutive and wholesale systems** is based on the population served by the largest system in the combined distribution system. Guidance for determining your schedule is in Chapter 2.

1.4 Early Implementation Process

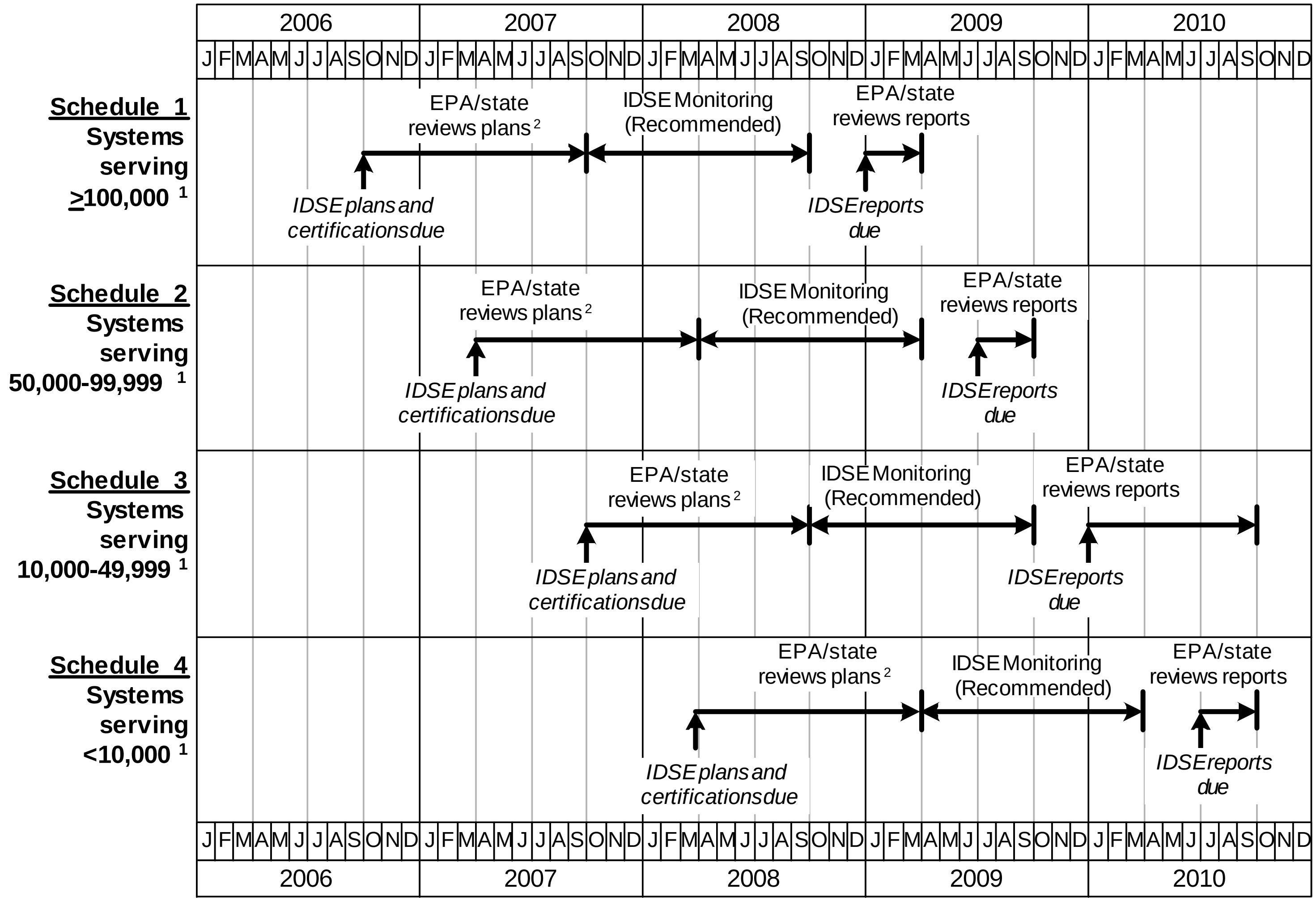
Because IDSE activities begin soon after the Stage 2 DBPR is finalized, EPA and states will be working together to implement the IDSE. To facilitate review and processing of IDSE submissions, EPA has created the **Information Processing and Management Center (IPMC)**. The IPMC is both a receiving facility and a web-based data management system that allows EPA and states to access, track, and respond to IDSE submissions.

The IPMC is password protected and accessible only by EPA and state drinking water representatives. IDSE submissions will not, however, be considered confidential business information (CBI) and are subject to the Freedom of Information Act (FOIA). ***Therefore, your IDSE submissions should not contain information that poses a security risk to your system.*** Chapters 5, 6, and 7 of this manual provide guidelines on the kinds of information you may want to exclude from your distribution system schematic for security reasons.

One advantage of the IPMC is that it provides a one-stop location for IDSE submissions. Regardless of whether EPA or your state is reviewing your IDSE materials, all submissions go to the same address. See Exhibit 1.4 on page 1-10 for ways in which you can submit IDSE materials to the IPMC. EPA and/or your state will review your IDSE plan and report. If they have concerns regarding your submission, they will work with you to resolve those issues during the one year review period.

If you have questions during the IDSE, you should visit EPA's website at http://www.epa.gov/safewater/disinfection/stage2 to determine the contact name and phone number for the IDSE for your state. You can also call the Safe Drinking Water Hotline at 1-800-426-4791 for this information.

Exhibit 1.3 Staggered Schedule for the IDSE



[1] For consecutive and wholesale systems, the schedule is based on the population served by the largest system in a combined distribution system.
[2] Communication with the system is included in the EPA/state review period.

Exhibit 1.4 Options for Submitting IDSE Material to EPA and States Through the IPMC[1]

Option 1	Option 2	Option 3
Use the **IDSE Tool** to submit completed certifications, plans and reports electronically	Mail paper copies of submissions to: STAGE 2 DBPR US EPA-IPMC P O Box 98 Dayton, OH 45401-0098	E-mail electronic submissions as attachments to: *stage2mdbp@epa.gov*

Notes:
1. You can use one of these three options to submit IDSE materials to the IPMC.

The IPMC accepts a variety of electronic formats:

- Adobe PDF file (*.pdf)
- Microsoft Word (*.doc)
- WordPerfect (*.wpd)
- Image files (*.gif, *.bmp, *.jpg, *.jpeg)
- Microsoft Excel (*.xls)
- Text file (*.txt)

1.5 Changes to IDSE Requirements Since the Proposed Stage 2 DBPR

Several changes have been made to the IDSE requirements since the publication of the proposed Stage 2 DBPR on August 18, 2003. Many of these changes are in response to public comment received on the proposed rule and are intended to facilitate implementation. These changes, which are discussed in more detail below, include:

- Change from plant-based to population-based monitoring for all systems
- Change in definition of consecutive systems
- Staggered IDSE schedule
- Changes to VSS waivers
- Change in 40/30 requirements
- Clarification to the IDSE SSS option
- Elimination of Stage 2A

Change from plant-based to population-based monitoring for all systems

The Stage 2 DBPR proposal included population-based monitoring requirements for consecutive systems that purchase all of their water. For all other systems, plant-based monitoring requirements were proposed. The plant-based approach, consistent with Stage 1 DBPR compliance monitoring requirements, is grounded in the assumption that larger systems have more treatment plants and thus greater system complexity. While this is generally true, the plant-based approach created disproportionately burdensome monitoring requirements for some systems where the number of plants did not correlate with system size, such as larger systems with only a few very large plants or smaller systems with many disinfecting wells. Moreover, a plant-based approach can complicate monitoring of purchased water systems, particularly complex ones with multiple connections.

For these reasons, EPA has developed population-based compliance monitoring requirements for all systems for the final Stage 2 DBPR. EPA believes that the new population-based approach makes monitoring requirements simpler and more equitable for systems of the same size and type.

Change in definition of consecutive system

For the Stage 2 DBPR proposal, the definition for consecutive systems specified the minimum length of time (60 days) a system must receive water from a wholesale system to be considered a consecutive system. EPA received public comments on this definition. Several commenters expressed concerns with including a time period of water delivery that defined whether a system was a consecutive system or wholesale system. This change was also made due to the change to population based monitoring because it is no longer necessary to define consecutive system entry points as it was under plant based monitoring. EPA has dropped this requirement from the final rule and has provided some flexibility for states to determine which systems are part of a combined distribution system (without presenting a time criterion).

Staggered IDSE schedule

EPA has modified the proposed compliance schedule to stagger deadlines for CWSs and NTNCWSs serving 10,000 to 99,999 people to allow for a more evenly distributed workload and greater opportunity for EPA and state involvement. The final compliance schedule includes a formal review period for EPA and/or state review of IDSE plans and 40/30 certifications as well as IDSE reports. The staggered schedule also provides time for analytical laboratories to build up capacity as necessary to accommodate the sample analysis needs of systems. The new IDSE plan and IDSE report submission dates are shown in Exhibit 1.3. It is important to note that, as in the proposal, smaller systems may have to comply on an earlier schedule than indicated for their individual system size if they are part of a combined distribution system that includes a large system. This is discussed further in Chapter 2.

Changes to VSS waivers

The final rule grants a waiver from the IDSE requirements to community water systems serving fewer than 500 people that have taken TTHM and HAA5 samples. This provision was changed from the proposal to reflect that most small systems have sampling locations that are representative of both high TTHM and high HAA5 because they have small and simple distributions systems. In addition, many very small systems are ground water systems which typically have stable DBP levels (ground water systems tend to have lower DBP levels than surface water systems). EPA recognizes, however, that there may be some small systems with extended or complex distribution systems that should be studied further to determine new sampling locations. For this reason, EPA or a state can contact a very small system and require them to conduct an IDSE.

Change in 40/30 requirements

The reporting requirements for the 40/30 certification option have been reduced from the requirements in the proposed Stage 2 DBPR. In the proposal, systems qualifying for the 40/30 certification were required to submit all qualifying data and provide recommendations for Stage 2 compliance monitoring locations. The final rule requires systems to submit a certification that their data meets all the requirements of the 40/30 certification and to include their Stage 2 compliance monitoring recommendations in their Stage 2 compliance monitoring plan. These changes were made to reduce the reporting burden on systems that qualify for the 40/30 certification and to maintain consistency with monitoring plan requirements under the Stage 1 DBPR. This approach also gives systems more time to select appropriate monitoring sites for Stage 2 compliance monitoring. EPA or the state may request systems to submit the data, a distribution system schematic, and/or recommendations for Stage 2 compliance monitoring as part of the 40/30 certification.

Clarification to the IDSE SSS option

The final rule includes more specific requirements than the proposal regarding how systems can use distribution system hydraulic models and existing monitoring results for the IDSE SSS. This change was made to help systems better understand expectations under this provision and lessen the chances of an SSS plan not being approved. The new modeling requirements reflect that distribution system hydraulic models can appropriately identify monitoring locations by predicting water age in distribution systems if they meet certain minimum requirements. Existing monitoring results requirements are equivalent to Standard Monitoring requirements, except they apply to data already collected.

Elimination of Stage 2A

The Stage 2 DBPR proposal included a phased-in approach to calculating compliance with MCLs using a Locational Running Annual Average (LRAA), referred to as Stage 2A and Stage 2B which coincided with the IDSE period. EPA received public comments that found this confusing, and this provision is no longer in the final rule. What was referred to in the proposal as Stage 2B compliance monitoring is now referred to as Stage 2 Compliance Monitoring.

2.0 Determining Your IDSE Schedule and Option

This chapter covers:

2.1 System Characteristics that Affect IDSE Requirements

Your IDSE schedule, option, and other requirements depend on your system characteristics. In general, there are three system characteristics that drive IDSE requirements:

- Whether you are a subpart H system or a ground water system.
- The population served by your system.
- If you are a consecutive or wholesale system, the population served by the largest system in your combined distribution system.

Regulatory definitions for subpart H systems, consecutive systems, wholesale systems, and combined distribution systems are provided in the **definitions section** at the beginning of this guidance manual. Appendix D provides additional discussion of important definitions for consecutive and wholesale systems.

2.2 Determining Your IDSE Schedule

EPA has established four IDSE compliance schedules, shown graphically in Exhibit 1.3 and summarized in the table in Exhibit 2.1. If you are a ***consecutive or wholesale system***, your schedule is based on the population served by the largest system in your ***combined distribution system***. If you are not a consecutive or wholesale system, your schedule is based on the population served by your individual system. EPA and your state have worked together to identify which systems are part of combined distribution systems.

Exhibit 2.1 IDSE Schedule Number

If you are this kind of system:	*You are on IDSE schedule number*	*Your first deadline is*
Systems serving 100,000 or more people OR belonging to a combined distribution system in which the largest system serves 100,000 people or more	1	October 1, 2006
Systems serving 50,000 to 99,999 people OR belonging to a combined distribution system in which the largest system serves 50,000 to 99,999 people	2	April 1, 2007
Systems serving 10,000 to 49,999 OR belonging to a combined distribution system in which the largest system serves 10,000 to 49,999 people	3	October 1, 2007
Systems serving fewer than 10,000 people and not belonging to a combined distribution system in which any system serves 10,000 people or more	4	April 1, 2008

Every system that is subject to the Stage 2 DBPR should receive a **letter** from EPA or the state with information on the Stage 2 DBPR and a determination of IDSE schedule (i.e., schedule 1, 2, 3, or 4). Exhibit 2.2 is an example of a letter sent by EPA to a system on schedule 1. Letters from states and letters to systems on other schedules look similar. Systems that EPA or the state anticipates are on schedules 1 and 2 should receive a letter in February 2006. Systems that EPA or the state anticipates are on schedules 3 and 4 should receive a letter in July 2006. States determined your schedule based on their records on your population served and connections to other systems. You should make sure the schedule determination in the letter is consistent with your system size, source water type, and buying / selling relationships with other systems before proceeding.

Some systems may be planning treatment changes before, during, or after the IDSE. Most treatment plant modifications should not impact the relative formation of DBPs in your distribution system. There are no provisions in the Stage 2 DBPR that allow the IDSE schedule to be changed or delayed[1]. Not meeting the IDSE compliance deadlines in your requirements summary sheets results in a Tier 3 monitoring and reporting violation for your system.

[1] The Stage 2 DBPR contains provisions that allow systems to modify their Stage 2 DBPR compliance monitoring plan after their IDSE has been completed. Systems should work with their state if they believe that their Stage 2 compliance monitoring sites should be changed after their IDSE is completed.

Exhibit 2.2 Example Letter from EPA to System on Schedule 1

System Name
System Address
City State Zip

January 31, 2006

★★★ Important New Rule Roll Out ★★★
Stage 2 Disinfectants and Disinfection Byproduct Rule (Stage 2 DBPR)

This letter applies to those systems serving 100,000 or more people OR those systems in which the largest system in their combined distribution system serves 100,000 or more people. These systems may also be referred to as Schedule 1 systems.

This letter is the third in a series of communications to inform you of the Stage 2 DBPR requirements. The Rule was published in the *Federal Register* on January 4, 2006. The Stage 2 DBPR builds on existing regulations by requiring water systems to meet disinfection byproduct maximum contaminant levels (MCLs) **at each disinfection byproduct monitoring site in the distribution system** to better protect public health. All community water systems (CWSs) and non-transient noncommunity water systems (NTNCWSs) that use or deliver water treated with a primary or residual disinfectant other than ultraviolet light are subject to the Stage 2 DBPR requirements. However, NTNCWS, serving less than 10,000 people do not have to comply with the Initial Distribution System Evaluation (IDSE) requirements (see below for an explanation of IDSE). An electronic copy of the Stage 2 DBPR can be downloaded from EPA's website at www.epa.gov/safewater/disinfection/stage2.

The first major requirement of the Stage 2 DBPR is for systems to conduct an IDSE. The purpose of the IDSE is to identify locations in the distribution system that have the highest trihalomethane (TTHM) and highest haloacetic acid (HAA5) concentrations. The locations in the distribution system with the highest TTHM and highest HAA5 concentrations will be used as Stage 2 DBPR compliance monitoring sites.

EPA and State records show that your system is required to comply with Schedule 1 IDSE requirements. These requirements are based on the information that your system:

- **Serves 100,000 or more people (or those systems those systems in which the largest system in your combined distribution system serves 100,000 or more people); and**

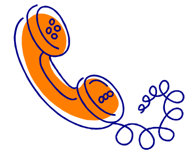
- **Provides water that has been treated with a primary or residual disinfectant other than ultraviolet light.**

If you believe our records are incorrect please notify us at stage2mdbp@epa.gov as soon as possible.

By October 1, 2006, Schedule 1 systems will have to comply with IDSE requirements by submitting a standard monitoring plan, system specific study plan, or a 40/30 certification. Systems that qualify for a very small system waiver would be exempt from this IDSE requirement.

(Continued)

Whom should I call if I don't receive my letter?



To identify your point of contact for the IDSE, visit EPA's website at http://www.epa.gov/safewater/disinfection/stage2. The website contains a list of contact numbers for the IDSE by state. You can also call the EPA SDWA hotline at 1-800-426-4791 for this information.

2.3 Determining Your IDSE Option

There are four options available to meet the requirements of the IDSE:

- Qualify for a Very Small System (VSS) Waiver
- Meet 40/30 Certification requirements
- Conduct a System Specific Study (SSS) using existing monitoring results or a hydraulic model
- Conduct Standard Monitoring

You can use the flowchart in Exhibit 2.3 and Checklists 2.1 and 2.2 to help you determine the right IDSE option for your system. Example 2.1 shows how a surface water system serving 25,000 people used the information in this chapter to determine their requirements.

The IDSE Tool works through the flowchart and checklists to determine the most suitable IDSE Option for your system. The tool is available on EPA's website at http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

2.4 IDSE Requirements Summary Sheets

EPA has prepared **Requirements Summary Sheets** that contain key information and compliance deadlines for each IDSE schedule and option. A list of requirements summary sheets and their page numbers is provided in Exhibit 2.4 and in the table of contents of this guidance manual. EPA recommends that you **make a copy of** the requirements summary sheet for your IDSE schedule and option and keep it handy throughout the IDSE process. If you are conducting an SSS or standard monitoring, make sure you also make a copy of the **Attachment** with monitoring requirements.

How does population served affect my IDSE requirements?

<u>IDSE Schedule</u>

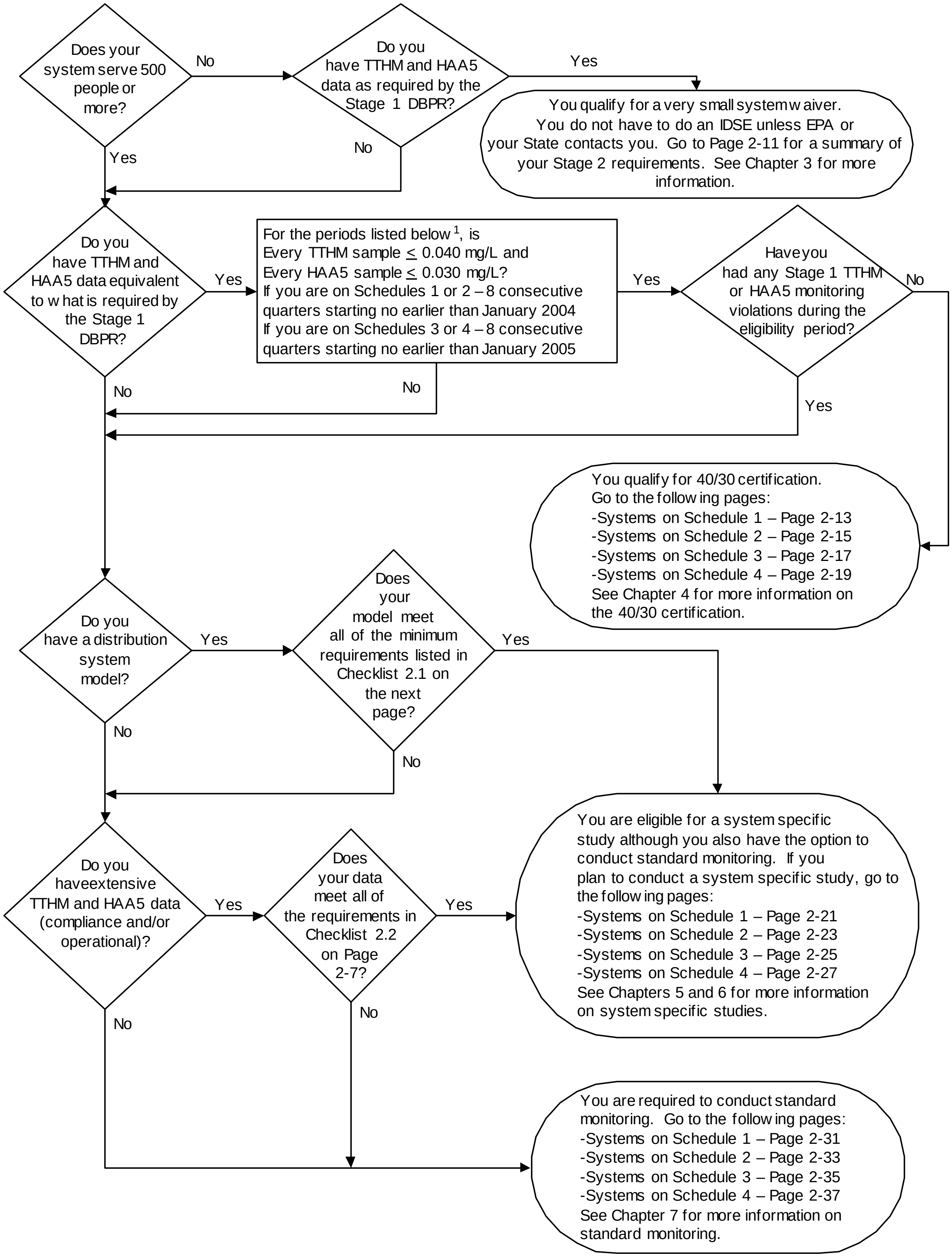
- If you are a consecutive or wholesale system, your IDSE schedule is based on the population served by the largest system in your combined distribution system and is designated in a **letter** from EPA or your state.

- If you are not a consecutive or wholesale system, your IDSE schedule is based on the population served by your system.

<u>IDSE Monitoring</u>

- For all systems, IDSE monitoring locations and sampling frequency are based on the population served by your individual system.

Exhibit 2.3 Flowchart for Determining Your IDSE Option



[1]Unless you are on reduced monitoring for Stage 1 and were not required to monitor during the specified period. If you did not monitor during the specified period, you must base your eligibility on compliance samples taken during the 12 months preceding the specified period.

Checklist 2.1 Minimum Requirements Checklist for an SSS Using a Distribution System Hydraulic Model

Yes	No	
☐	☐	Does your model run in extended period simulation?
☐	☐	Does it simulate 24-hr variation in demand and show a consistently repeating 24-hr pattern of 24-hr residence time?
☐	☐	Does your model include 75% of pipe volume?
☐	☐	Does it include 50% of pipe length?
☐	☐	Does it represent all pressure zones?
☐	☐	Does your model include all 12" diameter and larger pipes?
☐	☐	Does your model include all 8" diameter and larger pipes that connect pressure zones, influence zones from different sources, storage facilities, major demand areas, pumps, and control valves or are known or expected to be significant conveyors of water?
☐	☐	Does it include all 6" diameter and larger pipes that connect remote areas of the distribution system to the main portion of the system?
☐	☐	Are all storage facilities with standard operations represented in your model?
☐	☐	Are all active pump stations with controls represented in your model?
☐	☐	Does your model include all active control valves?
☐	☐	Has your model been calibrated (or do you have plans to complete calibration in the next 12 months) for the current configuration of the distribution system during periods of high TTHM formation potential?
☐	☐	Were all storage facilities evaluated as part of the calibration process?

If you answered yes to ***all*** *of the above questions, you meet EPA's minimum requirements for a model SSS. Remember, though, that EPA or the state can still require you to conduct standard monitoring, even if you meet the minimum requirements, or you can choose to conduct standard monitoring.*

Refer to Section 6.1 for additional guidance on minimum requirements.

Checklist 2.2 Minimum Requirements Checklist for an SSS Using Existing Monitoring Results

Yes No

☐ ☐ Do you have at least the minimum number of distribution system monitoring locations shown in the table below from which you collected TTHM and HAA5 samples?

☐ ☐ Do you have at least the minimum number of TTHM samples and HAA5 samples shown in the table below?

☐ ☐ Was each monitoring location sampled once during the month of high TTHM, high HAA5 or warmest water temperature for every 12 months of data?

☐ ☐ Were all samples collected and analyzed in accordance with an approved EPA method and by a certified laboratory?

☐ ☐ Were all sample results collected no earlier than five years prior to your SSS plan submission deadline?

☐ ☐ Have your distribution system and treatment not changed significantly since you collected your samples?

☐ ☐ Are your existing monitoring locations representative of your entire distribution system?

*If you answered yes to **all** of the above questions, you meet EPA's minimum requirements for an SSS using existing monitoring results. Remember, though, that EPA or your state can still require you to conduct standard monitoring, even if you meet the minimum requirements, or you can choose to conduct standard monitoring.*

Refer to Section 5.1 for additional guidance on minimum requirements.

Source Water Type	System Size Category (Population Served)	Minimum Number of Monitoring Locations	Minimum Number of Samples	
			TTHM	HAA5
Subpart H	<500	3	3	3
	500-3,300	3	9	9
	3,301-9,999	6	36	36
	10,000-49,999	12	72	72
	50,000-249,999	24	144	144
	250,000-999,999	36	216	216
	1,000,000-4,999,999	48	288	288
	≥5,000,000	60	360	360
Ground Water	<500	3	3	3
	500-9,999	3	9	9
	10,000-99,999	12	48	48
	100,000-499,999	18	72	72
	≥500,000	24	96	96

Example 2.1 Determining IDSE Requirements for a Consecutive System Serving 25,000 people

System X is a consecutive system serving 25,000 people. They purchase all of their water from System Y, which is a wholesale surface water system that serves their own retail population of 110,000 people. System X received a letter from their state notifying them of the new Stage 2 DBPR and stating that they are on **Schedule 1**. System X called System Y right away to confirm that they were on the same schedule.

Next, System X began working through the flowchart in Exhibit 2.3 of the IDSE guidance manual to determine their IDSE option.

- They serve more than 500 people and cannot qualify for the VSS waiver.

- Their Stage 1 DBPR monitoring results for TTHM were between 45 and 70 micrograms per liter (μg/L), so they did not qualify for the 40/30 certification.

- System X knows that System Y had been collecting TTHM and HAA5 samples from both systems for a long time. They contacted System Y and requested TTHM and HAA5 data collected from System X for the last five years. System X worked closely with System Y and determined that their existing monitoring results met the minimum requirements in Checklist 2.2. Therefore, System X selected the **SSS using existing monitoring results** as their IDSE option.

To determine which chapters of the IDSE manual they needed, System X referred to Exhibit 1.2. System X then downloaded Chapters 1, 2, and 5, and Appendices A, B, D, and E of the IDSE guidance manual from http://www.epa.gov/safewater/disinfection/stage2 to build their own custom manual. They made a copy of the requirements summary sheet titled "System Specific Study Requirements - Schedule 1" and the "System Specific Study Requirements - Attachment (For All Schedules)" sheet to keep handy throughout the IDSE process. Then they began preparing their SSS Plan.

Note: If System X had used the IDSE tool, it would have done these steps for them and created a custom form for their SSS Plan.

IDSE Tool

Exhibit 2.4 List of Requirements Summary Sheets

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Requirements for Very Small System Waivers

This summary sheet is for systems that:

- Serve fewer than 500 people, and
- Have taken TTHM and HAA5 samples.

WHAT TO DO NOW:
You have **NO** further requirements for the IDSE unless EPA or your state contacts you. If EPA or your state contacts you, they will work with you to determine an appropriate IDSE schedule for your system. See **Chapter 3** for more information.

Continue compliance monitoring for the Stage 1 DBPR until you begin compliance monitoring for the Stage 2 DBPR.

NEXT STEPS:
You must start taking Stage 2 DBPR compliance monitoring samples by the deadline listed on the next page. You must prepare a Stage 2 compliance monitoring plan before you take your first compliance sample.

If you have high levels of DBPs, you may need to make system changes to meet the requirements of the Stage 2 DBPR. See **Chapter 1, Section 1.1** of this guidance manual, for a list of additional guidance materials for the Stage 2 DBPR. If you buy water from another public water system, see EPA's *Consecutive System Guidance Manual* for more information.

Reminder:
Your requirements for Stage 2 DBPR compliance monitoring (locations and frequency) are based on the population served by your system and are listed on the next page.

Stage 2 DBPR Compliance Monitoring Deadlines

Schedule (population served)[1]	Year in Which You Must Begin Stage 2 Compliance Monitoring
Schedule 1 ($\geq$ 100,000)	2012
Schedule 2 (50,000 - 99,999)	2012
Schedule 3 (10,000 - 49,999)	2013
Schedule 4 (< 10,000)	2013 or 2014[2]

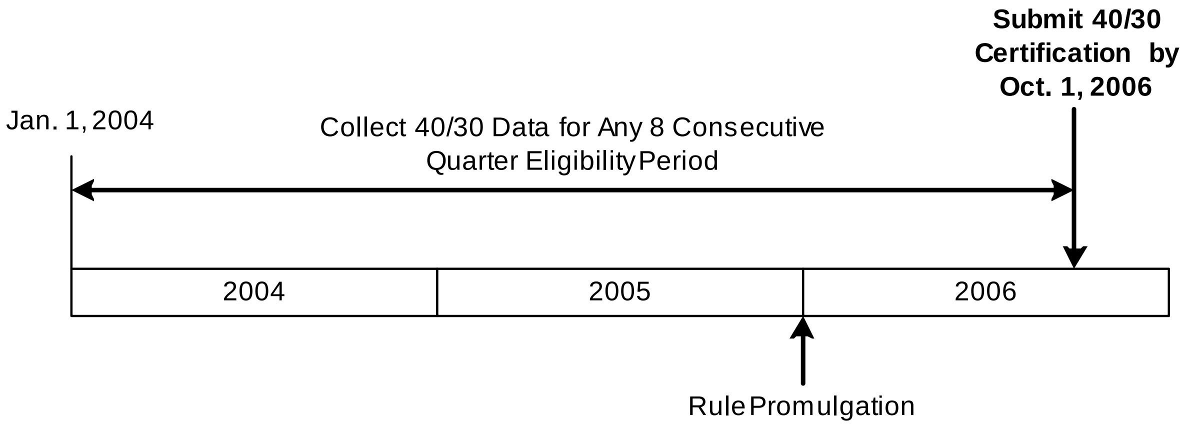
[1] If you are a consecutive or wholesale system, your schedule is based on the largest system in your combined distribution system. You should have received a letter from EPA or your state with your schedule for the Stage 2 DBPR.
[2] 2014 if *Cryptosporidium* monitoring is required under 141.701(a)(4) or (a)(6).

Stage 2 DBPR Compliance Monitoring Requirements

Source Water Type	Population Size Category[1]	Monitoring Frequency[2]	Distribution System Monitoring Location[3]
Subpart H	<500	per year	2
Ground Water	<500	per year	2

[1] Your monitoring requirements (location and frequency) are based on the population served by your individual system.
[2] You must monitor during the month of highest DBP concentrations.
[3] You are required to take individual TTHM and HAA5 samples at the locations with the highest TTHM and HAA5 concentrations, respectively. Only one location with a dual sample set per monitoring period is needed if the highest TTHM and HAA5 concentrations occur at the same location and month.

40/30 Certification Requirements - Schedule 1



This summary sheet is for systems that satisfy all of the following requirements for any **8 consecutive quarter eligibility period** beginning no earlier than **January 2004**:

- You serve 100,000 people or more OR are part of a combined distribution system where the largest system serves 100,000 people or more
- You have TTHM and HAA5 data equivalent to what is required by the Stage 1 DBPR
- No individual sample exceeds 0.040 mg/L for TTHM
- No individual sample exceeds 0.030 mg/L for HAA5
- Your system did not have any TTHM or HAA5 monitoring violations

WHAT TO DO NOW:

1. Prepare a certification letter **Due: October 1, 2006**

You must submit the certification letter to the address or e-mail provided below, or use the **IDSE Tool** to prepare and submit your certification letter. Note that EPA or your state could contact you and require more information, or require you to conduct an IDSE.

For more information and letter templates:
See **Chapter 4** of this guidance manual. If you are a consecutive or wholesale system, see Appendix D of this guidance manual. A template you can use for your 40/30 certification letter is included on Page 4-5. If you would like an electronic template, use the **IDSE Tool**, available at http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

2. Mail your 40/30 certification letter to:

STAGE 2 DBPR
US EPA-IPMC
P O Box 98
Dayton, OH 45401-0098

Email to stage2mdbp@epa.gov or submit electronically via the IDSE tool

3. Continue compliance monitoring for the Stage 1 DBPR until you begin compliance monitoring for the Stage 2 DBPR.

NEXT STEPS:
You have additional Stage 2 DBPR requirements. You must:

- Select Stage 2 DBPR compliance monitoring sites.
- Develop a Stage 2 compliance monitoring plan before you take your first compliance sample. If you are a subpart H system and you serve more than 3,300 people, you need to submit your plan to the state.
- Begin annual or quarterly Stage 2 compliance monitoring during the period starting with **April 2012,** according to your Stage 2 compliance monitoring plan.

See **Chapter 1, Section 1.1** of this guidance manual for a list of additional guidance materials for the Stage 2 DBPR.

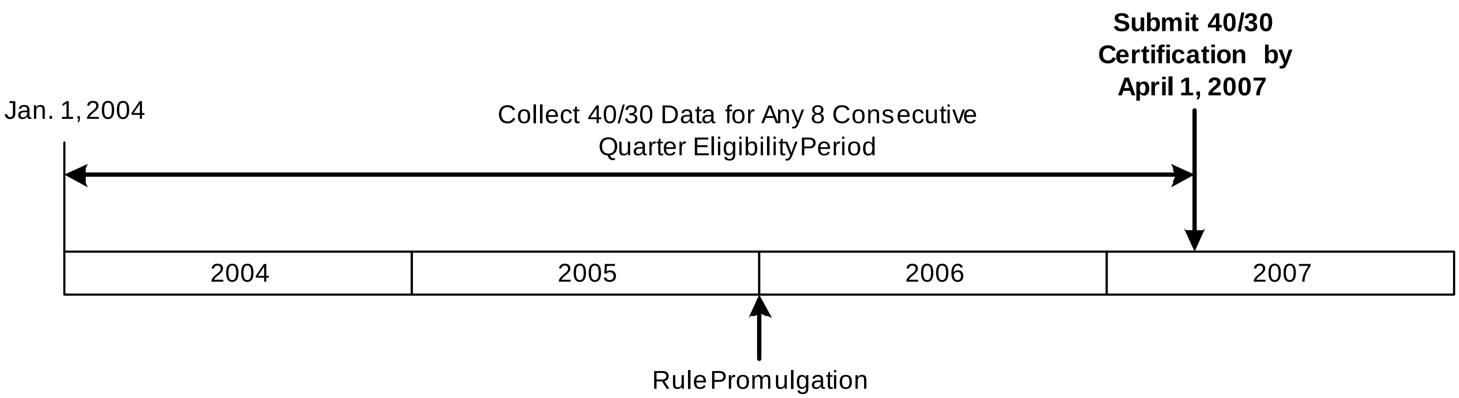
Reminder:
Your requirements for Stage 2 compliance monitoring are based on the population of your system and are listed below.

Stage 2 DBPR Compliance Monitoring Requirements

Source Water Type	Population Size Category[1]	Monitoring Frequency[2]	Distribution System Monitoring Location			
			Total per monitoring period[3]	Highest TTHM Locations	Highest HAA5 Locations	Existing Stage 1 DBPR Compliance Locations
Subpart H	<500	per year	2	1	1	....
	500-3,300	per quarter	2	1	1	....
	3,301-9,999	per quarter	2	1	1	....
	10,000-49,999	per quarter	4	2	1	1
	50,000-249,999	per quarter	8	3	3	2
	250,000-999,999	per quarter	12	5	4	3
	1,000,000-4,999,999	per quarter	16	6	6	4
	≥ 5,000,000	per quarter	20	8	7	5
Ground Water	<500	per year	2	1	1	....
	500-9,999	per year	2	1	1	....
	10,000-99,999	per quarter	4	2	1	1
	100,000-499,999	per quarter	6	3	2	1
	≥ 500,000	per quarter	8	3	3	2

1 Your monitoring requirements (location and frequency) are based on the population served by your system.
2 All systems must monitor during month of highest DBP concentrations.
3 Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500-3,300. Systems on annual monitoring and subpart H systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. Only one location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location (and month, if monitored annually).

40/30 Certification Requirements - Schedule 2



This summary sheet is for systems that satisfy all of the following requirements for any **8 consecutive quarter eligibility period** beginning no earlier than **January 2004**:

- You serve 50,000-99,999 people OR are part of a combined distribution system where the largest system serves 50,000-99,999 people
- You have TTHM and HAA5 data equivalent to what is required by the Stage 1 DBPR
- No individual sample exceeds 0.040 mg/L for TTHM
- No individual sample exceeds 0.030 mg/L for HAA5
- Your system did not have any TTHM or HAA5 monitoring violations

WHAT TO DO NOW:

1. Prepare a certification letter **Due: April 1, 2007**

You must submit the certification letter to the address or e-mail provided below, or use the **IDSE Tool** to prepare and submit your certification letter. Note that EPA or your state could contact you and require more information, or require you to conduct an IDSE.

For more information and letter templates:
See **Chapter 4** of this guidance manual. If you are a consecutive or wholesale system, see Appendix D of this guidance manual. A template you can use for your 40/30 certification letter is included on Page 4-5. If you would like an electronic template, use the **IDSE Tool**, available at http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

2. Mail your 40/30 certification letter to:

STAGE 2 DBPR
US EPA-IPMC
P O Box 98
Dayton, OH 45401-0098

Email to stage2mdbp@epa.gov or submit electronically via the IDSE tool

3. Continue compliance monitoring for the Stage 1 DBPR until you begin compliance monitoring for the Stage 2 DBPR.

40/30 Certification Requirements - Schedule 2

NEXT STEPS:
You have additional Stage 2 DBPR requirements. You must:

- Select Stage 2 compliance monitoring sites.
- Develop a Stage 2 compliance monitoring plan before you take your first compliance sample. If you are a subpart H system and you serve more than 3,300 people, you need to submit your plan to the state.
- Begin annual or quarterly Stage 2 compliance monitoring during the period starting with **October 2012,** according to your Stage 2 compliance monitoring plan.

See **Chapter 1, Section 1.1** of this guidance manual for a list of additional guidance materials for the Stage 2 DBPR.

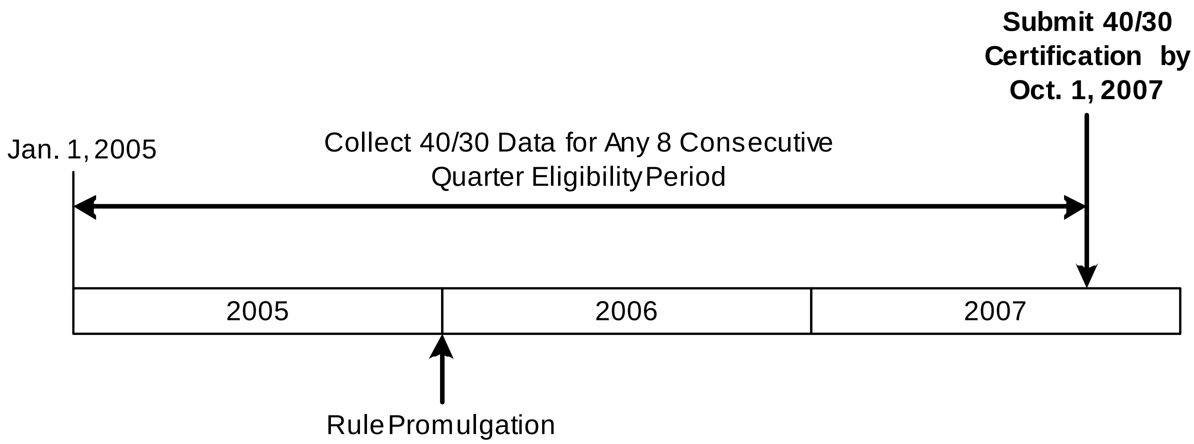
Reminder:
Your requirements for Stage 2 compliance monitoring are based on the population of your system and are listed below.

Stage 2 DBPR Compliance Monitoring Requirements

Source Water Type	**Population Size Category[1]**	**Monitoring Frequency[2]**	**Distribution System Monitoring Location**			
			Total per monitoring period[3]	Highest TTHM Locations	Highest HAA5 Locations	Existing Stage 1 DBPR Compliance Locations
Subpart H	<500	per year	2	1	1	....
	500-3,300	per quarter	2	1	1	....
	3,301-9,999	per quarter	2	1	1	....
	10,000-49,999	per quarter	4	2	1	1
	50,000-249,999	per quarter	8	3	3	2
	250,000-999,999	per quarter	12	5	4	3
	1,000,000-4,999,999	per quarter	16	6	6	4
	≥ 5,000,000	per quarter	20	8	7	5
Ground Water	<500	per year	2	1	1	....
	500-9,999	per year	2	1	1	....
	10,000-99,999	per quarter	4	2	1	1
	100,000-499,999	per quarter	6	3	2	1
	≥ 500,000	per quarter	8	3	3	2

[1] Your monitoring requirements (location and frequency) are based on the population served by your system.
[2] All systems must monitor during month of highest DBP concentrations.
[3] Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500-3,300. Systems on annual monitoring and subpart H systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. Only one location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location (and month, if monitored annually).

40/30 Certification Requirements - Schedule 3



This summary sheet is for systems that satisfy all of the following requirements for any **8 consecutive quarter eligibility period** beginning no earlier than **January 2005**:

- You serve 10,000-49,999 people OR are part of a combined distribution system where the largest system serves 10,000-49,999 people
- You have TTHM and HAA5 data equivalent to what is required by the Stage 1 DBPR
- No individual sample exceeds 0.040 mg/L for TTHM
- No individual sample exceeds 0.030 mg/L for HAA5
- Your system did not have any TTHM or HAA5 monitoring violations

WHAT TO DO NOW:

1. Prepare a certification letter **Due: October 1, 2007**

You must submit the certification letter to the address or e-mail provided below, or use the **IDSE Tool** to prepare and submit your certification letter. Note that EPA or your state could contact you and require more information, or require you to conduct an IDSE.

For more information and letter templates:
See **Chapter 4** of this guidance manual. If you are a consecutive or wholesale system, see Appendix D of this guidance manual. A template you can use for your 40/30 certification letter is included on Page 4-5. If you would like an electronic template, use the **IDSE Tool**, available at http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

2. Mail your 40/30 certification letter to:
STAGE 2 DBPR
US EPA-IPMC
P O Box 98
Dayton, OH 45401-0098

Email to stage2mdbp@epa.gov or submit electronically via the IDSE tool

3. Continue compliance monitoring for the Stage 1 DBPR until you begin compliance monitoring for the Stage 2 DBPR.

40/30 Certification Requirements - Schedule 3

NEXT STEPS:
You have additional Stage 2 DBPR requirements. You must:

- Select Stage 2 compliance monitoring sites.
- Develop a Stage 2 compliance monitoring plan before you take your first compliance sample. If you are a subpart H system and you serve more than 3,300 people, you need to submit your plan to the state.
- Begin annual or quarterly Stage 2 compliance monitoring during the period starting with **October 2013**, according to your Stage 2 compliance monitoring plan.

See **Chapter 1, Section 1.1** of this guidance manual for a list of additional guidance materials for the Stage 2 DBPR.

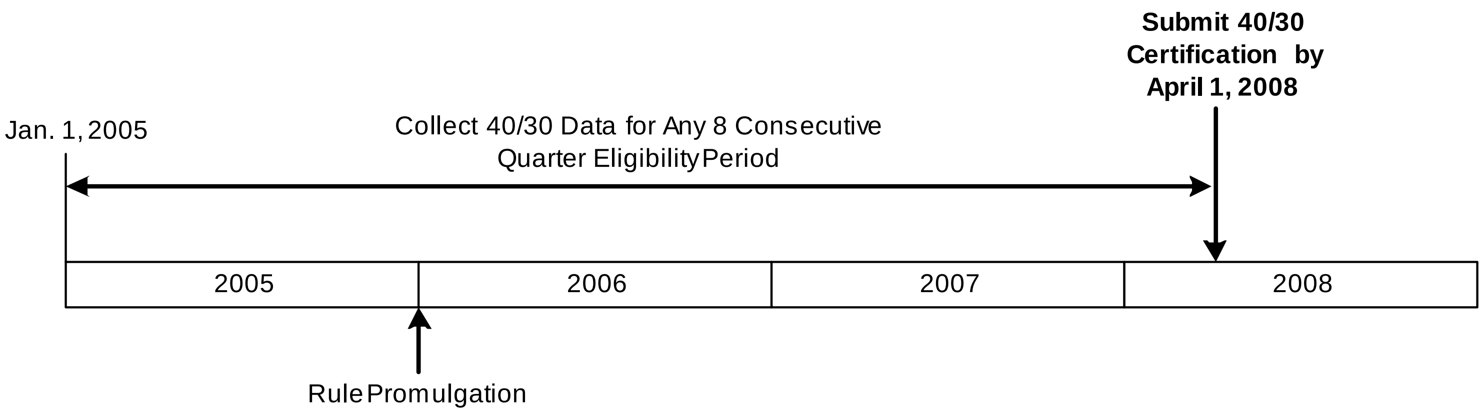
Reminder:
Your requirements for Stage 2 compliance monitoring are based on the population of your system and are listed below.

Stage 2 DBPR Compliance Monitoring Requirements

Source Water Type	**Population Size Category**[1]	**Monitoring Frequency**[2]	**Distribution System Monitoring Location**			
			Total per monitoring period[3]	Highest TTHM Locations	Highest HAA5 Locations	Existing Stage 1 DBPR Compliance Locations
Subpart H	<500	per year	2	1	1	....
	500-3,300	per quarter	2	1	1	....
	3,301-9,999	per quarter	2	1	1	....
	10,000-49,999	per quarter	4	2	1	1
	50,000-249,999	per quarter	8	3	3	2
	250,000-999,999	per quarter	12	5	4	3
	1,000,000-4,999,999	per quarter	16	6	6	4
	≥ 5,000,000	per quarter	20	8	7	5
Ground Water	<500	per year	2	1	1	....
	500-9,999	per year	2	1	1	....
	10,000-99,999	per quarter	4	2	1	1
	100,000-499,999	per quarter	6	3	2	1
	≥ 500,000	per quarter	8	3	3	2

1 Your monitoring requirements (location and frequency) are based on the population served by your system.
2 All systems must monitor during month of highest DBP concentrations.
3 Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500-3,300. Systems on annual monitoring and subpart H systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. Only one location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location (and month, if monitored annually).

40/30 Certification Requirements - Schedule 4



This summary sheet is for systems that satisfy all of the following requirements for any **8 consecutive quarter eligibility period** beginning no earlier than **January 2005**:

- You serve fewer than 10,000 people OR are part of a combined distribution system where the largest system serves fewer than 10,000 people
- You have TTHM and HAA5 data equivalent to what is required by the Stage 1 DBPR
- No individual sample exceeds 0.040 mg/L for TTHM
- No individual sample exceeds 0.030 mg/L for HAA5
- Your system did not have any TTHM or HAA5 monitoring violations

WHAT TO DO NOW:

1. Prepare a certification letter

Due: April 1, 2008

You must submit the certification letter to the address or e-mail provided below, or use the **IDSE Tool** to prepare and submit your certification letter. Note that EPA or your state could contact you and require more information, or require you to conduct an IDSE.

For more information and letter templates:

See **Chapter 4** of this guidance manual. If you are a consecutive or wholesale system, see Appendix D of this guidance manual. A template you can use for your 40/30 certification letter is included on Page 4-5. If you would like an electronic template, use the **IDSE Tool**, available at http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

2. Mail your 40/30 certification letter to:

STAGE 2 DBPR
US EPA-IPMC
P O Box 98
Dayton, OH 45401-0098

Email to stage2mdbp@epa.gov or submit electronically via the IDSE tool

3. Continue compliance monitoring for the Stage 1 DBPR until you begin compliance monitoring for the Stage 2 DBPR.

NEXT STEPS:
You have additional Stage 2 DBPR requirements. You must:
- Select Stage 2 compliance monitoring sites.
- Develop a Stage 2 compliance monitoring plan before you take your first compliance sample. If you are a subpart H system and you serve more than 3,300 people, you need to submit your plan to the state.
- Begin annual or quarterly Stage 2 compliance monitoring during the period starting with **October 2013 or October 2014,** according to your Stage 2 compliance monitoring plan.

See **Chapter 1, Section 1.1** of this guidance manual for a list of additional guidance materials for the Stage 2 DBPR.

Reminder:
Your requirements for Stage 2 compliance monitoring are based on the population of your system and are listed below.

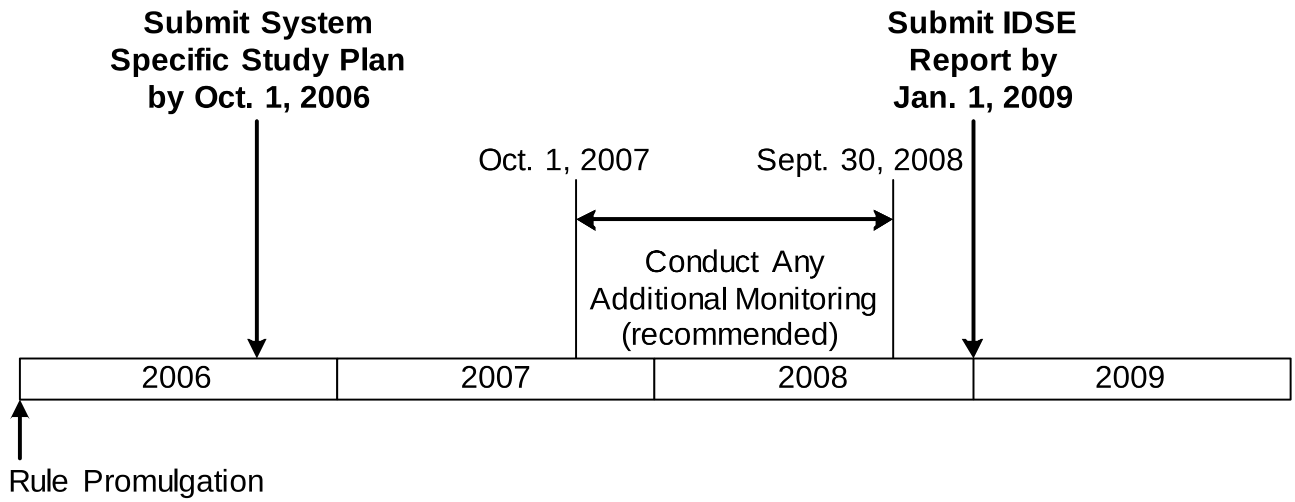
Stage 2 DBPR Compliance Monitoring Requirements

Source Water Type	**Population Size Category**[1]	**Monitoring Frequency**[2]	**Distribution System Monitoring Location**			
			Total per monitoring period[3]	Highest TTHM Locations	Highest HAA5 Locations	Existing Stage 1 DBPR Compliance Locations
Subpart H	<500	per year	2	1	1	....
	500-3,300	per quarter	2	1	1	....
	3,301-9,999	per quarter	2	1	1	....
	10,000-49,999	per quarter	4	2	1	1
	50,000-249,999	per quarter	8	3	3	2
	250,000-999,999	per quarter	12	5	4	3
	1,000,000-4,999,999	per quarter	16	6	6	4
	≥ 5,000,000	per quarter	20	8	7	5
Ground Water	<500	per year	2	1	1	....
	500-9,999	per year	2	1	1	....
	10,000-99,999	per quarter	4	2	1	1
	100,000-499,999	per quarter	6	3	2	1
	≥ 500,000	per quarter	8	3	3	2

[1] Your monitoring requirements (location and frequency) are based on the population served by your system.
[2] All systems must monitor during month of highest DBP concentrations.
[3] Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500-3,300. Systems on annual monitoring and subpart H systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. Only one location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location (and month, if monitored annually).

System Specific Study Requirements - Schedule 1

Page 1 of 2



This summary sheet is for systems that serve 100,000 people or more OR are part of a combined distribution system where the largest system serves 100,000 people or more.

WHAT TO DO NOW:

1. Develop a System Specific Study Plan **Due: October 1, 2006**

For guidance on how to develop your SSS Plan:

- If you are using existing monitoring results, see Chapter 5. Your minimum data requirements are also listed on the attachment on Page 2-29.
- If you are using a distribution system hydraulic model, see Chapter 6.
- Chapters 5 and 6 contain plan templates. If you would like an electronic template, see the IDSE Tool: http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

Mail your SSS Plan to:

STAGE 2 DBPR
US EPA-IPMC
P O Box 98
Dayton, OH 45401-0098

Email to stage2mdbp@epa.gov or submit electronically via the IDSE tool

EPA or your state will review your SSS plan and contact you before October 1, 2007 to either let you know it has been approved or discuss necessary changes. If you do not hear anything by this deadline, consider your SSS plan approved and proceed with your plans.

2. Conduct Any Additional Monitoring **Oct. 1, 2007 - Sept. 30, 2008**

Systems using existing monitoring results may take additional samples during the SSS. Monitoring should be done according to the approved SSS Plan. Systems using models are required to complete one period of monitoring.

System Specific Study Requirements - Schedule 1

WHAT TO DO NOW (cont'd):

3. Select Stage 2 Compliance Monitoring Sites and Develop IDSE Report for the SSS

Due: January 1, 2009

The number of Stage 2 compliance monitoring sites required for your system is listed on the attachment on Page 2-30. For guidance on how to select your sites and write your IDSE report:

- If you are using existing monitoring data, see Chapter 5, Section 5.3.
- If you are using a distribution system hydraulic model, see Chapter 6, Section 6.6 and Section 6.7.

EPA or your state will review your IDSE report and contact you before April 1, 2009 to either let you know your Stage 2 compliance monitoring sites and schedule have been approved or to discuss necessary changes. If you do not hear anything by this deadline, consider your report approved and start preparing for Stage 2 compliance monitoring.

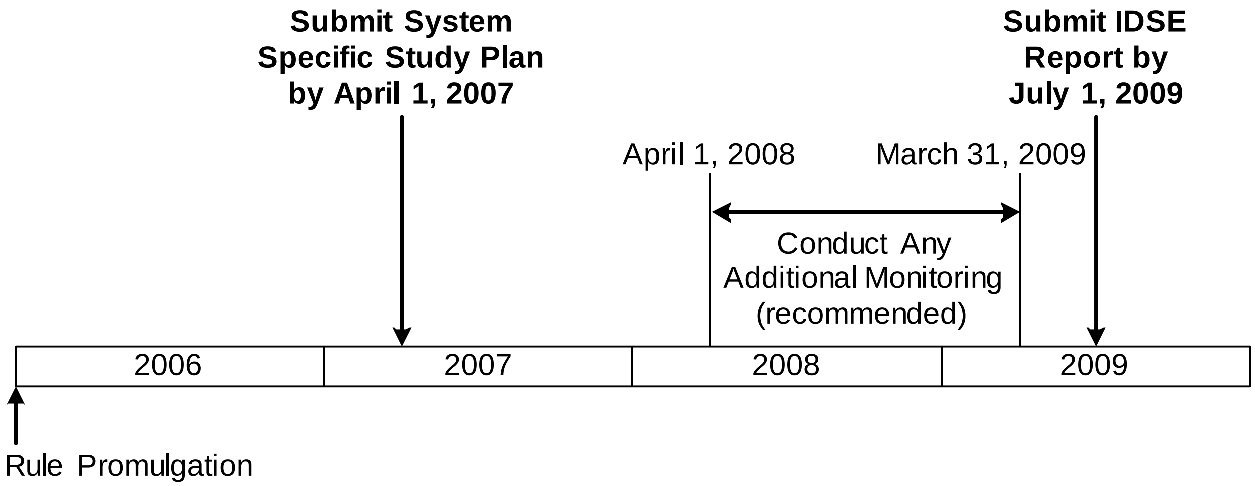
4. Continue compliance monitoring for the Stage 1 DBPR until you begin compliance monitoring for the Stage 2 DBPR.

NEXT STEPS:
You will have additional requirements for Stage 2 compliance. Your system will need to:

- If you have high levels of DBPs, you may need to make system changes before **April 1, 2012** to meet the requirements of the Stage 2 DBPR. If you buy water, see the Consecutive System Guidance Manual for more information.
- Develop a Stage 2 compliance monitoring plan before you take your first compliance sample. If you are a subpart H system and you serve more than 3,300 people, you need to submit your plan to the state.
- Begin annual or quarterly Stage 2 compliance monitoring during the period starting with **April 2012,** according to your Stage 2 compliance monitoring plan.

Reminder:
Your system's monitoring requirements for both the IDSE and Stage 2 compliance monitoring are based on the population of your system and are listed the attachment on Pages 2-29 and 2-30.

System Specific Study Requirements - Schedule 2



This summary sheet is for systems that serve 50,000-99,999 people OR are part of a combined distribution system where the largest system serves 50,000-99,999 people.

WHAT TO DO NOW:

1. Develop a System Specific Study Plan **Due: April 1, 2007**

For guidance on how to develop your SSS Plan:

- If you are using existing monitoring results, see Chapter 5. Your minimum data requirements are also listed on the attachment on Page 2-29.
- If you are using a distribution system hydraulic model, see Chapter 6.
- Chapters 5 and 6 contain plan templates. If you would like an electronic template, see the IDSE Tool: http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

Mail your SSS Plan to:

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US EPA-IPMC
P O Box 98
Dayton, OH 45401-0098

Email to stage2mdbp@epa.gov or submit electronically via the IDSE tool

EPA or your state will review your SSS plan and contact you before April 1, 2008 to either let you know it has been approved or discuss necessary changes. If you do not hear anything by this deadline, consider your SSS plan approved and proceed with your plans.

2. Conduct Any Additional Monitoring **Apr. 1, 2008 - March 31, 2009**

Systems using existing monitoring results may take additional samples during the SSS. Monitoring should be done according to the approved SSS Plan. Systems using models are required to complete one period of monitoring.

System Specific Study Requirements - Schedule 2

WHAT TO DO NOW (cont'd):

3. Select Stage 2 Compliance Monitoring Sites and Develop IDSE Report for the SSS

Due: July 1, 2009

The number of Stage 2 compliance monitoring sites required for your system is listed on the attachment on Page 2-30. For guidance on how to select your sites and write your IDSE report:

- If you are using existing monitoring data, see Chapter 5, Section 5.3.
- If you are using a distribution system hydraulic model, see Chapter 6, Section 6.6 and Section 6.7.

EPA or your state will review your IDSE report and contact you before October 1, 2009 to either let you know your Stage 2 compliance monitoring sites and schedule have been approved or to discuss necessary changes. If you do not hear anything by this deadline, consider your report approved and start preparing for Stage 2 compliance.

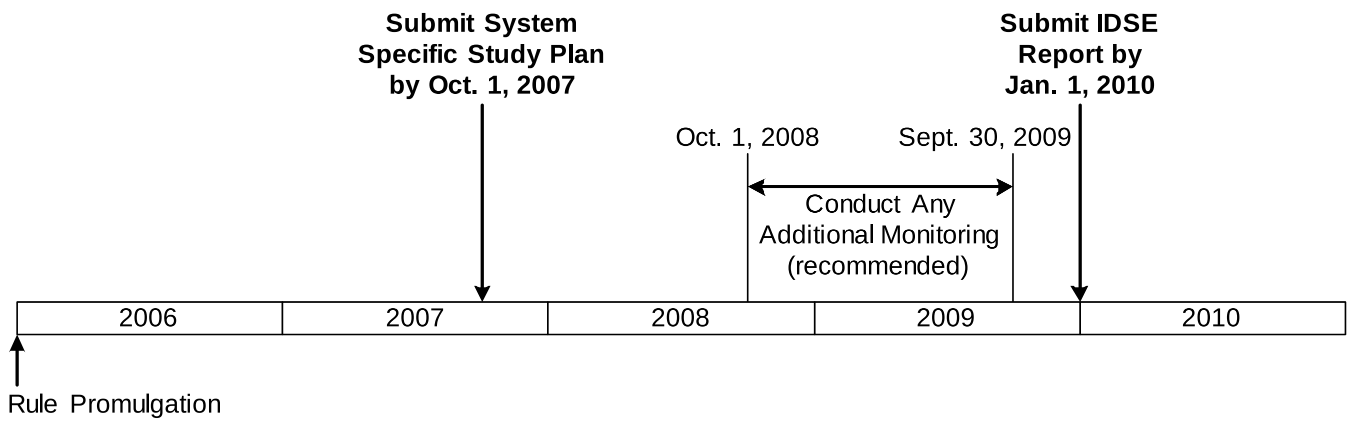
4. Continue compliance monitoring for the Stage 1 DBPR until you begin compliance monitoring for the Stage 2 DBPR.

NEXT STEPS:
You will have additional requirements for Stage 2 compliance. Your system will need to:

- If you have high levels of DBPs, you may need to make system changes before **October 1, 2012** to meet the Stage 2 MCLs. If you buy water, see the Consecutive System Guidance Manual for more information.
- Develop a Stage 2 compliance monitoring plan before you take your first compliance sample. If you are a subpart H system and you serve more than 3,300 people, you need to submit your plan to the state.
- Begin annual or quarterly Stage 2 compliance monitoring during the period starting with **October 2012,** according to your Stage 2 compliance monitoring plan.

Reminder:
Your system's monitoring requirements for both the IDSE and Stage 2 compliance monitoring are based on the population of your system and are listed the attachment on Pages 2-29 and 2-30.

System Specific Study Requirements - Schedule 3



This summary sheet is for systems that serve 10,000-49,999 people OR are part of a combined distribution system where the largest system serves 10,000-49,999 people.

WHAT TO DO NOW:

1. Develop a System Specific Study Plan **Due: October 1, 2007**

For guidance on how to develop your SSS Plan:

- If you are using existing monitoring results, see Chapter 5. Your minimum data requirements are also listed on the attachment on Page 2-29.
- If you are using a distribution system hydraulic model, see Chapter 6.
- Chapters 5 and 6 contain plan templates. If you would like an electronic template, see the IDSE Tool: http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

Mail your SSS Plan to:

STAGE 2 DBPR
US EPA-IPMC
P O Box 98
Dayton, OH 45401-0098

Email to stage2mdbp@epa.gov or submit electronically via the IDSE tool

EPA or your state will review your SSS plan and contact you before October 1, 2008 to either let you know it has been approved or discuss necessary changes. If you do not hear anything by this deadline, consider your SSS plan approved and proceed with your plans.

2. Conduct Any Additional Monitoring **Oct. 1, 2008 - Sept. 30, 2009**

Systems using existing monitoring results may take additional samples during the SSS. Monitoring should be done according to the approved SSS Plan. Systems using models are required to complete one period of monitoring.

System Specific Study Requirements - Schedule 3

WHAT TO DO NOW (cont'd):

3. Select Stage 2 Compliance Monitoring Sites and Develop IDSE Report for the SSS

Due: January 1, 2010

The number of Stage 2 compliance monitoring sites required for your system is listed on the attachment on Page 2-30. For guidance on how to select your sites and write your IDSE report:

- If you are using existing monitoring data, see Chapter 5, Section 5.3.
- If you are using a distribution system hydraulic model, see Chapter 6, Section 6.6 and Section 6.7.

EPA or your state will review your IDSE report and contact you before October 1, 2010 to either let you know your Stage 2 compliance monitoring sites and schedule have been approved or to discuss necessary changes. If you do not hear anything by this deadline, consider your report approved and start preparing for Stage 2 compliance.

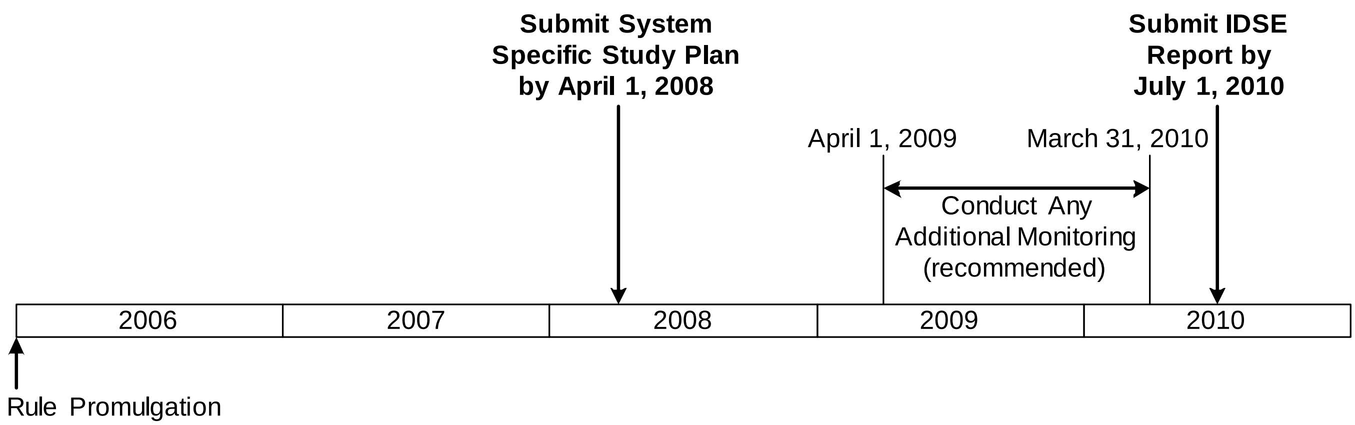
4. Continue compliance monitoring for the Stage 1 DBPR until you begin compliance monitoring for the Stage 2 DBPR.

NEXT STEPS:
You will have additional requirements for Stage 2 compliance. Your system will need to:

- If you have high levels of DBPs, you may need to make system changes before **October 1, 2013** to meet the Stage 2 MCLs. If you buy water, see the Consecutive System Guidance Manual for more information.
- Develop a Stage 2 compliance monitoring plan before you take your first compliance sample. If you are a subpart H system and you serve more than 3,300 people, you need to submit your plan to the state.
- Begin annual or quarterly Stage 2 compliance monitoring during the period starting with **October 2013,** according to your Stage 2 compliance monitoring plan.

Reminder:
Your system's monitoring requirements for both the IDSE and Stage 2 compliance monitoring are based on the population of your system and are listed the attachment on Pages 2-29 and 2-30.

System Specific Study Requirements - Schedule 4



This summary sheet is for systems that serve fewer than 10,000 people OR are part of a combined distribution system where the largest system serves fewer than 10,000 people.

WHAT TO DO NOW:

1. Develop a System Specific Study Plan **Due: April 1, 2008**

For guidance on how to develop your SSS Plan:

- If you are using existing monitoring results, see Chapter 5. Your minimum data requirements are also listed on the attachment on Page 2-29.
- If you are using a distribution system hydraulic model, see Chapter 6.
- Chapters 5 and 6 contain plan templates. If you would like an electronic template, see the IDSE Tool: http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

Mail your SSS Plan to:

STAGE 2 DBPR
US EPA-IPMC
P O Box 98
Dayton, OH 45401-0098

Email to stage2mdbp@epa.gov or submit electronically via the IDSE tool

EPA or your state will review your SSS plan and contact you before April 1, 2009 to either let you know it has been approved or discuss necessary changes. If you do not hear anything by this deadline, consider your SSS plan approved and proceed with your plans.

2. Conduct Any Additional Monitoring **Apr. 1, 2009 - March 31, 2010**

Systems using existing monitoring results may take additional samples during the SSS. Monitoring should be done according to the approved SSS Plan. Systems using models are required to complete one period of monitoring.

System Specific Study Requirements - Schedule 4

WHAT TO DO NOW:

3. Select Stage 2 Compliance Monitoring Sites and Develop IDSE Report for the SSS

Due: July 1, 2010

The number of Stage 2 compliance monitoring sites required for your system is listed on the attachment on Page 2-30. For guidance on how to select your sites and write your IDSE report:

- If you are using existing monitoring data, see Chapter 5, Section 5.3.
- If you are using a distribution system hydraulic model, see Chapter 6, Section 6.6 and Section 6.7.

EPA or your state will review your IDSE report and contact you before October 1, 2010 to either let you know your Stage 2 compliance monitoring sites and schedule have been approved or to discuss necessary changes. If you do not hear anything by this deadline, consider your report approved and start preparing for Stage 2 compliance.

4. Continue compliance monitoring for the Stage 1 DBPR until you begin compliance monitoring for the Stage 2 DBPR.

NEXT STEPS:
You will have additional requirements for Stage 2 compliance. Your system will need to:

- If you have high levels of DBPs, you may need to make system changes before **October 1, 2013** to meet the Stage 2 MCLs. If you buy water, see the Consecutive System Guidance Manual for more information.
- Develop a Stage 2 compliance monitoring plan before you take your first compliance sample. If you are a subpart H system and you serve more than 3,300 people, you need to submit your plan to the state.
- Begin annual or quarterly Stage 2 compliance monitoring during the period starting with **October 2013 or October 2014,** according to your Stage 2 compliance monitoring plan.

Reminder:
Your system's monitoring requirements for both the IDSE and Stage 2 compliance monitoring are based on the population of your system and are listed the attachment on Pages 2-29 and 2-30.

System Specific Study Requirements - Attachment (For All Schedules)

Minimum Sample Requirements for the SSS using Existing Monitoring Results

Source Water Type	Population Size Category [1]	Number of Monitoring Locations	Number of TTHM Samples	Number of HAA5 Samples
Subpart H	<500	3	3	3
	500-3,300	3	9	9
	3,301-9,999	6	36	36
	10,000-49,999	12	72	72
	50,000-249,999	24	144	144
	250,000-999,999	36	216	216
	1,000,000-4,999,999	48	288	288
	≥5,000,000	60	360	360
Ground Water	<500	3	3	3
	500-9,999	3	9	9
	10,000-99,999	12	48	48
	100,000-499,999	18	72	72
	≥500,000	24	96	96

[1] Your minimum sample requirements (locations and frequency) are based on the population served by your system.

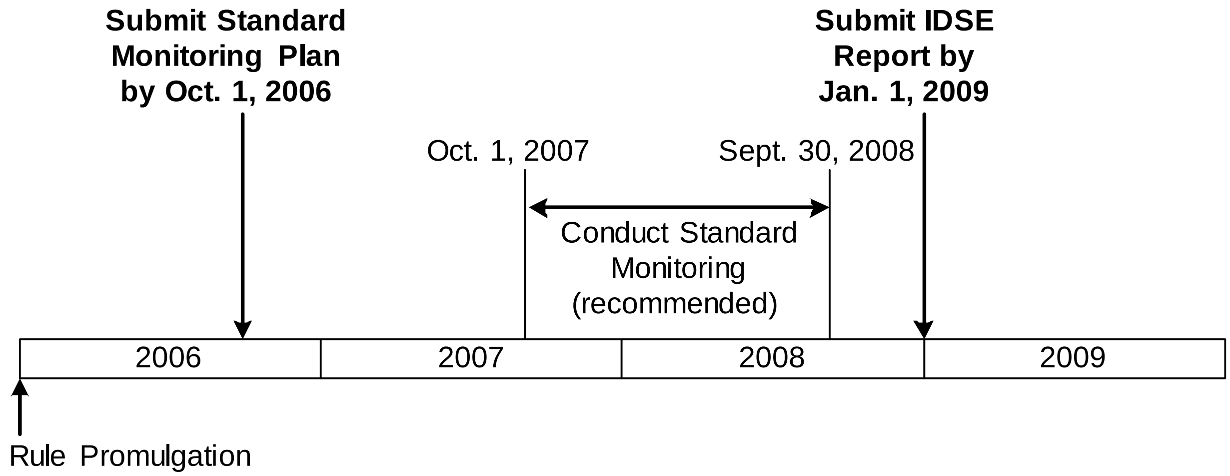
System Specific Study Requirements - Attachment (For All Schedules)

Stage 2 Compliance Monitoring Requirements

Source Water Type	Population Size Category[1]	Monitoring Frequency[2]	Distribution System Monitoring Location			
			Total per monitoring period [3]	Highest TTHM Locations	Highest HAA5 Locations	Existing Stage 1 DBPR Compliance Locations
Subpart H	<500	per year	2	1	1	....
	500-3,300	per quarter	2	1	1	....
	3,301-9,999	per quarter	2	1	1	....
	10,000-49,999	per quarter	4	2	1	1
	50,000-249,999	per quarter	8	3	3	2
	250,000-999,999	per quarter	12	5	4	3
	1,000,000-4,999,999	per quarter	16	6	6	4
	≥5,000,000	per quarter	20	8	7	5
Ground Water	<500	per year	2	1	1	....
	500-9,999	per year	2	1	1	....
	10,000-99,999	per quarter	4	2	1	1
	100,000-499,999	per quarter	6	3	2	1
	≥500,000	per quarter	8	3	3	2

[1] Your monitoring requirements (location and frequency) are based on the population served by your system.
[2] All systems must monitor during month of highest DBP concentrations.
[3] Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500-3,300. Systems on annual monitoring and subpart H systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. Only one location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location (and month, if monitored annually).

Standard Monitoring Requirements - Schedule 1



This summary sheet is for systems that serve 100,000 people or more OR are part of a combined distribution system where the largest system serves 100,000 people or more.

WHAT TO DO NOW:

1. Develop Standard Monitoring Plan **Due: October 1, 2006**

- See Chapter 7, Section 7.1.3 for guidance on how to develop your IDSE Standard Monitoring Plan. Your monitoring requirements are also listed on the attachment on Page 2-39.
- Chapter 7 contains plan templates. If you would like an electronic template, see the IDSE Tool: http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

Mail your standard monitoring plan to:

STAGE 2 DBPR
US EPA-IPMC
P O Box 98
Dayton, OH 45401-0098

E-mail to stage2mdbp@epa.gov or submit electronically via the IDSE tool

EPA or your state will review your standard monitoring plan and contact you before October 1, 2007 to either let you know it has been approved or discuss necessary changes. If you do not hear anything by this deadline, consider your plan approved and start monitoring.

2. Conduct Standard Monitoring **Oct. 1, 2007 - Sept. 30, 2008**

Monitoring should be done according to your standard monitoring plan.

WHAT TO DO NOW (cont'd):

3. Select Stage 2 Compliance Monitoring Sites and Develop IDSE Standard Monitoring Report

Due: January 1, 2009

- See Chapter 7, Section 7.3 for guidance on how to select Stage 2 compliance monitoring sites and write the IDSE report. The number of Stage 2 compliance monitoring sites required for your system is listed on the attachment on Page 2-40.
- **EPA or your state will review your IDSE report and contact you before April 1, 2009** to either let you know your Stage 2 compliance monitoring sites and schedule have been approved or to discuss necessary changes. If you do not hear anything by this deadline, consider your plan approved and start preparing for Stage 2 compliance.

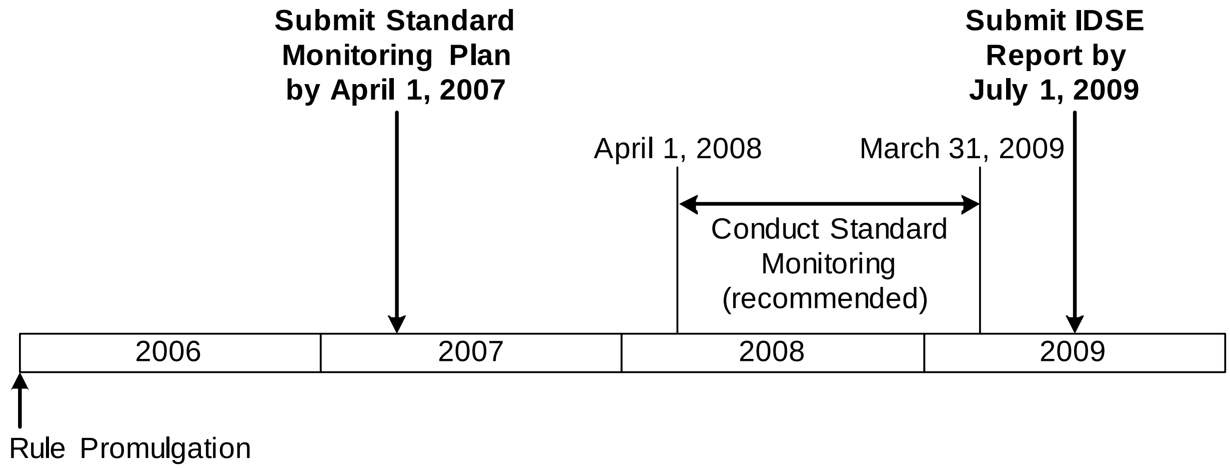
4. Continue compliance monitoring for the Stage 1 DBPR until you begin compliance monitoring for the Stage 2 DBPR.

NEXT STEPS:
You will have additional requirements for Stage 2 compliance. Your system will need to do the following:

- If you have high levels of DBPs, you may need to make system changes before **April 1, 2012** to meet the Stage 2 MCLs. If you buy water, see the Consecutive System Guidance Manual for more information.
- Develop a Stage 2 compliance monitoring plan before you take your first compliance sample. If you are a subpart H system and you serve more than 3,300 people, you need to submit your plan to the state.
- Begin annual or quarterly Stage 2 compliance monitoring during the period starting with **April 2012,** according to your Stage 2 compliance monitoring plan.

Reminder:
Your system's monitoring requirements for both the IDSE and Stage 2 compliance monitoring are based on the population of your system and are listed in the attachment on Pages 2-39 and 2-40.

Standard Monitoring Requirements - Schedule 2



This summary sheet is for systems that serve 50,000-99,999 people OR are part of a combined distribution system where the largest system serves 50,000-99,999 people.

WHAT TO DO NOW:

1. Develop Standard Monitoring Plan **Due: April 1, 2007**

- See Chapter 7, Section 7.1.3 for guidance on how to develop your IDSE Standard Monitoring Plan. Your monitoring requirements are also listed on the attachment on Page 2-39.
- Chapter 7 contains plan templates. If you would like an electronic template, see the IDSE Tool: http://www.epa.gov/safewater/disinfection/stage2.

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EPA or your state will review your standard monitoring plan and contact you before April 1, 2008 to either let you know it has been approved or discuss necessary changes. If you do not hear anything by this deadline, consider your plan approved and start monitoring.

2. Conduct Standard Monitoring **Apr. 1, 2008 - March 31, 2009**

Monitoring should be done according to your standard monitoring plan.

WHAT TO DO NOW (cont'd):

3. Select Stage 2 Compliance Monitoring Sites and Develop IDSE Standard Monitoring Report

Due: July 1, 2009

- See Chapter 7, Section 7.3 for guidance on how to select Stage 2 compliance monitoring sites and write the IDSE report. The number of Stage 2 compliance monitoring sites required for your system is listed on the attachment on Page 2-40.
- **EPA or your state will review your IDSE report and contact you before October 1, 2009** to either let you know your Stage 2 compliance monitoring sites and schedule have been approved or to discuss necessary changes. If you do not hear anything by this deadline, consider your plan approved and start preparing for Stage 2 compliance.

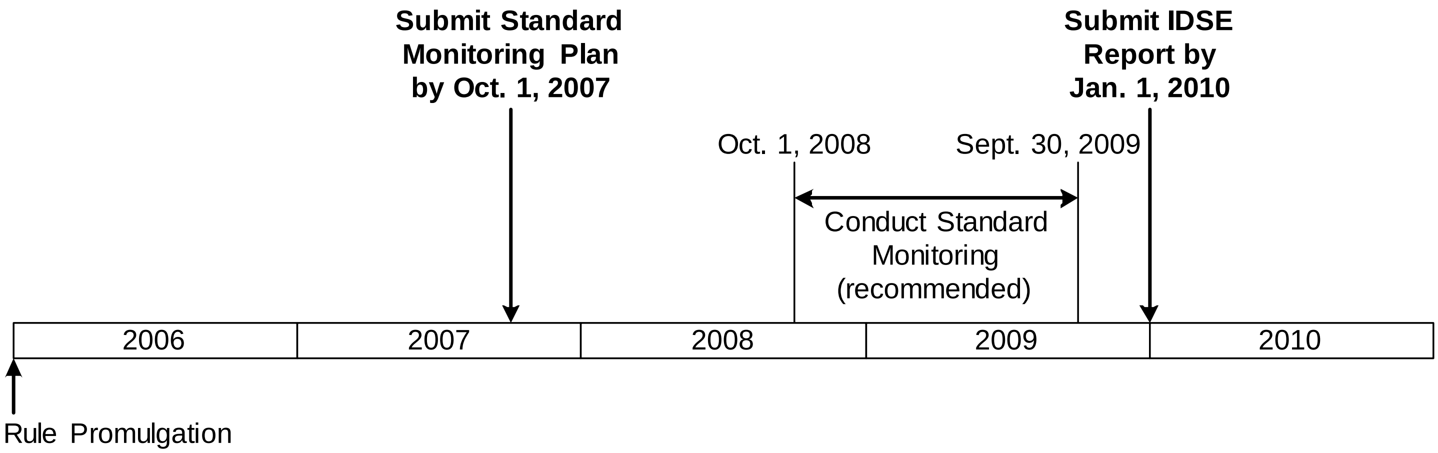
4. Continue compliance monitoring for the Stage 1 DBPR until you begin compliance monitoring for the Stage 2 DBPR.

NEXT STEPS:
You will have additional requirements for Stage 2 compliance. Your system will need to do the following:

- If you have high levels of DBPs, you may need to make system changes before **October 1, 2012** to meet the Stage 2 MCLs. If you buy water, see the Consecutive System Guidance Manual for more information.
- Develop a Stage 2 compliance monitoring plan before you take your first compliance sample. If you are a subpart H system and you serve more than 3,300 people, you need to submit your plan to the state.
- Begin annual or quarterly Stage 2 compliance monitoring during the period starting with **October 2012,** according to your Stage 2 compliance monitoring plan.

Reminder:
Your system's monitoring requirements for both the IDSE and Stage 2 compliance monitoring are based on the population of your system and are listed in the attachment on Pages 2-39 and 2-40.

Standard Monitoring Requirements - Schedule 3



This summary sheet is for systems that serve 10,000-49,999 people OR are part of a combined distribution system where the largest system serves 10,000-49,999 people.

WHAT TO DO NOW:

1. Develop Standard Monitoring Plan **Due: October 1, 2007**

- See Chapter 7, Section 7.1.3 for guidance on how to develop your IDSE Standard Monitoring Plan. Your monitoring requirements are also listed on the attachment on Page 2-39.
- Chapter 7 contains plan templates. If you would like an electronic template, see the IDSE Tool: http://www.epa.gov/safewater/disinfection/stage2.

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E-mail to stage2mdbp@epa.gov or submit electronically via the IDSE tool

EPA or your state will review your standard monitoring plan and contact you before October 1, 2008 to either let you know it has been approved or discuss necessary changes. If you do not hear anything by this deadline, consider your plan approved and start monitoring.

2. Conduct Standard Monitoring **Oct. 1, 2008 - Sept. 30, 2009**

Monitoring should be done according to your IDSE Standard Monitoring Plan.

WHAT TO DO NOW (cont'd):

3. Select Stage 2 Compliance Monitoring Sites and Develop IDSE Standard Monitoring Report

Due: January 1, 2010

- See Chapter 7, Section 7.3 for guidance on how to select Stage 2 compliance monitoring sites and write the IDSE report. The number of Stage 2 compliance monitoring sites required for your system is listed on the attachment on Page 2-40.
- **EPA or your state will review your IDSE report and contact you before October 1, 2010** to either let you know your Stage 2 compliance monitoring sites and schedule have been approved or to discuss necessary changes. If you do not hear anything by this deadline, consider your plan approved and start preparing for Stage 2 compliance.

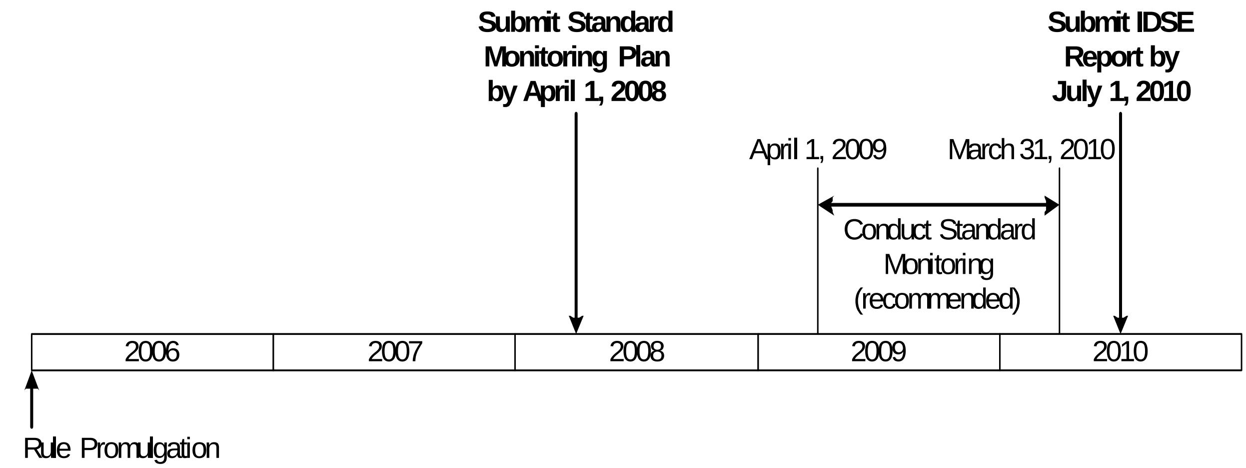
4. Continue compliance monitoring for the Stage 1 DBPR until you begin compliance monitoring for the Stage 2 DBPR.

NEXT STEPS:
You will have additional requirements for Stage 2 compliance. Your system will need to do the following:

- If you have high levels of DBPs, you may need to make system changes before **October 1, 2013** to meet the Stage 2 MCLs. If you buy water, see the Consecutive System Guidance Manual for more information.
- Develop a Stage 2 compliance monitoring plan before you take your first compliance sample. If you are a subpart H system and you serve more than 3,300 people, you need to submit your plan to the state.
- Begin annual or quarterly Stage 2 compliance monitoring during the period starting with **October 2013,** according to your Stage 2 compliance monitoring plan.

Reminder:
Your system's monitoring requirements for both the IDSE and Stage 2 compliance monitoring are based on the population of your system and are listed in the attachment on Pages 2-39 and 2-40.

Standard Monitoring Requirements - Schedule 4



This summary sheet is for systems that serve fewer than 10,000 people OR are part of a combined distribution system where the largest system serves fewer than 10,000 people.

WHAT TO DO NOW:

1. Develop Standard Monitoring Plan **Due: April 1, 2008**

- See Chapter 7, Section 7.1.3 for guidance on how to develop your IDSE Standard Monitoring Plan. Your monitoring requirements are also listed on the attachment on Page 2-39.
- Chapter 7 contains plan templates. If you would like an electronic template, see the IDSE Tool: http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

Mail your standard monitoring plan to:

STAGE 2 DBPR
US EPA-IPMC
P O Box 98
Dayton, OH 45401-0098

E-mail to stage2mdbp@epa.gov or submit electronically via the IDSE tool

EPA or your state will review your standard monitoring plan and contact you before April 1, 2009 to either let you know it has been approved or discuss necessary changes. If you do not hear anything by this deadline, consider your plan approved and start monitoring.

2. Conduct Standard Monitoring **Apr. 1, 2009 - March 31, 2010**

Monitoring should be done according to your standard monitoring plan.

WHAT TO DO NOW (cont'd):

3. Select Stage 2 Compliance Monitoring Sites and Develop IDSE Standard Monitoring Report

Due: July 1, 2010

- See Chapter 7, Section 7.3 for guidance on how to select Stage 2 compliance monitoring sites and write the IDSE report. The number of Stage 2 compliance monitoring sites required for your system is listed on the attachment on Page 2-40.
- **EPA or your state will review your IDSE report and contact you before October 1, 2010** to either let you know your Stage 2 compliance monitoring sites and schedule have been approved or to discuss necessary changes. If you do not hear anything by this deadline, consider your plan approved and start preparing for Stage 2 compliance.

4. Continue compliance monitoring for the Stage 1 DBPR until you begin compliance monitoring for the Stage 2 DBPR.

NEXT STEPS:
You will have additional requirements for Stage 2 compliance. Your system will need to do the following:

- If you have high levels of DBPs, you may need to make system changes before **October 1, 2013** to meet the Stage 2 MCLs. If you buy water, see the Consecutive System Guidance Manual for more information.
- Develop a Stage 2 compliance monitoring plan before you take your first compliance sample. If you are a subpart H system and you serve more than 3,300 people, you need to submit your plan to the state.
- Begin annual or quarterly Stage 2 compliance monitoring during the period starting with **October 2013 or October 2014,** according to your Stage 2 compliance monitoring plan.

Reminder:
Your system's monitoring requirements for both the IDSE and Stage 2 compliance monitoring are based on the population of your system and are listed in the attachment on Pages 2-39 and 2-40.

IDSE Standard Monitoring Requirements

Source Water Type	Population Size Category[1]	Monitoring Periods and Frequency of Sampling	Distribution System Monitoring Locations[2]				
			Total per monitoring period	Near Entry Points	Average Residence Time	High TTHM Locations	High HAA5 Locations
Subpart H	<500 consecutive systems	one (during peak historical month)[3]	2	1	....	1	....
	<500 non-consecutive systems		2	....	....	1	1
	500-3,300 consecutive systems	four (every 90 days)	2	1	....	1	....
	500-3,300 non-consecutive systems		2	....	....	1	1
	3,301-9,999		4	....	1	2	1
	10,000-49,999	six (every 60 days)	8	1	2	3	2
	50,000-249,999		16	3	4	5	4
	250,000-999,999		24	4	6	8	6
	1,000,000-4,999,999		32	6	8	10	8
	≥5,000,000		40	8	10	12	10
Ground Water	<500 consecutive systems	one (during peak historical month)[3]	2	1	....	1	....
	<500 non-consecutive systems		2	....	....	1	1
	500-9,999	four (every 90 days)	2	....	....	1	1
	10,000-99,999		6	1	1	2	2
	100,000-499,999		8	1	1	3	3
	≥500,000		12	2	2	4	4

[1] Your monitoring requirements (locations and frequency) are based on the population served by your system.
[2] A dual sample set (i.e., a TTHM and an HAA5 sample) must be taken at each monitoring location during each monitoring period.
[3] The peak historical month is the month with the highest TTHM or HAA5 levels or the warmest water temperature.

Standard Monitoring Requirements - Attachment (For All Schedules)

Stage 2 Compliance Monitoring Requirements

Source Water Type	Population Size Category[1]	Monitoring Frequency[2]	Distribution System Monitoring Location			
			Total per monitoring period[3]	Highest TTHM Locations	Highest HAA5 Locations	Existing Stage 1 DBPR Compliance Locations
Subpart H	<500	per year	2	1	1	....
	500-3,300	per quarter	2	1	1	....
	3,301-9,999	per quarter	2	1	1	....
	10,000-49,999	per quarter	4	2	1	1
	50,000-249,999	per quarter	8	3	3	2
	250,000-999,999	per quarter	12	5	4	3
	1,000,000-4,999,999	per quarter	16	6	6	4
	≥5,000,000	per quarter	20	8	7	5
Ground Water	<500	per year	2	1	1	....
	500-9,999	per year	2	1	1	....
	10,000-99,999	per quarter	4	2	1	1
	100,000-499,999	per quarter	6	3	2	1
	≥500,000	per quarter	8	3	3	2

[1] Your monitoring requirements (locations and frequency) are based on the population served by your system.
[2] All systems must monitor during month of highest DBP concentrations.
[3] Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500-3,300. Systems on annual monitoring and subpart H systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. Only one location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location (and month, if monitored annually).

3.0 Very Small System Waiver

This chapter covers:

3.1 Qualifying for the VSS Waiver
3.2 Selecting a Stage 2 Compliance Monitoring Site
3.3 Next Steps: Preparing the Stage 2 DBPR Compliance Monitoring Plan

EPA recognizes that very small systems typically have small distribution systems where the high total trihalomethane (TTHM) and high haloacetic acid-five (HAA5) levels occur at the same location. For this reason, systems serving fewer than 500 people are automatically exempt from IDSE requirements as long as the criteria in Section 3.1 are met, and EPA or your state does not require otherwise.

If you meet the very small system (VSS) waiver criteria and EPA or your state does not notify you that you need to conduct an IDSE, your system has NO further requirements for the IDSE. You will continue Stage 1 compliance monitoring until **Stage 2 compliance monitoring** starts. If you are in a combined distribution system, you must start Stage 2 compliance monitoring based on the schedule of the system with the largest population in your combined distribution system. If you are not in a combined distribution system, you must start Stage 2 compliance monitoring in 2013 (2014 if you must monitor for *Cryptosporidium* under the Long Term 2 Enhanced Surface Water Treatment Rule). See Chapter 2 for more information on determining your schedule. Refer to Appendix D if you are a **consecutive or wholesale system** for specific issues that you should consider.

This chapter discusses the requirements for VSS waivers. These requirements are also outlined on your **requirements summary sheet** in Chapter 2 of this manual.

3.1 Qualifying for the VSS Waiver

How can I qualify for the waiver?

To automatically qualify for the VSS waiver, you must serve fewer than 500 people and have taken TTHM and HAA5 samples. VSS eligibility is not dependent on your Stage 1 DBPR compliance monitoring or other TTHM or HAA5 data results. The results do not have to be below any particular level for you to receive the waiver.

As long as you have TTHM and HAA5 data, you are qualified for the VSS Waiver. You have ***NO further requirements for the IDSE*** unless EPA or your state tells you otherwise.

Many systems will have Stage 1 DBPR compliance monitoring data that will allow them to automatically qualify, including those on reduced monitoring. Some systems in combined distribution systems, however, may not have conducted Stage 1 DBPR compliance monitoring. These systems can still meet the waiver criteria if they have TTHM and HAA5 data. Below is guidance for systems that have compliance data and those that have operational TTHM and HAA5 data

- Systems with Compliance Data: If you have Stage 1 DBPR compliance data and have submitted TTHM and HAA5 results to your state, you have NO further requirements unless you hear otherwise from EPA or your state.

- Systems with Operational Data: If you have not conducted compliance monitoring under the Stage 1 DBPR but have other TTHM and HAA5 data, you should contact EPA or your state to determine if this data is sufficient to qualify for the waiver. Some of the criteria that the reviewer might use to evaluate your data are:

    - Were samples analyzed by approved methods?
    - Were samples analyzed at a certified laboratory?
    - Are the sites located in areas of maximum residence time?
    - Were samples taken during the month of warmest water temperature?

Consecutive systems that do not have any TTHM and HAA5 data for their system should check with their wholesaler to determine if the wholesaler collected any TTHM and HAA5 data in their system.

What if EPA or my state contacts me and requires me to conduct an IDSE?

Remember that even if you qualify for the VSS waiver, ***EPA or your state may require you to conduct an IDSE.*** IDSE sampling requirements for systems serving < 500 people are minor compared to requirements for medium and large systems. Standard monitoring for systems serving < 500 people consists of preparing a monitoring plan, taking dual sample sets at two distribution system locations during the peak historical month, and completing an IDSE report. Refer to the EPA document, *IDSE Guide for Systems Serving < 10,000 People*, for guidance on conducting standard monitoring.

3.2 Selecting a Stage 2 DBPR Compliance Monitoring Site

All systems serving <500 people are required to take one TTHM sample at the location with the highest TTHM concentration, and one HAA5 sample at the location with the highest HAA5 concentration. You can collect a dual sample set at **one location** if the highest TTHM and HAA5 concentrations occur at the same sample location and during the same month.

EPA recommends that you consider using your Stage 1 monitoring location for Stage 2 DBPR compliance monitoring it if meets these criteria. If you did not have a Stage 1 compliance monitoring location, you should work with your state to select the best Stage 2 compliance monitoring location(s). The high TTHM site will typically be an area of high residence time, located at an extreme end or isolated portion of the distribution system. The high HAA5 site will often be at the same location, unless you have difficulty maintaining a distribution system residual.

You should ***not*** select high HAA5 sites in locations that regularly or in the summer months have free chlorine residuals less than 0.2 mg/L or with chloramine residuals less than 0.5 mg/L.

3.3 Next Steps: Preparing the Stage 2 DBPR Compliance Monitoring Plan

As the final step before you can begin compliance monitoring for the Stage 2 DBPR, you must develop a **Stage 2 DBPR compliance monitoring plan**. The plan will be similar to your Stage 1 DBPR monitoring plan in that it will identify how you intend to sample for compliance with Stage 2. You do not need to submit the monitoring plan to EPA or your state, but you must keep it on file for state and public review. Note that Stage 1 DBPR compliance monitoring requirements are in effect until you begin Stage 2 DBPR compliance monitoring.

Exhibit 3.1 contains the minimum requirements for what must be included in your Stage 2 DBPR compliance monitoring plan. Because compliance monitoring plans are not addressed as part of the IDSE provisions of the Stage 2 DBPR, ***EPA has not included detailed guidance for developing Stage 2 compliance monitoring plans in this guidance manual***. EPA plans to develop other manuals and training that specifically address the compliance monitoring provisions of the Stage 2 DBPR.

See EPA's website at http://www.epa.gov/safewater/disinfection/stage2 for an up-to-date inventory of Stage 2 DBPR guidance manuals and training materials, or call the Safe Drinking Water Hotline at 1-800-426-4791.

Exhibit 3.1 Required Contents of Stage 2 DBPR Compliance Monitoring Plans

All Systems	Additional Requirements for Consecutive and Wholesale Systems [1]
• Monitoring locations • Monitoring dates • Compliance calculation procedures	• If your state has used its special primacy authority to modify your monitoring requirements, you must include monitoring plans for other systems in your combined distribution system

1. See Appendix D of this manual for guidance specifically for consecutive and wholesale systems.

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4.0 40/30 Certification

This chapter covers:

Systems can qualify for the IDSE 40/30 certification if they have measured consistently low total trihalomethane (TTHM) and haloacetic acid-five (HAA5) levels during Stage 1 DBPR compliance monitoring. The term " 40/30" refers to a system having all individual Stage 1 DBPR compliance samples less than or equal to 0.040 milligrams per liter (mg/L) for TTHM and 0.030 mg/L for HAA5 during a specific time period.

If you qualify for the 40/30 certification and comply with the certification requirements, and EPA or your state does not notify you that you need to conduct an IDSE, ***your system has NO further requirements for the IDSE.*** Your next steps will be to prepare a compliance monitoring plan and start monitoring for the Stage 2 DBPR. You must continue with Stage 1 DBPR monitoring until you begin Stage 2 monitoring.

If you have not already done so, complete the **flowchart** in Exhibit 2.3 of this guidance manual before reading this chapter. The flowchart directs you to a 2-page ***Requirements Summary Sheet*** which contains compliance dates and additional requirements for complying with the Stage 2 DBPR. You should keep your requirements summary sheet handy as you work through this chapter.

This chapter provides guidance on how to prepare and submit a 40/30 certification letter and select Stage 2 DBPR compliance monitoring sites. If you are a **consecutive or wholesale system**, refer to Appendix D for specific issues that you should consider.

4.1 Qualification Criteria

To be eligible for 40/30 certification, you must meet all of the following requirements for the **8 consecutive quarter eligibility period** shown in Exhibit 4.1:

- You have TTHM and HAA5 data equivalent to what is required by the Stage 1 DBPR for your system (e.g., quarterly, annual, or every third year)
- No individual sample exceeds 0.040 mg/L for TTHM
- No individual sample exceeds 0.030 mg/L for HAA5
- Your system did not have any TTHM or HAA5 monitoring violations

Exhibit 4.1 40/30 Criteria Compliance Dates

Schedule[1]	Stage 1 DBPR Data Eligibility Period[2]	40/30 Certification Deadline
1	8 consecutive calendar quarters starting no earlier than January 2004	October 1, 2006
2		April 1, 2007
3	8 consecutive calendar quarters starting no earlier than January 2005	October 1, 2007
4		April 1, 2008

Notes:
1. Your schedule is defined by population served by your system or by the largest system in your combined distribution system. See Chapter 2 for more information.
2. If you were not required to sample during this period, use data from the 12-month period prior to the eligibility period shown.

Example 4.1 is an example of a system determining whether they meet the 40/30 criteria.

If you don't have Stage 1 compliance data, EPA or your state may allow you to use operational TTHM and HAA5 data to qualify for 40/30 certification if your sampling and analysis met the general intent of Stage 1 DBPR compliance. Some of the criteria that EPA or your state might use to evaluate your data are below.

- Were samples analyzed by EPA approved methods?
- Were samples analyzed at a certified laboratory?
- Is the number of sites adequate to represent the distribution system?
- Are the sites located appropriately (average and maximum residence time)?
- Were samples taken during the month of warmest water temperature?
- Were samples taken at the appropriate frequency (monthly, quarterly or annually)?

Example 4.1 Qualifying for a 40/30 Certification

A ground water system serving 8,000 people with two wells has been sampling annually at two locations in their distribution system under the Stage 1 DBPR. Because they do not buy or sell water, this system is on schedule 4. The table below shows their TTHM and HAA5 data for their eligibility period.

	July 21, 2005		July 24, 2006		July 23, 2007	
	TTHM (mg/L)	HAA5 (mg/L)	TTHM (mg/L)	HAA5 (mg/L)	TTHM (mg/L)	HAA5 (mg/L)
Stage 1 Site 1	0.033	0.015	0.037	0.020	0.035	0.021
Stage 1 Site 2	0.040	0.022	0.035	0.021	0.037	0.019

No individual sample exceeded 0.040 mg/L for TTHM or 0.030 mg/L for HAA5. The system does not have any TTHM or HAA5 monitoring violations during the eligibility period. The system determines that they meet the criteria for the 40/30 certification and they submit their certification for the period of January 1, 2006 to December 31, 2007 by their deadline of April 1, 2008.

Depending on the 8 consecutive quarter eligibility period upon which you are basing your certification, you may be sampling right before your certification deadline. If this is the case, you will not know whether you have met the eligibility criteria for 40/30 certification until these last samples are analyzed. If your TTHM or HAA5 results exceed the 40/30 threshold near the end of the period, you must conduct an IDSE through standard monitoring or a system specific study (SSS). The deadlines for submittal of a standard monitoring plan or a SSS plan are the same as the 40/30 certification deadline shown in Exhibit 4.1. Systems may want to consider preparing a standard monitoring plan if they are concerned that they might exceed the 40/30 levels at the end of the eligibility period.

Remember that even if you meet the eligibility criteria and submit the certification, ***EPA or your state may still require you to conduct an IDSE*** using standard monitoring or an SSS. If this occurs, you may need to work with EPA or your state to determine a schedule for completing a standard monitoring or SSS plan and submitting an IDSE report.

4.2 Preparing and Submitting the Certification Letter

At a minimum, you **must** prepare and submit a statement certifying that you meet the eligibility criteria in Section 4.1. Your certification should also contain basic system information including population served by your system, your system type (subpart H or ground water, community or non-community), and contact information. EPA has developed a **40/30 Certification Letter Form (Form 1)**, shown on the next page, that can be used by any system to prepare a certification letter. This form is also available electronically as part of the **IDSE Tool.** Example 4.2 is a completed certification form for a hypothetical system.

The IDSE Tool creates a custom 40/30 certification form for your system and submits the completed letter to EPA and your state for you. The tool is available on EPA's website at http://www.epa.gov/safewater/disinfection/stage2.

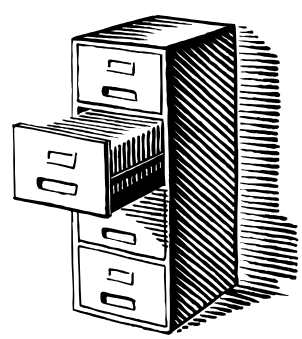
You must submit your certification letter by the deadline in Exhibit 4.1. You should submit the certification to the Information Processing and Management Center (IPMC) for review by EPA or your state. See Section 1.4 of this guidance manual for information on how to submit your letter to the IPMC. If you do not submit either a 40/30 certification, standard monitoring, or study plan by this deadline, you will incur a monitoring and reporting violation. You can submit the letter as early as you want after you have met the requirements.

EPA or your state may require you to submit additional information listed below:

- Stage 1 compliance monitoring results
- A distribution system schematic
- Recommended Stage 2 compliance monitoring locations

If the reviewer wants to request additional information or to have you conduct an IDSE, they will contact you. However, you may not receive a confirmation that your 40/30 certification has been accepted. If you do not hear from EPA or your state within 12 months after the submission deadline, you can assume your certification has been accepted.

4.3 Recordkeeping



You must retain a complete copy of your 40/30 certification letter on file for **10 years** after you submit it to EPA or your state. You must also make your 40/30 certification letter and any notification from EPA or your state available for review by your state or the public.

STAGE 2 DBPR
US EPA-IPMC
P O Box 98
Dayton, OH 45401-0098

System Information

PWS Name:______________________ PWS ID:________________________
Street Address:____________________ Population Served:_________________
City:____________________________
State:____________________________
Zip:_____________________________

Source Water Type: ☐Ground ☐Subpart H
System Type: ☐CWS ☐NTNCWS
Combined Distribution System: ☐Wholesale ☐Consecutive ☐Neither

Contact Person

Name: ________________________ Title: _____________________
Phone Number:___________________ Fax Number (if available):_____________
Email Address (if available):________________________

Certification

I hereby certify that each individual Stage 1 DBPR compliance sample collected from ________ to ______________ was less than or equal to 0.040 mg/L for TTHM and 0.030 mg/L for HAA5. I understand that to be eligible, each individual sample must be equal to or below these values. I also certify that this PWS collected all required Stage 1 samples and did not have any Stage 1 monitoring violations during this time period.

Signature:__________________ Date:_______________________

Example 4.2 Completed 40/30 Certification Letter Using Form 1

STAGE 2 DBPR
US EPA-IPMC
P O Box 98
Dayton, OH 45401-0098

System Information

PWS Name: Hometown
PWS ID: US 1234567
Street Address: 987 Main Street
Population Served: 25,976
City: Hometown
State: XX
Zip: 12345

Source Water Type: ☐Ground ✓Subpart H
System Type: ✓CWS ☐NTNCWS
Combined Distribution System: ☐Wholesale ☐Consecutive ✓Neither

Contact Person

Name: Jim Smith
Title: Certified Operator
Phone Number: 987-6543
Fax Number (if available):
Email Address (if available): J.smith@hometown.gov

Certification

I hereby certify that each individual Stage 1 DBPR compliance sample collected from March 2005 to February 2007 was less than or equal to 0.040 mg/L for TTHM and 0.030 mg/L for HAA5. I understand that to be eligible, each individual sample must be equal to or below these values. I also certify that this PWS collected all required Stage 1 samples and did not have any Stage 1 monitoring violations during this time period.

Signature: Jim Smith *Date:* May 13, 2007

4.4 Selecting Stage 2 Compliance Monitoring Sites

The required number and type of sites for Stage 2 DBPR compliance monitoring are based on your source water type and the population served by your system. Monitoring requirements are summarized on the second page of your ***Requirements Summary Sheet*** in Chapter 2 and presented again here in Exhibit 4.2. Keep in mind that even if you qualify for reduced monitoring under Stage 2 compliance monitoring, you must still select the required number of monitoring sites as shown in Exhibit 4.2 and include them in your Stage 2 compliance monitoring plan (see Section 4.5 for a summary of compliance monitoring plan requirements).

Due to the change from plant-based monitoring under the Stage 1 DBPR to population-based monitoring for the Stage 2 DBPR, you may have **the same number, more, or fewer** monitoring sites for Stage 2 compared to Stage 1. Compare your required number of Stage 2 DBPR sites to the total number of Stage 1 DBPR monitoring sites for all plants in your system. Depending on your findings, go to the appropriate subsection (4.4.1, 4.4.2, or 4.4.3) for guidance on selecting Stage 2 DBPR compliance monitoring sites.

Exhibit 4.2 Stage 2 Compliance Monitoring Requirements

Source Water Type	Population Size Category	Monitoring Frequency[1]	Total Number of Distribution System Monitoring Locations [2]
Subpart H	<500	per year	2
	500-3,300	per quarter	2
	3,301-9,999	per quarter	2
	10,000-49,999	per quarter	4
	50,000-249,999	per quarter	8
	250,000-999,999	per quarter	12
	1,000,000-4,999,999	per quarter	16
	≥5,000,000	per quarter	20
Ground Water	<500	per year	2
	500-9,999	per year	2
	10,000-99,999	per quarter	4
	100,000-499,999	per quarter	6
	≥500,000	per quarter	8

[1] All systems must monitor during the month of highest DBP concentration.

[2] Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500-3,300. Systems on annual monitoring and subpart H systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. Only one location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location (and month, if monitored annually).

4.4.1 You Have THE SAME Number of Stage 1 Sites as Required by the Stage 2 DBPR

If the number of Stage 1 DBPR monitoring locations in your system is exactly the same as the required number of Stage 2 DBPR monitoring locations, continue to use all of your Stage 1 DBPR sites for Stage 2 DBPR compliance monitoring.

4.4.2 You Have MORE Stage 1 Sites than Required by the Stage 2 DBPR

If you have more Stage 1 sites than you need for Stage 2 DBPR monitoring (this could be the case if you have multiple treated entry points in your system), you **must** select the sites with highest DBP levels for Stage 2 monitoring. You must alternate your site selection between locations representing high TTHM levels and high HAA5 levels, starting with high TTHM.

To identify locations representing high TTHM levels and high HAA5 levels, EPA recommends that you use Stage 1 DBPR monitoring results. Specifically, you can use the 4-Step process outlined below:

Step 1: Calculate the locational running annual average (LRAA) TTHM and HAA5 concentrations at each Stage 1 DBPR monitoring site. You should use data for the most recent calendar year, as long as this year is generally representative of typical system conditions.

For systems collecting quarterly data: LRAA = (Q1 + Q2+ Q3 + Q4) / 4 For systems collecting annual data (once/year): LRAA = result for warmest temperature month

Step 2: Select the site with the highest TTHM LRAA as your first high TTHM site

Step 3: Select the site with the highest HAA5 LRAA not previously selected as your first high HAA5 site

Step 4: Repeat Steps 2 and 3, selecting the next highest sites for TTHM and HAA5 respectively, until the total number of selected sites equals the number of sites required for Stage 2 DBPR compliance monitoring (as shown in Exhibit 4.2)

You can use the site selection Worksheet 4.1 to organize your Stage 1 DBPR data and select Stage 2 DBPR monitoring sites. If you use this form, you should consider keeping it as part of your Stage 2 DBPR monitoring plan (see Section 4.5).

Worksheet 4.1 Stage 2 DBPR Site Selection for Systems Getting the 40/30 Certification

Instructions: *Enter the site ID and LRAAs for each Stage 1 DBPR monitoring location. You may want to sort your entries in order by TTHM LRAA or HAA5 LRAA values.*

As you work through the site selection protocol, fill in the "Stage 2 Site Type" column each time you select a site to indicate whether the site is a high TTHM or high HAA5 site. This will help you to track which sites have already been selected and can help you ensure that you select the required number of each type of site.

Stage 1 DBPR Monitoring Site ID	LRAA		Stage 2 Site Type*
	TTHM (mg/L)	HAA5 (mg/L)	
Example	0.032	0.025	1st high TTHM

** Enter high TTHM or high HAA5 site*

4.4.3 You Have FEWER Stage 1 Sites than Required by the Stage 2 DBPR

If you do not have enough Stage 1 sites to meet Stage 2 DBPR monitoring requirements (this could be the case if you are a large system with very few treatment plants), you **must** select additional sites. You must identify additional locations by alternating selection of locations representing high TTHM and high HAA5. Remember that you will need to provide a justification for the new site selection in your Stage 2 compliance monitoring plan discussed in Section 4.5 below.

General guidelines for selecting candidate locations for high TTHM and high HAA5 sites are provided below. Guidance for final site selection considering other factors follows. If you would like more information about formation of disinfection by-products, refer to Appendix A. In addition, Chapter 7 provides a more in-depth discussion of how to select sites that represent high levels of TTHM or HAA5.

High TTHM sites

In general, **higher water temperatures** and **increased water age** lead to higher TTHM concentrations. Exhibit 4.3 provides typical characteristics of high TTHM sites. Storage facilities in a distribution system typically increase water age. Therefore, if your system has storage tanks or reservoirs, you should locate high TTHM sites downstream of those tanks. In addition, sites near dead ends and sparsely populated residential areas can be likely sites for high TTHM. Be sure to locate the sites before or at the last group of customers on a dead end line. Samples taken at the very end of a dead end line are not representative of the water received by customers.

Exhibit 4.3 Typical Characteristics of High TTHM Sites

High TTHM sites are often located:
- hydraulically downstream of storage facilities
- near the ends of the distribution system, at or before the last group of customers
- in hydraulic dead-ends, where flow of water is low or stagnant
- prior to the last fire hydrant

Sample sites should <u>not</u> be located:
- at a dead-end where there are no customers.
- prior to booster disinfection with chlorine

High HAA5 Sites

As with TTHM, higher temperatures and increased residence time can lead to higher HAA5 concentrations. However, ***HAA5 can biodegrade*** where biological activity is present and disinfectant residual levels are low or non-existent. Therefore, you should consider locating high HAA5 sites where disinfectant residuals are significantly less than the system average (indicating a long residence time), but **avoid areas that have very low or no residual**. When booster disinfection is applied, the disinfectant residual will increase despite advanced water age. HAA5 levels are likely to increase after a booster disinfectant is applied due to the greater concentration of disinfectant available to react with DBP precursors and the lack of biological activity in these areas. Therefore, if your system practices booster disinfection, you should locate high HAA5 sites after booster disinfection is applied.

You should ***not*** select high HAA5 sites in locations that regularly or in the summer months have free chlorine residuals less than 0.2 mg/L or with chloramine residuals less than 0.5 mg/L.

Final Site Selection

Once you have considered the likely high TTHM and HAA5 locations in your distribution system, you will choose the best locations for monitoring. Consider the following issues when making these choices.

- Select sites that provide the best geographic and hydraulic representation.
- Make sure that you have located sites in as many key areas as possible. These would include isolated portions of the distribution system, areas downstream of tanks, areas downstream of booster chlorination, and within each pressure zone.
- Consider site access issues as each selected site must remain accessible over the long term.

4.5 Next Steps: Preparing the Stage 2 DBPR Compliance Monitoring Plan

As the final step before you can begin compliance monitoring for the Stage 2 DBPR, you must develop a **Stage 2 DBPR compliance monitoring plan**. The plan will be similar to your Stage 1 DBPR monitoring plan in that it will identify how you intend to sample for compliance with Stage 2. You must keep your plan on file for state and public review. If you are a subpart H system serving > 3,300 people, you **must** also submit your plan to EPA or your state prior to when you are required to start monitoring.

Exhibit 4.4 contains the minimum requirements for what must be included in your Stage 2 DBPR compliance monitoring plan. Because compliance monitoring plans are not addressed as part of the IDSE provisions of the Stage 2 DBPR, ***EPA has not included detailed guidance for developing Stage 2 compliance monitoring plans in this guidance manual***. EPA plans to develop other manuals and training that specifically address the compliance monitoring provisions of the Stage 2 DBPR.

See EPA's website at http://www.epa.gov/safewater/disinfection/stage2 for an up-to-date inventory of Stage 2 DBPR guidance manuals and training materials, or call the Safe Drinking Water Hotline at 1-800-426-4791.

Exhibit 4.4 Required Contents of Stage 2 DBPR Compliance Monitoring Plans

All Systems	Additional Requirements for Systems Getting the 40/30 Certification	Additional Requirements for Consecutive and Wholesale Systems [1]
• Monitoring locations • Monitoring dates • Compliance calculation procedures	• If you had FEWER Stage 1 DBPR compliance monitoring sites than required by the Stage 2 DBPR, you must include the rationale for identifying locations as having high levels of TTHM or HAA5	• If your state has used its special primacy authority to modify your monitoring requirements, you must include monitoring plans for other systems in your combined distribution system

1. See Appendix D of this manual for guidance specifically for consecutive and wholesale systems.

5.0 System Specific Study Using Existing Monitoring Results

This chapter covers:

This system specific study (SSS) allows systems to avoid duplicating field monitoring efforts under the Initial Distribution System Evaluation (IDSE) if they already have significant existing total trihalomethane (TTHM) and haloacetic acid-five (HAA5) data. Some systems may have operational TTHM and HAA5 data beyond what is required by the Stage 1 Disinfectants and Disinfection Byproducts Rule (DBPR) that will allow them to qualify for this IDSE option. Other small and medium systems with many plants may be able to qualify using their Stage 1 DBPR data (these systems may have more data for Stage 1 than will be required by the Stage 2 DBPR because of the change from plant-based to population-based monitoring requirements). Section 5.1 provides the minimum requirements systems must meet to qualify for the existing monitoring SSS.

If you have not already done so, you should complete the **flowchart** in Exhibit 2.3 of this guidance manual. The flowchart will help you select the most appropriate IDSE option for your system and will direct you to a 2-page ***Requirements Summary Sheet*** for your schedule. You will also be directed to the ***System Specific Study Requirements - Attachment*** sheet containing detailed requirements for Stage 2 compliance monitoring (e.g., number of samples and sampling frequency). You should keep these sheets handy as you work through this chapter.

This chapter provides guidelines for compiling results, preparing an Existing Monitoring Results SSS Plan, selecting Stage 2 DBPR compliance monitoring sites, and preparing the IDSE report. Appendix E supports this chapter by providing an example SSS plan and report for a surface water system serving 40,000 people.

It is important that **consecutive and wholesale systems** communicate with each other throughout the IDSE process. If you are a consecutive or wholesale system, refer to **Appendix D** for specific issues that you should consider.

If you plan to conduct an SSS using existing monitoring results, you must submit an SSS study plan for state or EPA review in accordance with the schedule on your requirements summary sheet found in Chapter 2. You have the option of submitting the SSS plan and IDSE report together (which must include selection of Stage 2 DBPR compliance monitoring sites) by the study plan deadline if all monitoring is complete. If you choose this option, you have no further requirements under the IDSE unless you are contacted by EPA or your state. Alternatively, you may submit the SSS plan first, conduct additional monitoring, then submit your IDSE report for the existing monitoring results SSS by the report deadline in your requirements summary sheet. Below is a discussion of when you should use each of these two options.

Option 1: Submitting a Completed Study Plan and IDSE Report at the Same Time

You should consider Option 1 if:

- You have at least as much data as the minimum requirements.
- You believe that your existing data provides good coverage of your system and adequately identifies locations of high TTHM and HAA5.

You need to:

- Select Stage 2 DBPR compliance monitoring locations based on your existing monitoring results.
- Submit both the SSS plan and IDSE report by the deadline for the SSS plan provided on your requirements summary sheet.

Option 2: Submitting a Separate SSS Plan and IDSE Report

You should consider Option 2 if:

- You believe that Stage 1 compliance monitoring data collected during the IDSE period can help select Stage 2 compliance monitoring sites.
- You have additional operational monitoring planned that will aid you in selecting Stage 2 DBPR compliance monitoring sites.
- Your existing data does not provide good geographic coverage of your system.

You need to:

- Submit the SSS plan by the deadline provided on your requirements summary sheet.
- Conduct additional monitoring by the date listed in your requirements summary sheet.
- Select Stage 2 DBPR compliance monitoring sites based on existing and new monitoring results.
- Submit your IDSE report by the deadline in your requirements summary sheet.

5.1 Qualifying for an Existing Monitoring Results SSS

Checklist 5.1 on the next page contains the minimum requirements your system must meet to qualify for an SSS using existing monitoring results. The data you use to meet the minimum number of monitoring locations and number of samples must meet the criteria presented in the checklist. Remember, though, that EPA or your state can still require you to conduct standard monitoring even if you qualify for the existing monitoring results SSS.

The following sections provide additional guidance for evaluating your data, source water conditions, and distribution system conditions to determine if you qualify.

5.1.1 Evaluating Existing Monitoring Data

You must have collected at least the total number of TTHM and HAA5 samples as shown in Checklist 5.1. You must also have sampled from the minimum number of locations shown for your system size and source water type. Your existing monitoring results must include your Stage 1 DBPR compliance monitoring data. All of the data you use to count towards these minimum numbers must meet the criteria in the checklist. All data must have been collected within ***five years prior to your SSS plan deadline*** as listed on your requirements summary sheet found in Chapter 2. See Exhibit 5.1 for the five-year qualifying periods for each Stage 2 DBPR schedule.

Exhibit 5.1 Qualifying Period for the Existing Monitoring Results SSS

Schedule[1]	SSS Plan Deadline	Five-Year Qualifying Period for Existing Monitoring Results
1	October 1, 2006	October 1, 2001 - October 1, 2006
2	April 1, 2006	April 1, 2001 - April 1, 2006
3	October 1, 2007	October 1, 2002 - October 1, 2007
4	April 1, 2008	April 1, 2003 - April 1, 2008

Note:
1. Your schedule is defined by population served by your system or by the largest system in your combined distribution system. You should have received a letter from EPA or your state with your schedule for the Stage 2 DBPR. See Chapter 2 for more information.

Checklist 5.1 Minimum Requirements Checklist for an SSS Using Existing Monitoring Results

Yes	No	
☐	☐	Do you have at least the minimum number of distribution system monitoring locations shown in the table below from which you collected TTHM and HAA5 samples?
☐	☐	Do you have at least the minimum number of TTHM samples and HAA5 samples shown in the table below?
☐	☐	Was each monitoring location sampled once during the peak historical month for TTHM, HAA5, or warmest water temperature for every 12 months of qualifying data submitted?
☐	☐	Were all qualifying samples collected and analyzed in accordance with an approved EPA method and by a certified laboratory?
☐	☐	Were all sample results collected no earlier than five years prior to your SSS plan submission deadline?
☐	☐	Have your distribution system and treatment not changed significantly since you collected your samples?
☐	☐	Are your existing monitoring locations representative of your entire distribution system?

*If you answered yes to **all** of the above questions, you meet EPA's minimum requirements for an SSS using existing monitoring results. Remember, though, that EPA or your state can still require you to conduct standard monitoring, even if you meet the minimum requirements, or you can choose to conduct standard monitoring.*

Source Water Type	System Size Category (Population Served)	Minimum Number of Monitoring Locations	Minimum Number of Samples	
			TTHM	HAA5
Subpart H	<500	3	3	3
	500-3,300	3	9	9
	3,301-9,999	6	36	36
	10,000-49,999	12	72	72
	50,000-249,999	24	144	144
	250,000-999,999	36	216	216
	1,000,000-4,999,999	48	288	288
	≥5,000,000	60	360	360
Ground Water	<500	3	3	3
	500-9,999	3	9	9
	10,000-99,999	12	48	48
	100,000-499,999	18	72	72
	≥500,000	24	96	96

Each location must have been sampled once during the **peak historical month for TTHM, HAA5, or warmest water temperature** for every 12 months of qualifying data. You should identify your month of high TTHM, high HAA5 or warmest water temperature by reviewing your compliance or other operational data. If you have more than one source in your system, you should base the peak historical month on the source associated with the highest TTHM or HAA5 formation.

If you have monthly or quarterly TTHM or HAA5 data, EPA recommends that you use these results to identify your peak historical month. You can also evaluate water temperature data to identify the peak historical month for each year. If the peak historical month for TTHM, HAA5, or water temperature is different in different years, you should select the month that is most reflective of your system's normal operating and climatological conditions and use that month throughout your analysis. You should document the basis for your peak historical month for TTHM, HAA5, or warmest water temperature in your SSS Plan (See Section 5.2 for guidance on preparing your SSS plan).

Your existing monitoring results for TTHM and HAA5 must have been collected and analyzed in accordance with **an approved EPA method**. See Appendix C of this manual for information on sample collection and approved methods. Your results must have been generated by a certified laboratory.

If you have several years worth of data during your five-year qualifying period, you can use different locations sampled in different years to qualify, as long as the data meet all other criteria for the SSS. Alternatively, you can qualify exclusively with data from one 12-month period, as long as the 12-month period is within five years prior to your SSS plan deadline. If you have data that spans more than 12 months, but not 24 months, the data from one peak historical month can only be used to qualify one 12-month period of data. For example, if you have collected data from January 2004 through June 2005 and August is your peak historical month, you may only use data from one 12-month period (e.g., January 2004-January 2005 or June 2004-June 2005) to count toward your minimum requirements. See Examples 5.1 and 5.2 for how hypothetical systems used their existing monitoring results to qualify for the SSS.

As you evaluate your data, keep in mind that **you are required to include all of your Stage 1 DBPR compliance monitoring data and all other operational TTHM and HAA5 data collected during the time period beginning with the first reported result and ending with the most recent Stage 1 DBPR results.** This includes data that may not meet qualifying criteria such as samples analyzed by a non-certified laboratory. You must submit this data even though it does not count toward your minimum number of locations and samples. You should verify that the qualifying data you submit meet the minimum numbers and criteria for an existing monitoring results SSS.

See Section 5.1.4 and the instructions for filling out Form 2 in Section 5.2 of this manual for suggestions for compiling your data.

Example 5.1 Qualifying With Multiple Years of Data Collected From Different Locations

A surface water system serving 9,000 people has extensive operational DBP data from their distribution system. Because they purchase water from a wholesale system serving 110,000 people, they are on Schedule 1 for the IDSE, and their SSS plan is due on October 1, 2006. The system samples quarterly at one location under the Stage 1 DBPR. Below is a description of their TTHM and HAA5 data from their system during the qualifying period (October 1, 2001 - October 1, 2006)

Peak Historical Month for TTHM, HAA5 or water temperature:	August, based on high TTHM and water temperature
Special Monitoring Program, January 2002 through December 2003:	Collected TTHM and HAA5 samples quarterly at 4 locations. Monitored during peak historical month for 2002 and 2003. Total qualifying samples = 32 TTHM 32 HAA5
Special Monitoring Program, January 2004 through December 2005:	Collected TTHM and HAA5 samples twice per year at 1 of the previous 4 locations plus 1 new location. Monitored during peak historical month in 2004 and 2005. Total qualifying samples = 8 TTHM 8 HAA5
Stage 1 Compliance Monitoring, January 2004 through December 2005:	Collected one TTHM and HAA5 sample per quarter at the Stage 1 DBPR compliance monitoring site. Monitored during peak historical month in 2004 and 2005. Total qualifying samples = 8 TTHM 8 HAA5
	Total Monitoring Locations = 6 (4+1+1) **Total qualifying samples = 48** (32+8+8) TTHM **48** (32+8+8) HAA5

The system has made no significant changes to treatment or the distribution system since the data were collected. They used certified laboratories and approved methods for all data collected. This system qualifies for the SSS using existing monitoring results. They plan to submit both their SSS plan and IDSE report by their plan deadline (October 1, 2006).

Example 5.2 Qualifying Using Data from a One-Year Special Study

A subpart H water system serving 90,000 people serves a geographically diverse community. They have three springs that are ground water under the direct influence of surface water (GWUDI) and are each treated at the spring. The system currently monitors quarterly for the Stage 1 DBPR at 12 distribution system monitoring locations.

This system conducted a detailed study of TTHM and HAA5 levels in their system in calendar year 2003. They monitored quarterly at 16 different locations in their system (in addition to Stage 1 DBPR compliance monitoring locations) and collected a total of 64 TTHM and HAA5 samples. Also during 2003, the system conducted quarterly monitoring at 12 sites for Stage 1 DBPR compliance, generating a total of 48 TTHM and HAA5 results. Dual samples were taken at each site during the peak historical month of July during calendar year 2003.

Total monitoring locations = 28 (16+12)
Qualifying samples in 2003 = 112 (64+48) TTHM
= 112 HAA5
Qualifying samples in 2004 = 48 TTHM
= 48 HAA5
Qualifying samples in 2005 = 48 TTHM
= 48 HAA5
Qualifying samples in 2006 = 48 TTHM
= 48 HAA5
Total qualifying samples = 256 (112+48+48+48) **TTHM**
256 (112+48+48+48) **HAA5**

The system has made no significant changes to treatment or the distribution system since the data were collected. They used certified laboratories and approved methods for all data collected. This system qualifies for the SSS using existing monitoring results. They plan to submit both their SSS plan and IDSE report by their plan deadline (by April 1, 2007).

5.1.2 Evaluating Treatment and Source Conditions

The monitoring results used for your SSS should reflect the source water(s) and treatment configuration in place at the time that your SSS is completed. Within the period of the SSS data, temporary changes, such as regular maintenance, rehabilitation, and upgrades of plant processes are generally acceptable. Temporary changes to disinfection practices are also generally acceptable within the period of the SSS data. Regular, repeating, and seasonal changes in supply or treatment are allowable during the SSS qualifying period and should be reflected in data submitted.

If you made permanent changes to your system that significantly affected relative DBP formation in the distribution system, ***only existing monitoring results representing conditions after the change should be used for your SSS.*** Treatment changes that affected the magnitude of TTHM and HAA5 levels in the distribution system, but that are unlikely to have changed the DBP formation rate and relative levels of TTHMs and HAA5s in different parts of the system, are acceptable. For example, improved control of an existing coagulation process or minor changes in coagulation pH that reduce average levels of DBP precursors are acceptable. If treatment process or source changes have occurred and data collected prior to the change are utilized in an SSS, then the use of the data should be justified. An explanation of the change and a demonstration that the change is unlikely to have significantly affected the relative TTHM and HAA5 levels in the distribution system should be provided. See Appendix A for more information on factors affecting DBP formation.

5.1.3 Evaluating Distribution System Conditions

Your qualifying data must reflect the overall distribution system hydraulic operation and large-scale movement of water through your system at the time you submit your SSS plan or report. Normal daily and seasonal changes in system operation during the data collection period for the SSS are acceptable. Supply points, pressure zones, large transmission mains, pump stations, storage tanks, and large wholesale and retail customers should generally be consistent throughout the data collection period for the SSS and submittal of your study plan and IDSE report, but do not have to remain exactly the same. A steady increase in water demand over time that occurs in many systems due to growth is acceptable during the data collection period for the SSS, if it did not result in major changes in water flow pattern and age within the distribution system.

Exhibit 5.2 Examples of System Changes[1]

Temporary Changes that do not Significantly Impact DBP Formation	Permanent Changes that are Generally Considered Cutoff Points for Using Existing Data

• Regular maintenance, rehabilitation, and upgrades of plant processes
• Short duration switches to free chlorine for secondary disinfection:
  • to control nitrification in a chloraminated system
  • for short duration emergencies
  • for special disinfection operations
	• Adding booster chlorination in the distribution system
	• Addition of a new water source
	• Addition or removal of a very high water use customer (industrial, institutional, or wholesale)
	• Addition, deletion, or replacement of mains or storage tanks that significantly change water flow patterns
	• Large main looping projects that significantly change water flow patterns

[1] Note that this list is not comprehensive—you should use best professional judgement to determine if a modification to your treatment or distribution system should be considered a cutoff point for the use of existing monitoring results.

Significant distribution system changes that should be considered as cutoff points for the use of existing monitoring results include:

- Major, permanent changes in plant production rates, installation or removal of high service or booster pump stations, or pump operation schemes that significantly change the location of influence zones of treatment plants and mixing zones within the distribution system.

- Major, permanent changes in water use patterns or system hydraulics.

Specific examples of these types of changes are shown in Exhibit 5.2.

This list is not comprehensive—you should use best professional judgement to determine if a modification to your distribution system should be considered a cutoff point for the use of existing monitoring results.

5.1.4 Compiling Your Data and Calculating LRAAs

You must include ***all*** of your existing TTHM and HAA5 data (Stage 1 compliance and operational data) from the first monitoring date that you included through the most recent Stage 1 DBPR compliance monitoring results in your SSS plan and certify that you have not omitted any data. The Stage 2 DBPR requires all data to be submitted to confirm that there were no significant or permanent changes to source water quality (swings or shifts) during the monitoring period that might affect the selection of appropriate Stage 2 compliance monitoring sites.

To organize your data for submission, compile your data into a table or spreadsheet format. You may wish to use the tables in the SSS plan form in this chapter. You should note which location IDs are Stage 1 compliance locations. If your locations were monitored at different time intervals (e.g., twice / year vs. quarterly), consider organizing your data such that data from your peak historical month lines up vertically.

You should select a repeating 12-month period for your data analysis, and calculate the annual average at each monitoring site for that time period for every 12-month period of qualifying data submitted. See the instructions for filling out Form 2 in Section 5.2 for more suggestions on how to organize your data.

5.2 Preparing Your Existing Monitoring Results SSS Plan

Every system that conducts an SSS using existing monitoring results **must** prepare and submit an SSS study plan. You should submit the plan to the Information Processing and Management Center (IPMC) for review by EPA or your state. See Section 1.4 of this guidance manual for information on how to submit your plan to the IPMC.

EPA has developed an **Existing Monitoring Results SSS Form (Form 2)**, presented in this section and available electronically as part of the **IDSE Tool.** You are not required to use this form; however, if you choose not to use it, refer to Exhibit 5.3 for a list of the minimum elements you must include in your SSS study plan.

The IDSE Tool creates a custom form for your system and provides links to technical guidance from this manual. The tool is available on EPA's website at http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

Your deadline for submitting your study plan can be found on your requirements summary sheet in Chapter 2. If EPA or your state does not approve or request modifications to your plan, or notify you that your plan is still under review **within 12 months** after the deadline for plan submission, **you may consider the plan approved**.

Exhibit 5.3 Required Elements of Your SSS Plan

- The population served by your system.
- Your system type (subpart H or ground water).
- All stage 1 DBPR monitoring results and other monitoring results generated during the time period beginning with the first reported result and ending with the most recent Stage 1 DBPR compliance results.
- Certification that the reported monitoring results include all compliance and non-compliance results generated during the time period beginning with the first reported result and ending with the most recent Stage 1 result.
- Certification that the samples were representative of the entire distribution system and that the treatment and distribution system have not changed significantly since the samples were collected.
- A distribution system schematic showing entry points, sources, storage facilities, and locations and dates of all completed and planned (if applicable) compliance and non-compliance monitoring.
- Identification of your peak historical month for TTHM, HAA5 or warmest water temperature.

The Existing Monitoring Results SSS Plan Form (Form 2) includes the following sections:

I. General Information
II. SSS Requirements
III. Peak Historical Month
IV. Previously Collected Monitoring Results
V. Certification of Data
VI. Proposed SSS Monitoring Dates
VII. Distribution System Schematic
VIII. Attachments

Sections of the form with an asterisk (*) are required by the Stage 2 DBPR. An example of a completed form is provided in Appendix E of this guidance manual.

I. General Information

I.A. PWS Information* - Important definitions for classifying your system are provided in the **definitions section** at the beginning of this guidance manual. If you have any questions on this section, contact EPA or your state.

PWSID - Enter your PWSID identification number here. This number is typically assigned by your state.

PWS Name - Enter the name of your system here.

PWS Address - Enter the primary mailing address for your water system here.

Population Served - Enter the number of people served by your PWS. Remember, this is your RETAIL population served, not including the population served by consecutive systems that purchase water from you.

System Type - Put a check mark in the appropriate box to identify whether your system is a CWS or a NTNCWS. Definitions for CWS and NTNCWS can be found in the **definitions section** at the beginning of this guidance manual.

Source Water Type - Put a check mark in the appropriate box to identify whether your system is a subpart H system or a ground water system. If you use any surface water or GWUDI as a source, mark the subpart H box. Definitions for subpart H system (including GWUDI) and ground water system can be found in the **definitions section** at the beginning of this guidance manual.

Buying/Selling Relationships - Put a check mark in the appropriate box to identify whether your system is a consecutive system, a wholesale system, or neither. If you are both a consecutive and wholesale system (e.g., you buy and sell water), check both boxes. Definitions for consecutive system and wholesale system can be found in the **definitions section** at the beginning of this guidance manual and in **Appendix D**.

I.B. Date Submitted* - Enter either the date that you are submitting the form electronically, putting it in the mailbox, or dropping it off with an express delivery service. Be sure to submit your SSS study plan before the deadline found on your requirements summary sheet.

I.C. PWS Operations - This section asks questions about your system to help inform EPA and state personnel during the plan review process.

Residual Disinfectant Type - Put a check mark in the appropriate box to identify the type of disinfectant you most often use **to maintain a residual in your distribution system** (not necessarily the same disinfectant used for primary disinfection at the treatment plant). If you use chloramine but switch to free chlorine for a short time, you should still check chloramine only. If you use chloramine and chlorine regularly in your system (e.g, 4 months of free chlorine and 8 months of chloramines), check both chlorine and chloramine. If you maintain your residual with a disinfectant other than chlorine or chloramines (e.g., chlorine dioxide), you should place a check next to the box marked “Other” and enter the type of disinfectant you use in the blank next to “Other”.

Number of Disinfected Sources - Enter the total number of sources that deliver disinfected water to your distribution system. If you connect to a single wholesale system at a number of locations in your distribution system, consider this one purchased source. Multiple wells that are disinfected at a common treatment plant should also be considered one source. Do not count wells that are not disinfected or are disinfected by UV only.

I.D. Contact Person* - Enter the contact information of the person who is submitting the form. This should be the person who will be available to answer questions from EPA and/or the state reviewers.

II. SSS Requirements*

II.A. Minimum Number of Monitoring Locations - Refer to the ***System Specific Study Requirements - Attachment*** sheet in Chapter 2. Copy the numbers from the “SSS Existing Data - Minimum Sample Requirements” table for the number of monitoring locations that corresponds to your source type and the population served by your system.

II.B. Minimum Number of Required Samples - Refer to the ***System Specific Study Requirements - Attachment*** sheet in Chapter 2. Copy the numbers from the “SSS Existing Data - Minimum Sample Requirements” table for the number of TTHM and HAA5 samples that corresponds to your source type and the population served by your system.

II.C. IDSE Schedule - Enter the schedule for your system based on the **letter** sent to you from EPA or your state. See Chapter 2 for more information on the letter.

III. Peak Historical Month

III.A. Peak Historical Month for TTHM, HAA5 or Warmest Water Temperature* - Enter the month that you determined to be your peak historical month for TTHM, HAA5 or warmest water temperature for your existing monitoring results.

III.B. If Multiple Sources, Source Used to Determine Peak Historical Month - If your system has only one source, write “N/A” here. If you have more than one source, write the name of the source you used as the basis for determining peak historical month. For example, if a system has one surface water, one ground water, and one purchased ground water source, it is likely that they relied heavily on data from the surface water source to select their peak historical month. This system would write “surface water source” in the blank provided.

III.C. Peak Historical Month Based On - Put a check mark in the appropriate box to identify whether your system used TTHM, HAA5, or warmest water temperature to determine the peak historical month. If more than one were used, check as many as necessary. If you used data other than TTHM, HAA5 and temperature data to select your peak historical month (e.g., you used TOC data and/or water age data), describe how you used additional data here.

IV. Previously Collected Monitoring Results*

IV.A. Where were your TTHM and HAA5 samples analyzed? - Put a check mark in the appropriate box to identify whether your system analyzed TTHM and HAA5 samples in an in-house laboratory or sent the samples to a certified laboratory for analysis.

If you analyzed your TTHM and HAA5 samples in an in-house laboratory, check the appropriate box to identify whether your laboratory is certified. If you sent your TTHM and HAA5 samples to a certified laboratory, enter the name of the laboratory in the blank. If you used more than one laboratory (e.g., if you used different laboratories for operational and compliance samples), list both laboratories, or check "in-house" and list the name of the laboratory if applicable.

IV.B. What method was used to analyze your TTHM and HAA5 samples? Put a check mark in the appropriate box to indicate the analytical method used to measure TTHM and HAA5. If more than one method was used (e.g., if you used different methods for operational and compliance samples), check more than one method. If you do not know what method was used, contact your laboratory.

IV.C. TTHM Results - Enter the TTHM results for each monitoring site for each monitoring period in which you collected data. Attach additional copies of this page if needed. Alternatively, you can use your own format and submit all monitoring results in an attachment. Guidelines for using the data tables in this section of Form 2 to report results are provided below.

- **If you have multiple years of data at a monitoring location:** Select a repeating 12-month period for your data analysis. You may choose the calendar year, fiscal year, or other 12-month period. While you can select any 12-month period, you must include one sample for the peak historical month for every 12 months of qualifying data submitted. List each 12-month period in a separate row and indicate the 12-month period during which the data were collected. List multiple years of data for each monitoring location before continuing to the next monitoring location.

- **If you have data from one 12-month period at a monitoring location:** Use the 12-month period for which you have collected data, even if you used a different time period for other monitoring locations.

Enter the site ID for each location, and note which site IDs are Stage 1 compliance locations. If your locations were monitored at different time intervals (e.g., twice/year vs. quarterly), consider organizing your data such that data from your peak historical month lines up vertically. For each sample result, enter the date on which sampling was conducted.

In the column marked "Data Qualifies (yes/no)," indicate whether the data in the row are qualifying data. To be considered qualifying data, the samples must be analyzed by a certified laboratory using an approved method, and each location must be sampled during the peak historical month identified in III.A for each 12-month period of data submitted. See Section 5.1.1 for more information.

Calculate the LRAA for each 12-month period of qualifying data submitted and enter it in the last column in the table. If you did not monitor on a regular basis, compute quarterly averages first, then use these values to calculate your LRAA. If you took a sample once during the peak historical month, then your LRAA is the single result from your peak historical month.

Appendix E provides an example of how you can present your data.

Remember, you **must** include all Stage 1 DBPR compliance results and operational results generated during the time period beginning with the first result reported for the SSS and ending with the most recent Stage 1 DBPR results.

IV.D. HAA5 Results - Enter the HAA5 results for each monitoring site for each monitoring period in which you collected data. For each sample result, enter the date on which sampling was conducted. Attach additional copies of this page if needed. Alternatively, you can use your own format and submit all monitoring results in an attachment.

Use the same 12-month periods you used to report TTHM data under IV.C. Refer to IV.C. for suggestions on how to organize and report your data.

Remember, you **must** include all Stage 1 DBPR compliance results and operational results generated during the time period beginning with the first result reported for the SSS and ending with the most recent Stage 1 DBPR results.

V. Certification of Data* - Carefully read the criteria listed in this section and review your system data to verify that each statement is true. If all statements are true, sign your name and enter the date in the spaces provided.

VI. **Proposed SSS Monitoring Schedule*** - *Skip this section if you are submitting your IDSE report at the same time as your SSS plan. Complete it only if you plan to conduct monitoring during the SSS period.*

Enter the ID for each monitoring site in the table (verify that these match the IDs you enter on your schematic), and enter your proposed sampling schedule. The entry can be a specific date or week and can be in a number of different formats. For example:

- 7/9/07
- 2nd week in Nov '07
- Week of 7/9/07

Be sure to include dates for Stage 1 DBPR monitoring to be conducted during the SSS period. Remember that at least one monitoring period must be during the peak historical month identified in Section III.A. for each 12 months of qualifying data. Attach additional sheets as needed.

VII. **Distribution System Schematic*** - Attach a distribution system schematic to your SSS plan. Your schematic must include the locations of entry points, sources, storage facilities, Stage 1 compliance monitoring sites, and monitoring sites for your existing results.

SSS plans will not be considered confidential business information (CBI) and are subject to the Freedom of Information Act (FOIA). *Therefore,* ***your distribution system schematic should not contain information that poses a security risk to your system.*** EPA suggests that you consider one of the following options for submitting distribution system schematics:

- **Option 1: Distribution system schematic with no landmarks or addresses indicated.** Show locations of sources, entry points, storage facilities, Stage 1 compliance monitoring locations, and monitoring sites for your existing results (required). Also include pressure zone boundaries and locations of pump stations. Provide map scale.
- **Option 2: City map without locations of pipes indicated.** Show locations of sources, entry points, storage facilities, Stage 1 compliance monitoring locations, and monitoring sites for your existing results (required). Also include boundaries of the distribution system, pressure zone boundaries and locations of pump stations. Provide map scale.

Schematics should be as clear and easy to read as possible. They should typically be submitted on a scale of between 1:4,000 and 1:8,000; however, larger-scale drawings are acceptable as long as systems components can still be clearly shown. All sizes from 8½ inches x 11 inches to larger, plan-sized sheets are acceptable. If electronic versions are submitted, use one of the following file types:

- Adobe PDF file (*.pdf)
- Microsoft Word (*.doc)
- WordPerfect (*.wpd)
- Image file (*.gif, *.bmp, *.jpg, *.jpeg)

VIII. Attachments - Put a check mark in each of the boxes corresponding to any attachments that you have included in your report. A distribution system schematic is required. Refer to Section VII for details.

If you submit your study plan electronically, you also have the option to submit attachments in hard copy. Include a note in your electronic study plan explaining that attachments are being submitted in hard copy, and mail the hard copy to the IPMC mailing address in your Requirements Summary Sheet. The IPMC will match the hard copy submission with your electronic submission when it is received.

Enter the total number of pages in your monitoring plan (including attachments) in the blank at the bottom of this section. This will allow EPA or your state to ensure that all pages were received.

This page intentionally left blank.

Form 2: Existing Monitoring Results SSS Plan

I. GENERAL INFORMATION

A. PWS Information*

PWSID: ____________________

PWS Name: ____________________

PWS Address: ____

City: ______________________ State: _____ Zip: ______

Population Served: ______________________

B. Date Submitted*

____

System Type:	Source Water Type:	Buying / Selling Relationships:
☐ CWS	☐ Subpart H	☐ Consecutive System
☐ NTNCWS	☐ Ground	☐ Wholesale System
		☐ Neither

C. PWS Operations

Residual Disinfectant Type: ☐ Chlorine ☐ Chloramines ☐ Other_____________

Number of Disinfected Sources: ____Surface____GWUDI____Ground____Purchased

D. Contact Person*

Name: ____

Title: ____

Phone #: ______________________ Fax #: __________________

E-mail: ____

II. SSS REQUIREMENTS*

A. Minimum Number of Monitoring Locations ______

B. Minimum Number of Required Samples

______ TTHM ______ HAA5

C. IDSE Schedule

☐ Schedule 1 ☐ Schedule 2 ☐ Schedule 3 ☐ Schedule 4

Form 2: Existing Monitoring Results SSS Plan

III. PEAK HISTORICAL MONTH

A. Peak Historical Month* _______________

B. If Multiple Sources, Source Used to Determine Peak Historical Month (write "N/A" if only one source in your system)

____

C. Peak Historical Month Based On (check as many as needed)

☐ High TTHM ☐ High HAA5 ☐ Warmest Water temperature

If you used other information to select your peak historical month, explain here (*attach additional sheets if needed*)

____

____

____

IV. PREVIOUSLY COLLECTED MONITORING RESULTS*

A. Where were your TTHM and HAA5 samples analyzed?

☐ In-House

Is your in-house laboratory certified? ☐ Yes ☐ No

☐ Certified Laboratory

Name of certified laboratory: _________________________

B. What method(s) was used to analyze your TTHM and HAA5 samples?

TTHM	HAA5
☐ EPA 502.2	☐ EPA 552.1
☐ EPA 524.3	☐ EPA 552.2
☐ EPA 551.1	☐ EPA 552.3
	☐ SM 6251 B

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (continued)*

C. TTHM Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	TTHM (mg/L)						LRAA
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							

[1] Verify that site IDs match the site IDs on your distribution system schematic.

Attach additional sheets as needed for previously collected compliance and operational monitoring results.

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (continued)*

C. TTHM Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	TTHM (mg/L)						LRAA
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							

[1] *Verify that site IDs match the site IDs on your distribution system schematic.*

Attach additional sheets as needed for previously collected compliance and operational monitoring results.

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (continued)*

D. HAA5 Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	HAA5 (mg/L)						LRAA
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							

[1] Verify that site IDs match the site IDs on your distribution system schematic.

Attach additional sheets as needed for previously collected compliance and operational monitoring results.

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (continued)*

D. HAA5 Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	HAA5 (mg/L)						LRAA
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							

[1] Verify that site IDs match the site IDs on your distribution system schematic.

Attach additional sheets as needed for previously collected compliance and operational monitoring results.

Form 2: Existing Monitoring Results SSS Plan

V. CERTIFICATION OF DATA*

I hereby certify that:

- The reported monitoring results include all compliance and non-compliance results generated during the time period beginning with the first reported result and ending with the most recent Stage 1 DBPR results.
- The samples are representative of the entire distribution system.
- Treatment and the distribution system have not changed significantly since the samples were collected.

Signature: ______________________________

Date: ______________________________

VI. PROPOSED SSS MONITORING SCHEDULE*

Skip if you are submitting your IDSE Report at the same time as your plan

SSS Site ID (from map) [1]	Projected Sampling Date (date or week) [2]					
	period 1	period 2	period 3	period 4	period 5	period 6

[1] Verify that site IDs match IDs on your distribution system schematic (See Section VII of this form). Attach additional copies of this sheet if necessary.

[2] period = monitoring period. Can list exact date or week (e.g., week of 7/9/07)

Form 2: Existing Monitoring Results SSS Plan

VII. DISTRIBUTION SYSTEM SCHEMATIC*

ATTACH a schematic of your distribution system.

Distribution system schematics are not confidential and should not contain information that poses a ***security risk*** to your system. EPA recommends that you use one of two options:

Option 1: Distribution system schematic with no landmarks or addresses indicated. Show locations of sources, entry points, storage facilities, operational monitoring locations, and Stage 1 compliance monitoring locations (required). Also include pressure zone boundaries and locations of pump stations. Provide map scale.

Option 2: City map without locations of pipes indicated. Show locations of sources, entry points, storage facilities, operational monitoring locations, and Stage 1 compliance monitoring locations (required). Also include boundaries of the distribution system, pressure zone boundaries and locations of pump stations. Provide map scale.

VIII. ATTACHMENTS

- ☐ Additional sheets for explaining how you selected the peak historical month (Section III).
- ☐ Additional sheets for previously collected monitoring results (Section IV).
- ☐ Additional sheets for proposed monitoring dates (Section VI).
- ☐ Distribution system schematic* (Section VII).

Total Number of Pages in Your Plan: __________

Note: Fields with an asterisk (*) are required by the Stage 2 DBPR.

5.3 Selecting Stage 2 DBPR Compliance Monitoring Sites and Preparing the IDSE Report

If you submitted your study plan separate from your IDSE report, EPA or your state will review the plan. If EPA or your state does not approve or request modifications to your plan, or notify you that your plan is still under review **within 12 months** after the deadline for plan submission, **you may consider the plan approved**. Follow your approved study plan as you complete SSS monitoring.

Every system that conducts an existing monitoring results SSS **must** use results from their SSS to select Stage 2 DBPR compliance monitoring sites. You must follow a **specific protocol**, as laid out in the Stage 2 DBPR, to evaluate data and select compliance sites unless you decide to recommend alternative Stage 2 compliance monitoring sites to your state or EPA. This section presents the required protocol for selecting Stage 2 DBPR compliance monitoring sites and provides guidance for preparing an IDSE report.

You **must** include all additional monitoring results taken during the period of the SSS and recommended Stage 2 compliance monitoring sites in your IDSE Report. You should submit your IDSE report to the Information Processing and Management Center (IPMC) for review by EPA or your state. See Section 1.4 of this guidance manual for information on how to submit your plan to the IPMC.

You must submit the report by the deadline in your requirements summary sheet identified in chapter 2. As discussed on page 5-2 of this chapter, you have the option of submitting your IDSE report with the SSS plan by the plan deadline. In this case, all monitoring results must be included in your study plan.

EPA has developed a form for the **IDSE Report for an Existing Monitoring Results SSS (Form 3)**, presented in Section 5.3.3 and available electronically as part of the **IDSE Tool.** You are not required to use this form; however, if you choose not to use it, refer to Exhibit 5.4 for a list of the minimum elements you must include in your IDSE report. An example of a completed report can be found in Appendix E. The IDSE Tool is available on EPA's website at http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

Exhibit 5.4 Required Elements of Your IDSE Report for an Existing Monitoring Results SSS

- All additional Stage 1 DBPR monitoring results and other monitoring results generated during the time period of the SSS in tabular or spreadsheet format.
- Recommendations and justifications of Stage 2 DBPR monitoring sites and sampling dates.
- If changed from your approved study plan,
  - Distribution system schematic
  - Population
  - System type (subpart H or ground water).
- An explanation of any deviations from your approved study plan

5.3.1 Selecting Stage 2 DBPR Compliance Monitoring Locations

Section 5.1.4 provided guidance on compiling data for each Stage 1 compliance site and each operational site. These results should have been included in your SSS plan. Calculate the LRAAs for all sites that were monitored since you submitted your SSS plan, including your Stage 1 monitoring sites. If you are submitting your IDSE report at the same time as your SSS plan, you do not need to make additional calculations.

You will be starting with the LRAA results for each monitoring location to select Stage 2 compliance monitoring sites. If you have multiple years of data at the same monitoring location, use the year of data with the highest LRAA for each site. If you monitored at different frequencies at different locations or in different years, consider using your peak historical month data to evaluate your monitoring locations. If you do this, ensure your analysis and resulting recommendation is clear in your justification for each monitoring location. EPA recommends that you use **Worksheet 5.1** to organize your data and select Stage 2 DBPR compliance monitoring sites.

As noted in the worksheet, you must use the **site selection protocol in Exhibit 5.5** to select your Stage 2 compliance monitoring locations. The number of required Stage 2 compliance monitoring sites for your system can be found on page 2 of the **System Specific Study Requirements - Attachment** sheet in Chapter 2. Use qualifying data only as you work through the protocol. If you complete all steps in the protocol and need additional compliance monitoring sites for the Stage 2 DBPR, repeat the protocol until the required number of sites has been selected. If you arrive at Step 3 or Step 7 and have no more Stage 1 DBPR sites from which to select, continue to the next step. Example 5.3 shows how a system uses the protocol to select their Stage 2 compliance monitoring sites.

Additional Factors to Consider During Selection of Stage 2 Compliance Monitoring Sites

You may select alternate sites other than those identified using the protocol, but you **must justify** the alternate locations in your IDSE report.

In general, TTHM and HAA5 LRAAs are the most important factors in site selection. However, the Stage 2 rule allows for some flexibility in this process. As you work through the site selection protocol, you should consider other factors that may lead you to select a site with a similar or slightly lower LRAA. If you do not use your highest TTHM and HAA5 LRAAs to select your Stage 2 compliance monitoring sites, you **must** provide justification for your selection in your IDSE report. The following conditions are possible reasons why you may select a site with a slightly lower LRAA over another site:

- The site provides more complete geographic coverage of the entire distribution system
- The site allows you to maintain a historical record
- Sampling at that site provides the opportunity to collect other water quality or operational data (e.g., chloramine systems may want to collect nitrate or nitrite data at that site)

EPA recognizes that a slight difference between LRAAs measured at two sites may not be meaningful given the normal variability that may occur at a site over time. As a result, the selection of a Stage 2 compliance monitoring site with a slightly lower LRAA may be acceptable if other factors, such as those listed above, favor the site with the lower LRAA. Examples 5.4 and 5.5 illustrate situations in which hypothetical systems might select Stage 2 DBPR compliance monitoring sites using criteria other than the site selection protocol. When two sites have the same LRAA, you should also consider the factors listed above to select the best site for your Stage 2 compliance monitoring.

You may want to discuss additional site characteristics that make the location suitable for Stage 2 compliance monitoring. Some characteristics you might consider including in your justifications are as follows:

- Peak historical month data
- Pipe size, or range of pipe sizes in the area
- Relationship to storage facilities
- Estimated water age, if available
- Source of water (if the distribution system is served by more than one source)

It is possible that EPA or your state may not concur with your justification and may require you to select different Stage 2 compliance monitoring sites.

Worksheet 5.1 Stage 2 DBPR Site Selection Worksheet for an Existing Monitoring Results SSS

<u>Instructions:</u>

1) Enter the number of required Stage 2 DBPR compliance monitoring sites based on your ***System Specific Study Requirements - Attachment*** summary sheet from Chapter 2.

2) Enter the Site ID and LRAA for each Stage 1 compliance monitoring location and each operational monitoring location. You may want to sort your entries in order by TTHM LRAA or HAA5 LRAA values.

3) As you work through the site selection protocol in Exhibit 5.5, fill in the "Stage 2 Site Type" column each time you select a site to indicate whether the site is a high TTHM, high HAA5, Existing Stage 1 DBPR Compliance Monitoring Site, or selected using criteria other than the protocol.

<u>No. of Stage 2 DBPR Compliance Monitoring Sites Required</u>

_____Highest TTHM _____Highest HAA5 ____Existing Stage 1 _______TOTAL

Site ID	LRAA		Stage 2 DBPR Site Type*
	TTHM (mg/L)	HAA5 (mg/L)	
Example	*0.075*	*0.045*	*Highest TTHM*

* Enter Highest TTHM, Highest HAA5, or existing Stage 1 DBPR

Exhibit 5.5 Protocol for Selecting Stage 2 DBPR (Subpart V) Compliance Monitoring Sites

<table>
<tr><th colspan="2">Steps[1]
[required by rule]</th><th>Stage 2 Compliance Monitoring Sites Selected [2]</th></tr>
<tr><td>1</td><td>Select the location with the highest TTHM LRAA</td><td>1st highest TTHM site</td></tr>
<tr><td>2</td><td>Select the remaining location with the highest HAA5 LRAA</td><td>1st highest HAA5 site</td></tr>
<tr><td>3</td><td><u>For subpart H systems</u>: Select the remaining existing Stage 1 DBPR average residence time compliance monitoring location with the highest HAA5 LRAA

<u>For ground water systems</u>: Select the remaining existing Stage 1 DBPR maximum residence time compliance monitoring location with the highest HAA5 LRAA

Skip this step if you have no more Stage 1 DBPR sites</td><td>1st Stage 1 DBPR site</td></tr>
<tr><td>4</td><td>Select the remaining location with the next highest TTHM LRAA.</td><td>2nd highest TTHM site</td></tr>
<tr><td>5</td><td>Select the remaining location with the next highest TTHM LRAA</td><td>3rd highest TTHM site</td></tr>
<tr><td>6</td><td>Select the remaining location with the next highest HAA5 LRAA</td><td>2nd highest HAA5 site</td></tr>
<tr><td>7</td><td><u>For subpart H systems</u>: Select the remaining existing Stage 1 DBPR average residence time compliance monitoring location with the highest TTHM LRAA

<u>For ground water systems</u>: Select the remaining existing Stage 1 DBPR maximum residence time compliance monitoring location with the highest TTHM LRAA

Skip this step if you have no more Stage 1 DBPR</td><td>2nd Stage 1 DBPR site</td></tr>
<tr><td>8</td><td>Select the remaining location with the next highest HAA5 LRAA</td><td>3rd highest HAA5 site</td></tr>
<tr><td colspan="3">If you need more Stage 2 DBPR compliance monitoring locations, Go back to Step 1 of this protocol and repeat the steps until you have selected the required number of total sites.</td></tr>
</table>

1. All steps are based on your calculated LRAAs for your operational sites and Stage 1 DBPR compliance monitoring sites. This means that your existing Stage 1 DBPR sites can be selected in steps *other than* 3 or 7. Stop when you reach your required number of Stage 2 DBPR compliance monitoring sites.
2. You cannot select the same site as a highest TTHM and a highest HAA5 compliance monitoring site.

Example 5.3 Selecting Stage 2 DBPR Compliance Monitoring Sites

A consecutive system serving 15,000 people has completed an existing monitoring results SSS for the IDSE. This system purchases disinfected ground water from a number of ground water systems drawing from the same aquifer. Based on state determination, the system has two Stage 1 DBPR compliance monitoring sites. According to the ***System Specific Study - Attachment*** sheet in Chapter 2, the system must select the following **four** Stage 2 compliance monitoring sites from operational monitoring and Stage 1 DBPR sites:

- 2 highest TTHM sites,
- 1 highest HAA5 site, and
- 1 maximum residence time site from the existing Stage 1 DBPR data.

The table below lists the maximum TTHM and HAA5 LRAAs for the Stage 1 DBPR compliance monitoring sites and operational monitoring data submitted for the existing monitoring results SSS.

Site Number and Description	Maximum TTHM LRAA (mg/L)	Maximum HAA5 LRAA (mg/L)
Stage 1 DBPR Compliance Monitoring Results:		
1	0.058	0.031
2	0.052	0.046
Operational Monitoring Results:		
3	0.053	0.040
4	0.056	0.032
5	0.051	0.042
6	0.047	0.038
7	0.045	0.036
8	0.049	0.039
9	0.038	0.034
10	0.035	0.026
11	0.021	0.015
12	0.022	0.019

Example 5.3 Selecting Stage 2 DBPR Compliance Monitoring Sites (cont.)

The water system used the site selection protocol in Exhibit 5.5 to select their compliance monitoring sites.

Go to Step 1: Select the Highest TTHM LRAA Site

Site 1 has the highest TTHM LRAA and is selected as the first high TTHM site.

Go to Step 2: Select the Highest HAA5 LRAA Site

Site 2 has the highest HAA5 LRAA and has not already been selected. Therefore, **Site 2** is chosen as the first high HAA5 site.

Go to Step 3: Select the Stage 1 Maximum Residence Time Site with the Highest HAA5 LRAA

There are no remaining Stage 1 sites to select from. **Skip this step and go to Step 4.**

Go to Step 4: Select the Next Highest TTHM LRAA Site

Site 4 has the next highest TTHM LRAA and is therefore chosen as the next highest TTHM site.

Go to Step 5: Select the Next Highest TTHM LRAA Site

Site 3 has the next highest TTHM LRAA and is therefore chosen as the next highest TTHM site.

Final Inventory of Stage 2 DBPR Compliance Monitoring Sites*

Highest TTHM: Site 1, Site 3, Site 4 (3 sites)

Highest HAA5: Site 2 (1 site)

Existing Stage 1 DBPR Site (as described in Step 3): No sites

TOTAL Sites = 4

**Note that the requirements on the previous page are for 2 highest TTHM sites, 1 highest HAA5 site, and 1 maximum residence time site from existing Stage 1 DBPR data. However, because the two Stage 1 DBPR sample sites were the highest TTHM site and the highest HAA5 site, these sites were selected during the first two steps of the selection protocol. As a result, there were no remaining Stage 1 DBPR sites to choose from during Step 3. Step 3 was skipped and the remaining two Stage 2 compliance sites were chosen using Steps 4 and 5. Based on the data collected, the system seems to have chosen its Stage 1 DBPR sites well in terms of sampling at locations with the highest TTHM and HAA5 levels.*

Example 5.4 Maintaining a Historical Record

A ground water system serves 90,000 people and must select four Stage 2 compliance sites. The system has already selected one highest TTHM site, one highest HAA5 site, and one Stage 1 maximum residence time site with the highest HAA5 LRAA. The fourth site to be selected is a high TTHM site which must be selected from the Stage 1 DBPR sites and operational sites not yet selected. The table below lists three remaining high-TTHM sites

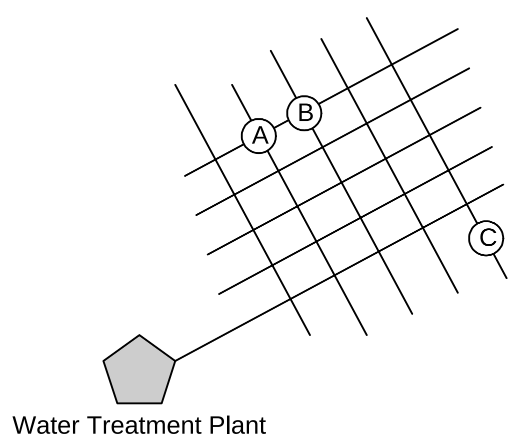
Site Number and Description	LRAA	
	TTHM (mg/L)	HAA5 (mg/L)
4 (operational site)	0.072	0.051
8 (operational site)	0.065	0.056
9 (Stage 1 DBPR max residence time site)	0.070	0.051

Among the three remaining high sites, Site 4 has the highest TTHM LRAA. However, the Stage 1 DBPR site has only slightly lower TTHM LRAA than operational Site 4. The system chooses **the Stage 1 DBPR site over site 4** for the Stage 2 high TTHM site to maintain the historical DBP record at that site.

Example 5.5 Providing Geographic Coverage When Choosing Stage 2 Sites

In general, two representative high TTHM sites should not be located in the same general area of the distribution system. Consider the following example:

The two highest TTHM LRAAs in the distribution system are from adjacent historical sample sites (sites A and B). The site with the third highest TTHM LRAA is on the far side of the distribution system (site C). In this case, consider selecting sites **A and C** or **B and C** as Stage 2 sites for a broader geographical coverage of the distribution system.



5.3.2 Determining Your Stage 2 DBPR Compliance Monitoring Dates

The first step in selecting your Stage 2 DBPR compliance monitoring dates is to select the peak historical month. According to the Stage 2 DBPR, you must conduct Stage 2 DBPR compliance monitoring during the peak historical month for TTHM or HAA5. You should use the peak historical month selected in your SSS plan unless new data suggest another month. If your high TTHM and high HAA5 data occur in different months, you should consider which contaminant is of more concern. If one contaminant clearly shows a higher overall trend and is closer to the MCL, you should choose the month in which that contaminant is highest.

You **must** conduct Stage 2 DBPR compliance monitoring during the peak historical month. If you are a ground water system that serves more than 9,999 people or you are a surface water system that serves more than 499 people, you must also conduct Stage 2 compliance sampling at 90 day intervals before and/or after the peak historical month.

The intent of the required time interval is to ensure that samples are representative of the quality of water over an extended period and do not over-emphasize either high or low concentrations of TTHM or HAA5 that might occur seasonally. For example, a system on quarterly monitoring could sample in the **third full week of every third month**. It is not necessary to sample all sites on the same day.

5.3.3 Preparing the IDSE Report

Every system that conducts an SSS for Existing Monitoring **must** prepare and submit an IDSE Report for an Existing Monitoring Results SSS. You should submit the report to the Information Processing and Management Center (IPMC) for review by EPA or your state. See Section 1.4 of this guidance manual for information on how to submit your report to the IPMC.

EPA has developed a form for the **IDSE Report for an Existing Monitoring SSS (Form 3)**, presented in this section and available electronically as part of the **IDSE Tool.** You are not required to use this form; however, if you choose not to use it, refer to Exhibit 5.4 for a list of the minimum elements you must include in your IDSE report.

The IDSE Tool creates a custom form for your system and provides links to technical guidance from this manual. The tool is available on EPA's website at http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

Before you begin Stage 2 DBPR compliance monitoring, you will also be required to prepare a Stage 2 DBPR compliance monitoring plan. In addition, if you are a subpart H system serving >3,300 people, you must submit a copy of your Stage 2 compliance monitoring plan to the state. If you include **compliance calculation procedures** in your IDSE report, the report can meet the requirement of the plan, and you do not have to prepare or submit a separate plan. As a guide for specifying your compliance calculation procedures, refer to the Stage 1 DBPR, 141.133(b), and your Stage 1 compliance monitoring plan. Check with your state, as they may have different requirements under the Stage 2 DBPR. If you are a consecutive or wholesale system, your state may choose to use its special primacy authority to modify your Stage 2 compliance monitoring requirements. In this case, you should check with the state to see if they are going to use this authority. You should develop your IDSE report for the total number of required Stage 2 compliance locations for your system.

The IDSE report for an Existing Monitoring Results SSS form includes the following sections:

I. General Information
II. Stage 2 DBPR Requirements
III. Additional SSS and Stage 1 Compliance Monitoring Results
IV. Justification of Stage 2 DBPR Compliance Monitoring Sites
V. Peak Historical Month
VI. Proposed Stage 2 Compliance Monitoring Schedule
VII. Distribution System Schematic
VIII. Attachments

If you are submitting an SSS plan and IDSE report at the same time, you must submit the portions listed in bold above. The rest of this section provides guidance on the completion of this form.

I. General Information

I.A. PWS Information* - If nothing has changed since you completed your modeling study plan, copy information from your plan into this section. If your system characteristics have changed, see Section 5.2 of this chapter for guidance on completing this section.

I.B. Date Submitted* - Enter either the date that you are submitting the form electronically, putting it in the mailbox, or dropping it off with an express delivery service. Be sure to submit your IDSE report before the deadline found on your requirements summary sheet.

I.C. PWS Operations - This section asks questions about your system to help inform EPA and state personnel during the plan review process. If nothing has changed since you completed your modeling study, copy information from your plan into this section. If your system characteristics have changed, see Section 5.2 of this chapter for guidance on completing this section.

I.D. Contact Person* - Enter the contact information of the person who is submitting the report. This should be the person who will be available to answer questions from EPA and/or the state reviewers.

II. Stage 2 DBPR Requirements*

II.A. Number of Required Stage 2 DBPR Compliance Monitoring Sites - Refer to the ***System Specific Study Requirements - Attachment*** in Chapter 2. Copy the numbers from the "Stage 2 Compliance Monitoring Requirements" table that correspond to your source type and the population served by your system.

II.B. IDSE Schedule -This should be the same schedule you entered for your modeling study plan. See Section 5.2 of this chapter for guidance.

II.C. Required Stage 2 DBPR Compliance Monitoring Frequency - Refer to the ***System-Specific Study Requirements - Attachment*** in Chapter 2. Locate the monitoring frequency from the "Stage 2 Compliance Monitoring Requirements" table that corresponds to your source type and the population served by your system. Put a check mark in the box corresponding to that monitoring frequency.

III. Additional SSS and Stage 1 Compliance Monitoring Results*

Skip this section if you are submitting your IDSE Report at the same time as your SSS plan. If you are submitting additional data with your IDSE report, complete this section. See the instructions for Form 2 part IV in Section 5.2 of this guidance manual..

IV. Justification of Stage 2 DBPR Compliance Monitoring Sites*

Enter the site ID from the distribution schematic and the site type (whether it is highest TTHM, highest HAA5, Stage 1 DBPR, or a site selected using criteria other than the site selection protocol). An example of how you might justify a site is given below. For example:

2nd Highest TTHM Site

An example of how you might justify a site that was ***not*** selected using the protocol is below:

Among the three remaining high TTHM sites, operational Site 4 has the highest TTHM LRAA. However, Stage 1 DBPR Site 7 has only a slightly lower TTHM LRAA than operational Site 4. Therefore, we choose Stage 1 DBPR Site 7 over operational site 4 to maintain the historical DBP record.

Note that there is only space for 8 monitoring sites on this sheet. If you are a subpart H system serving more than 249,999 people you are required to monitor at more than 8 sites. Therefore, you will need to attach additional sheets.

V. Peak Historical Month

V.A. Peak Historical Month* - Enter the month that you determined to be your peak historical month for TTHM or HAA5.

V.B. Is Your Peak Historical Month the Same as in Your System Specific Study Plan? - Put a check mark in the appropriate box to identify whether your system used the same peak historical month as in your SSS plan. If you selected a new peak historical month based on additional monitoring or other data, explain the basis for your selection here.

VI. Proposed Stage 2 DBPR Compliance Monitoring Schedule*

Enter the ID for each Stage 2 DBPR compliance monitoring site in the table (verify that these match the IDs you enter in Section IV and on your schematic). Enter your proposed sampling schedule for the number of monitoring periods identified in Section II.C. The entry can be a specific date or week and can be in a number of different formats. For example:

- 7/9/07
- 2nd week in Nov ‘07
- Week of 7/9/07

Remember that at least one monitoring period must be during the peak historical month identified in Section V.A. Note that there is only space for 8 monitoring sites on this sheet. If you are a subpart H system serving more than 249,999 people you are required to monitor at more than 8 sites. Therefore, you will need to attach additional sheets.

VII. Distribution System Schematic*

If you are submitting an IDSE report at the same time as your SSS plan, skip this section.

A distribution system schematic is required *only if it has changed from your SSS plan.* If it has changed, you must attach a distribution system schematic. See Section 5.2 of this manual for guidance.

VIII. Attachments - Put a check mark in each of the boxes corresponding to any attachments that you have included in your report.

Note that there is only space for 8 Stage 2 DBPR compliance monitoring sites and monitoring schedule in Sections IV and VI. If you are a subpart H system serving more than 249,999 people, you are required to monitor at more than 8 sites. Therefore, you will need to attach additional sheets.

Note that a schematic is required only if it has changed from your approved SSS study plan.

If you deviated from your approved study plan, you must attach an explanation of all deviations.

If you submit your IDSE report electronically, you also have the option to submit attachments in hard copy. Include a note in your electronic IDSE report explaining that attachments are being submitted in hard copy, and mail the hard copy to the IPMC mailing address in your Requirements Summary Sheet. The IPMC will match the hard copy submission with your electronic submission when it is received.

If you are a subpart H system serving >3,300 people, you must submit a copy of your Stage 2 compliance monitoring plan to the state. If you include **compliance calculation procedures** in your IDSE report, the report can meet the requirement of the plan, and you do not have to prepare or submit a separate plan. As a guide for specifying your compliance calculation procedures, refer to the Stage 1 DBPR, 141.133(b), and your Stage 1 compliance monitoring plan. Check with your state, as they may have different requirements under the Stage 2 DBPR.

Enter the total number of pages in your IDSE report (including attachments) in the blank at the bottom of this section. This will allow EPA or your state to ensure that all pages were received.

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Form 3: IDSE Report for an Existing Monitoring Results SSS

I. GENERAL INFORMATION

(*Skip this section if you are submitting the plan and report at the same time*)

A. PWS Information*

PWSID: ______________________

PWS Name: ______________________

PWS Address: ____

City: ________________________ State: _____ Zip: ______

Population Served: ________________________

B. Date Submitted*

____

System Type:	Source Water Type:	Buying / Selling Relationships:
☐ CWS	☐ Subpart H	☐ Consecutive System
☐ NTNCWS	☐ Ground	☐ Wholesale System
		☐ Neither

C. PWS Operations

Residual Disinfectant Type: ☐ Chlorine ☐ Chloramines ☐ Other ____________

Number of Disinfected Sources: ___Surface ___GWUDI ___Ground ___Purchased

D. Contact Person*

Name: ____

Title: ____

Phone #: ________________________ Fax #: ____________________

E-mail: ____

II. STAGE 2 DBPR REQUIREMENTS*

A. Number of Required Stage 2 DBPR Compliance Monitoring Sites _____ TOTAL

_______ Highest TTHM _______ Stage 1 DBPR _______ Highest HAA5

Form 3: IDSE Report for an Existing Monitoring Results SSS

II. STAGE 2 DBPR REQUIREMENTS (continued)*

B. IDSE Schedule

☐ Schedule 1

☐ Schedule 2

☐ Schedule 3

☐ Schedule 4

C. Required Stage 2 DBPR Compliance Monitoring Frequency

☐ During peak historical month (1 monitoring period)

☐ Every 90 days (4 monitoring periods)

III. ADDITIONAL SSS AND STAGE 1 COMPLIANCE MONITORING RESULTS*

(Skip this section if you are submitting the plan and report at the same time)

A. Where were your TTHM and HAA5 samples analyzed?

☐ In-House

Is your in-house laboratory certified? ☐ Yes ☐ No

☐ Certified Laboratory

Name of certified laboratory: ______________________________

B. What method(s) was used to analyze your TTHM and HAA5 samples?

TTHM	HAA5
☐ EPA 502.2	☐ EPA 552.1
☐ EPA 524.3	☐ EPA 552.2
☐ EPA 551.1	☐ EPA 552.3
	☐ SM 6251 B

Form 3: IDSE Report for an Existing Monitoring Results SSS

III. ADDITIONAL SSS AND STAGE 1 DBPR MONITORING RESULTS (Continued)*

C. TTHM Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	TTHM (mg/L)						LRAA
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							

[1] *Verify that site IDs match the site IDs in your SSS Plan.*

Attach additional sheets as needed for SSS and Stage 1 DBPR results.

Form 3: IDSE Report for an Existing Monitoring Results SSS

III. ADDITIONAL SSS AND STAGE 1 DBPR MONITORING RESULTS (Continued)*

D. HAA5 Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	HAA5 (mg/L)						LRAA
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							
			Sample Date							
			Sample Result							

[1] *Verify that site IDs match the site IDs in your SSS Plan.*

Attach additional sheets as needed for SSS and Stage 1 DBPR results.

Form 3: IDSE Report for an Existing Monitoring Results SSS

IV. JUSTIFICATION OF STAGE 2 DBPR COMPLIANCE MONITORING SITES*

Stage 2 Compliance Monitoring Site ID	Site Type	Justification
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	

Attach additional copies of this sheet if you need more room.

Form 3: IDSE Report for an Existing Monitoring Results SSS

V. PEAK HISTORICAL MONTH

A. Peak Historical Month* _______________

B. Is Your Peak Historical Month the Same as in Your SSS Plan?

☐ Yes ☐ No

If no, explain how you selected your new peak historical month *(attach additional sheets if needed)*:

____

____

____

____

____

VI. PROPOSED STAGE 2 DBPR COMPLIANCE MONITORING SCHEDULE*

Stage 2 Compliance Monitoring Site ID	Projected Sampling Date (date or week)[1]			
	period 1	period 2	period 3	period 4

[1] *period = monitoring period. Complete for the number of monitoring periods from Section II.C.*

Attach additional copies of this sheet if you need more room.

Form 3: IDSE Report for an Existing Monitoring Results SSS

VII. DISTRIBUTION SYSTEM SCHEMATIC*
(Skip this section if you are submitting the plan and report at the same time)

ATTACH a schematic of your distribution system if it has changed since you submitted your Existing Monitoring Results SSS Plan (Form 2).

VIII. ATTACHMENTS

☐ Additional sheets for Additional SSS Monitoring Results (Section III).

☐ Additional sheets for Stage 2 DBPR Monitoring Sites (Section IV). **REQUIRED if you are a subpart H system serving more than 249,999 people**.

☐ Additional sheets for explaining how you selected the peak historical month (Section V).

☐ Additional sheets for proposed compliance monitoring dates (Section VI). **REQUIRED if you are a subpart H system serving more than 249,999 people**.

☐ Explanation of deviations from approved study plan.

☐ Distribution system schematic* (Section VII). **REQUIRED if it has changed from your approved SSS plan**.

☐ Compliance calculation procedures (for Stage 2 Compliance Monitoring Plan).

Total Number of Pages in Your Report: __________

Note: Fields with an asterisk(*) are required by the Stage 2 DBPR.

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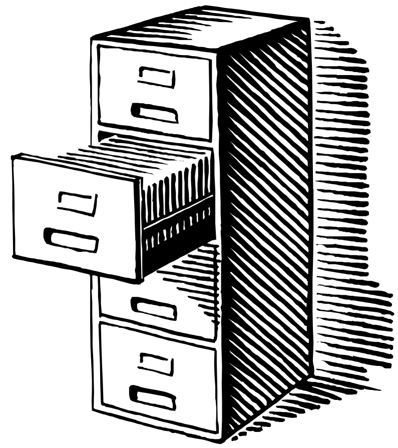
5.4 Recordkeeping



The IDSE SSS report must be kept on file for **10 years** after the date it is submitted. If EPA or your state modifies the recommendations made in your report or approves alternative Stage 2 DBPR compliance monitoring locations, you must also keep a copy of EPA or your state's notification on file for 10 years after the date of the notification. You must make your IDSE report and any notification available for review by your state or the public.

The SSS plan, including any modifications by EPA or your state, must also be kept on file for as long as you are required to retain your IDSE SSS report. You must make the plan and any modifications available for review by your state or the public.

5.5 Next Steps: Preparing the Stage 2 DBPR Compliance Monitoring Plan

As the final step before you can begin compliance monitoring for the Stage 2 DBPR, you must develop and implement a **Stage 2 DBPR monitoring plan** by the deadline provided in your requirements summary sheet. The plan will be similar to your Stage 1 DBPR monitoring plan in that it will identify how you intend to sample for compliance with Stage 2. You must keep your plan on file for state and public review. If you are a subpart H system serving > 3,300 people, you **must** submit your plan to EPA or your state prior to when you are required to start monitoring.

Exhibit 5.6 contains the minimum requirements for what must be included in your Stage 2 DBPR compliance monitoring plan. Because compliance monitoring plans are not addressed as part of the IDSE provisions of the Stage 2 DBPR, ***EPA has not included detailed guidance for developing Stage 2 compliance monitoring plans in this guidance manual***. EPA plans to develop other manuals and training that address the compliance monitoring provisions of the Stage 2 DBPR.

See EPA's website http://www.epa.gov/safewater/disinfection/stage2 for an up-to-date inventory of Stage 2 DBPR guidance manuals and training materials, or call the Safe Drinking Water Hotline at 1-800-426-4791.

Exhibit 5.6 Required Contents of Stage 2 DBPR Compliance Monitoring Plans

All Systems	Additional Requirements for Consecutive and Wholesale Systems [1]
• Monitoring locations • Monitoring dates • Compliance calculation procedures	• If your state has used its special primacy authority to modify your monitoring requirements, you must include monitoring plans for other systems in your combined distribution system

1. See Appendix D of this manual for guidance specifically for consecutive and wholesale systems

6.0 System Specific Study Using a Distribution System Hydraulic Model

This chapter covers:

One of two options for the system specific study (SSS) involves the use of a detailed, comprehensive, and well-calibrated distribution system hydraulic model to help select Stage 2 DBPR compliance monitoring locations. Systems using a distribution system hydraulic model will be required to submit a modeling study plan and IDSE Report describing the modeling analysis, selection of monitoring sites, and sampling data.

Distribution system hydraulic models can be used for the SSS provided the minimum model requirements are met. An overview of requirements is given in Exhibit 6.1 and detailed guidance is provided in Section 6.1 The option of using a distribution system hydraulic model is intended to allow systems that have models to use their ***existing technical resources*** to perform the IDSE. For many systems, developing a detailed and well-calibrated distribution system hydraulic model ***from scratch*** and training staff to use it could cost more than conducting standard monitoring (see Chapter 7). If the model will be used for other purposes after the completion of the SSS, such as optimizing system operations and prioritizing capital improvements, then the cost of the model development may be justified. If a system's existing model **does not** meet the minimum requirements in Exhibit 6.1 at the beginning of the IDSE period, the system may be able to upgrade the model to complete the modeling SSS or instead use it in combination with other data and/or analyses for selecting sites for standard monitoring (see Chapter 7). Exhibit 6.2 includes a list of minimum reporting requirements for the modeling SSS.

Exhibit 6.1 Minimum Distribution System Hydraulic Model Requirements

To meet the minimum model requirements, your model must include:

Physical System Data

- At least 50 percent of total pipe length in the distribution system.
- At least 75 percent of the pipe volume in the distribution system.
- All 12-inch diameter and larger pipes.
- All 8-inch diameter and larger pipes that connect pressure zones, mixing zones from different sources, storage facilities, major demand areas, pumps, and control valves, or are known or expected to be significant conveyors of water.
- All 6-inch diameter and larger pipes that connect remote areas of a distribution system to the main portion of the system or are known or expected to be significant conveyors of water.
- All storage facilities, with controls or settings applied to govern the open/closed status of the facility that reflect standard operations.
- All active pump stations, with realistic controls or settings applied to govern their on/off status that reflect standard operations.
- All active control valves or other system features that could significantly affect the flow of water through the distribution system (e.g., interconnections with other systems, pressure reducing valves between pressure zones).

Demand Data

- Extended period simulation with representative diurnal variations in demand
  - Represent total system demand for the peak month of TTHM formation

Calibration

- A calibration verification using data for the peak month of TTHM formation and current system configuration
  - Operational controls to represent typical operation during the peak month of TTHM formation
- Evaluation of actual system performance compared to modeled performance at all storage facilities in the system
- Ability to complete all required calibration no later than 12 months after your required plan submission date

Modeling Analysis

- The ability to simulate water age during the peak month of TTHM formation using a sufficient simulation length to overcome initial conditions and produce a consistent, repeating pattern of 24-hour water age

Exhibit 6.2 Minimum Reporting Requirements for Modeling Study Plan

The following information must be provided in your Modeling Study Plan. You may use the Modeling Study Plan Form (Form 4) found in this chapter or the IDSE tool to help you prepare your submission.

1. Tabular or spreadsheet data demonstrating that your model meets the physical system data requirements in Exhibit 6.1.

2. A description of all calibration activities undertaken (or to be undertaken). This must include, if calibration is complete,

- A graph of predicted tank levels versus measured tank levels for the storage facility with the highest residence time in each pressure zone.
- A time series graph of water age results for the storage facility with the highest residence time in your system showing predictions for the entire EPS simulation period (i.e. from time zero until the time it takes for the model to reach a consistently repeating pattern of residence time).

3. Preliminary results of the modeling analysis showing showing 24-hour average water age predictions throughout the distribution system.

4. Timing and number of samples planned for at least one period of TTHM and HAA5 monitoring at a number of locations no less than that required for your system under standard monitoring during the month of high TTHM.

5. Description of how all requirements will be completed no later than 12 months after your required plan submission date.

6. Distribution system schematic showing entry points and their sources, storage facilities, and locations of all completed SSS monitoring and all subpart L compliance monitoring.

7. Population served and system type (subpart H or ground water).

Notes:

- You must respond to any state or EPA inquiries regarding your model and your SSS plan submission.
- If you have already completed your required monitoring, it is highly recommended that you submit your IDSE report at the same time as your study plan.

For the purposes of the modeling SSS, water age is used as a surrogate for TTHM concentration. Thus, the minimum requirements for the modeling SSS are focused only on the hydraulic component of distribution system models. A well-calibrated water quality model may provide a better understanding of the behavior of the distribution system, leading to superior selections of Stage 2 DBPR compliance monitoring locations compared to hydraulic models without water quality calibration. However, proper calibration of the water quality component can be a difficult task and is typically done with much less accuracy than calibration of the hydraulic component. In addition, the data needed to properly calibrate and verify the water quality concentrations predicted by the model may exceed data collection requirements under the IDSE standard monitoring option. If systems decide to use water quality modeling, they are encouraged to provide information on the water quality calibration to EPA or the state in addition to the required information for the underlying hydraulic components of the model.

A variety of public domain and commercial software packages are available for distribution system modeling. Public domain software includes EPANET and PipelineNET, which are both available for free download. EPANET is available from www.epa.gov/ORD/NRMRL/wswrd/epanet.html and PipelineNET is available from http://eh2o.saic.com/iwqss/. Systems should verify that the software used to model the distribution system can provide the output required to demonstrate the model's calibration and performance (Section 6.1).

If you have not already done so, you should complete the flowchart in Exhibit 2.3 of this guidance manual. The flowchart will direct you to a 2-page ***Requirements Summary Sheet*** for your schedule. You will also be directed to the ***System Specific Study Requirements - Attachment*** sheet containing detailed requirements for Stage 2 compliance monitoring (e.g., number of samples and sampling frequency). You should keep these sheets handy as you work through this chapter. It is important that **consecutive and wholesale systems** communicate with each other throughout the IDSE process. If you are a consecutive or wholesale system, refer to Appendix D for specific issues that you should consider.

If you plan to conduct an SSS using a model, you must submit a modeling study plan for state or EPA review in accordance with the schedule on your requirements summary sheet. You have the option of submitting the modeling study plan and IDSE report together (which must include selection of Stage 2 DBPR compliance monitoring sites) by the study plan deadline if all required elements have been completed. If you choose this option, you have no further requirements under the IDSE unless you are contacted by EPA or your state. Below is a list of conditions under which you should consider submitting the report at the same time as the plan, and conditions under which you would want to submit your modeling study plan first, then your report at the end of the IDSE monitoring period.

Option 1: Submitting a Completed Modeling Study Plan and IDSE Report at the Same Time

You should consider Option 1 if:

- You have completed calibration of your model, and
- You have completed one monitoring period of additional TTHM and HAA5 monitoring meeting the criteria in Section 6.3.

You need to:

- Submit both the modeling study plan and the IDSE report by the deadline for the modeling study plan that is provided on your requirements summary sheet.

Option 2: Submitting a Separate Modeling Study Plan and IDSE Report

You should consider Option 2 if:

- You have not completed calibration of your model, or
- You have not completed one monitoring period of additional TTHM and HAA5 monitoring meeting the criteria in Section 6.3.

You need to:

- Submit the modeling study plan by the deadline for the modeling study plan on your requirements summary sheet.
- Conduct additional monitoring and/or perform calibration by the date listed in your requirements summary sheet.
- Submit the IDSE report for a modeling SSS by the deadline in your requirements summary sheet.

6.1 Minimum Model Requirements and Calibration

Exhibit 6.1 summarizes the minimum model requirements for the SSS. In general, a system's distribution system hydraulic model should be more comprehensive for the purpose of an SSS than models typically used for long-range capital improvement program analysis of transmission capacity (e.g., master planning). A calibrated hydraulic model intended for detailed distribution system design or operational studies is likely to be adequate. A well-calibrated water quality model is also likely to be acceptable. In either case, the model **must** be an extended period simulation (EPS) model. Also, the model must be calibrated for the **peak month for TTHM formation**. Consequently, the model will need to incorporate operational and demand conditions for the peak month for TTHM formation**.** See Section 6.3 for guidance on selecting the peak month.

Distribution systems are always changing (e.g., population growth, new industrial users, aging of mains), so it is important that the model reflect system conditions and demand at the time of the SSS. If your model is not current, it **must** be updated and calibrated before it could be considered adequate for the SSS. Your model must be calibrated for the current configuration of the distribution system.

Sections 6.1.1 through 6.1.4 provide additional guidelines to help you determine if your model meets the minimum requirements. Note that the guidelines in this section are not comprehensive—every distribution system is unique. Systems should always use their best professional judgment when determining model adequacy for the SSS. You should note that EPA or your state can still require you to conduct standard monitoring even if you meet minimum requirements. AWWA Manual M32, *Computer Modeling of Water Distribution Systems*, 2nd Edition, 2005, may be a useful reference that goes into greater detail on the distribution system modeling presented in this chapter.

6.1.1 Physical System Data

Most distribution system models do not include every pipe in a distribution system. Typically, small pipes near the periphery of the system and other pipes that affect relatively few customers are excluded to a greater or lesser extent depending on the intended use of the model. This process is called *skeletonization*. Models including only transmission networks (e.g. pipes larger than 12 inches in diameter only) are highly skeletonized while models including many smaller diameter distribution mains (e.g. 4 to 6 inches in diameter) are less skeletonized. In general, water moves quickly through larger transmission piping and slower through the smaller distribution mains. Therefore, the simulation of water age or water quality requires that the smaller mains be included in the model to fully capture the residence time and potential water quality degradation between the treatment plant and the customer. Increases in computing capabilities are making it possible to include many more pipes in hydraulic models than was previously feasible.

To be used for the purposes of conducting the SSS, the model should be relatively detailed (less skeletonized) and include the majority of pipes in the distribution system. Minimum requirements for physical system data are provided in Exhibit 6.1.

System inventory information can be used to determine the adequacy of the model, including pipe information in GIS or on water atlas maps. Documentation of the ability of the model to meet the minimum requirements **must** be submitted with the modeling study plan. Most modeling software provides the ability to calculate and export data on the total length of the pipes within the model. GIS, water system inventory data, or water atlas sheets can be used to calculate the length of pipes that exist in the distribution system but are not included in the model. Systems should use their best professional judgment in the estimation of the coverage of the distribution system that is included in the model. An example of these calculations is provided in Appendix F.

6.1.2 Demand Data

A key set of input data to a hydraulic model is the demand data used to simulate consumption of water throughout the system. The demand data dictates the flow through each pipe and therefore is an important part of the model. Water demand should be allocated among the nodes in the model in a manner that reflects the actual spatial distribution of such demand throughout the system, with a level of detail appropriate for the system size. A proper demand allocation will help ensure that the model provides a realistic simulation of water flow throughout the system.

In general, it is desirable to have demand allocated to as many nodes as possible in the model. The calculation of water age at nodes on dead end mains with zero demand is not accurate because the water age will equal the simulation time at each time step, so often model results will show the highest water age at dead ends. While this is a realistic representation of the distribution system, you should take these results into consideration when selecting sampling locations. Much of the modeling and GIS software available contains tools to assist with demand allocation based on geocoding of customer accounts, processing of census population data, or spatial analysis of land use patterns. Alternatively, it is possible to allocate customer demands manually based on system knowledge of meter locations, meter reader routes, or zone flow meters.

To ensure that your model is calibrated well for the period of high TTHM formation potential, include all significant users in the system in your model. Many skeletonized models will exclude dead ends in the system even though they may serve a subdivision or other area with a sizable number of customers. Systems should make an effort to include dead end pipes that serve significant populations to capture the full system demand as well as any potential degradation of water quality within the dead end area. Exhibit 6.3a shows a typical subdivision layout with dead ends that are not included in the model (more skeletonized) and Exhibit 6.3b shows that model with all pipes included (less skeletonized).

Systems with rapidly changing populations and water usage should verify that the demands in the hydraulic model reflect the distribution system conditions under which the SSS will be evaluated. Particular attention should be paid to large users in the system, which are often industrial or institutional and can have a significant impact on flows. Seasonal trends in demand variation should also be considered so that the model reflects the correct water usage for the month with the highest TTHM formation potential (see Section 6.3 for more information on determining peak month for TTHM formation). For example, many commercial properties have automatic irrigation systems that operate during summer months only and some systems may have seasonal users such as campgrounds or swimming pools.

System water loss should also be reflected in the demands in the hydraulic model. Many systems calculate a non-revenue water percentage based on the difference between their monthly production records and customer billing data. This water loss should be included in the model. Many systems apply a constant rate of water loss across their system by using a global demand multiplier. However, if more detailed information on losses is available, such as measured losses in a particular zone in the system, that data could be used to allocate the total water loss to specific areas in the model.

Exhibit 6.3a Sample Subdivision Layout in a Less Skeletonized Model

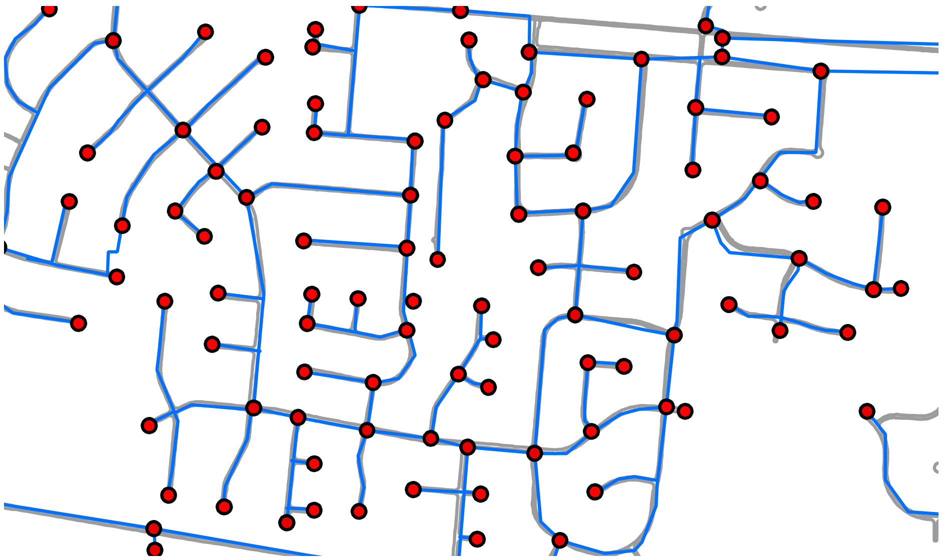
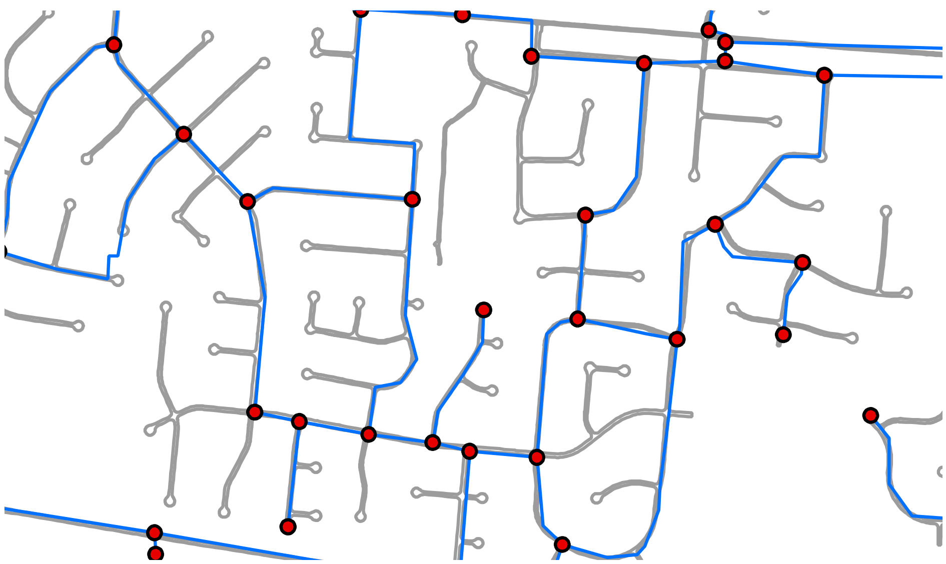


Exhibit 6.3b Sample Subdivision Layout in a More Skeletonized Model



Diurnal Demand Variation

The prediction of water age or water quality requires an extended period simulation (EPS). To run a hydraulic model EPS, demand patterns showing the variation in usage over time are required. Therefore, models must not only include realistic base demands but must also reflect the variation in demand over time. For water age or water quality simulation in the modeling SSS, a minimum of a 24-hour EPS is required and therefore this discussion will refer to diurnal demand variations.

Residential customers typically show a diurnal variation of water use with a peak in the morning (before work) and in the evening (after work), with little use during the night. Large users, such as industries, may use water on a different schedule than residential users. For example, a factory running full production 24 hours per day will not decrease its water usage during the night. In order to simulate realistic water movement throughout the distribution system and calibrate your model, capture the different patterns of usage, particularly for large users. Systems are encouraged to verify the diurnal water usage patterns for large users and to include separate demand variation categories for these users if they differ from a typical residential user.

Diurnal curves will also vary by season. For example, residential use will often increase in the evening and night hours during the summer due to lawn watering. Other systems may experience seasonal population shifts that will affect the demand patterns.

Demand patterns can be derived from a mass balance calculation using water production and pumping records, tank levels, and other operational data. Most reference books on hydraulic modeling include an explanation of diurnal demand variation calculations. The pattern is a series of multipliers that represent the ratio of instantaneous demand to the average daily demand at a given point in time. The average of all multipliers is equal to 1.0. Exhibit 6.4 shows an example of a diurnal demand variation pattern.

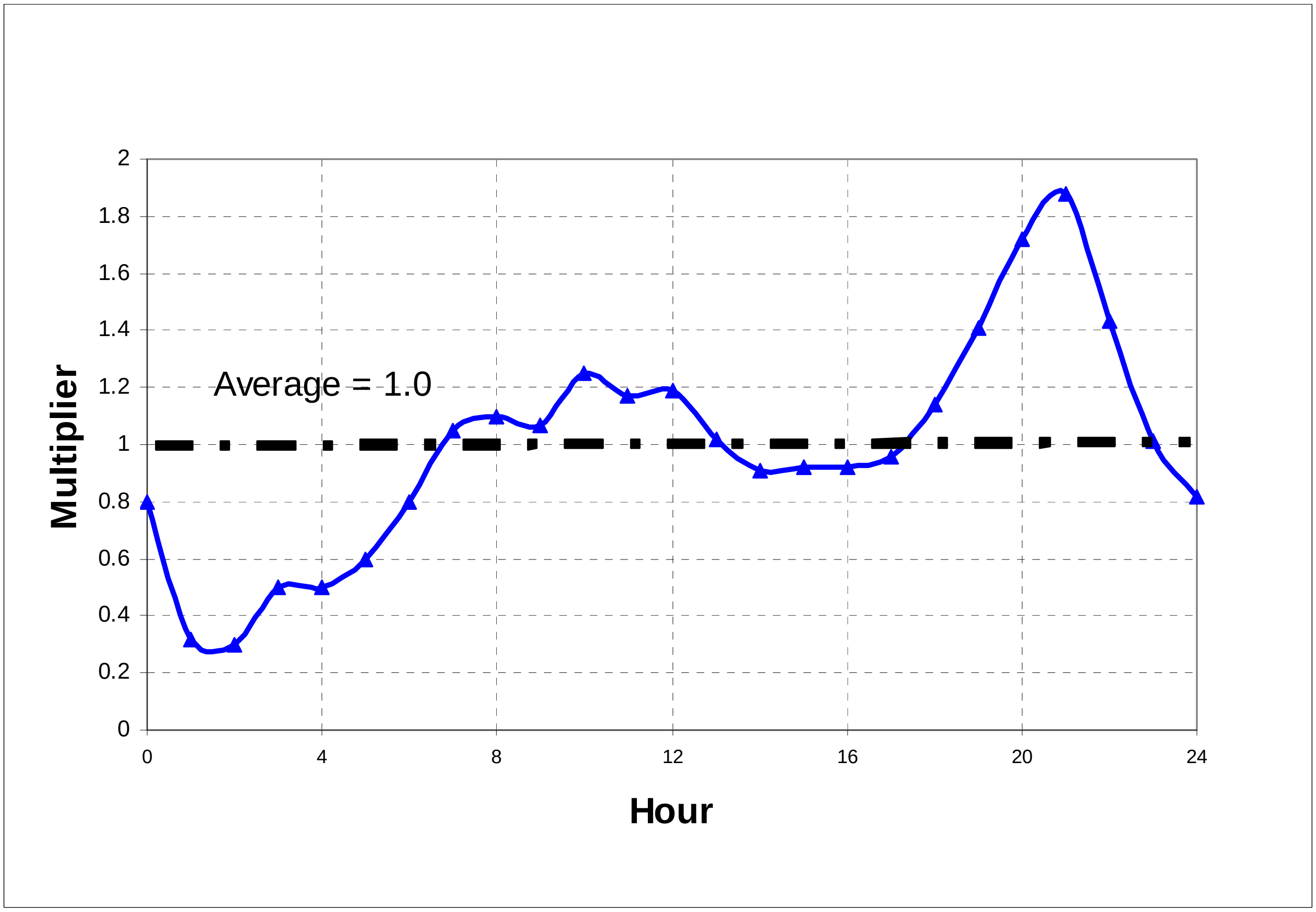
The IDSE requires modeling of the peak month of TTHM formation and therefore systems **must** ensure that their model adequately simulates demand variation during that month for the purposes of the SSS. In addition to diurnal demand patterns, the total demand in the model must match the typical demand for the peak month of TTHM formation. The base demand in the model may need to be adjusted by using a global demand multiplier to better represent the peak month of TTHM formation. See Section 6.3 for guidance on selecting the peak month for TTHM formation.

6.1.3 Operational Controls

Another important feature of a good EPS model is the ability to simulate system operation using controls. Controls are used within the model to turn on or off pumps, open or close valves, and perform other operations to mimic the real-life operations that occur in a system. The ability of the model to simulate the actual operation of the system requires the specification of controls.

Hydraulic modeling software offers several options for controls. In general, controls are either time-based or logical. Time-based controls perform a specific operation (e.g. turn on a pump) at a specified time in the simulation. Logical controls perform a given operation based on an evaluation of conditions in the system (e.g. turn on a pump when the tank is half empty). For large systems, a series of conditions must often be met before a change in status of operation can occur. To simulate these cases, complex logical controls can be created in the model.

Exhibit 6.4 Example Diurnal Demand Variation Pattern



The simulation of water age and water quality throughout a distribution system is heavily impacted by the modeled behavior at the storage facilities. The behavior of the storage facilities is in turn greatly affected by the operational rules used to control levels and fill rates. Therefore it is important that systems ensure that the controls used in the hydraulic model provide a simulation of true system operation.

For the SSS using a distribution system model, you must simulate the conditions during the period with the highest TTHM formation potential in your model.

6.1.4 Calibration

Once a base model for a distribution system has been developed, the model must be calibrated to match the simulated system performance to actual operating conditions. Calibration is generally an iterative process where model parameters are adjusted until simulation results match field conditions. Systems must demonstrate that their model is either calibrated using data collected during the peak month for TTHM formation or, if previously calibrated to a different time period, can satisfactorily simulate operation during the period with the highest TTHM formation potential through model verification. Calibration of a model for steady-state simulations only is not adequate for the modeling SSS. The model **must** be calibrated in extended period simulation for at least a 24-hour period. Because storage facilities have such a significant impact upon water age and reliability of water age predictions throughout the distribution system, you **must** compare and evaluate the model predictions versus the actual water levels of **all storage facilities** in the system to meet calibration requirements. However, you are only required to submit the graph for the storage facility with the highest water age in each pressure zone.

Calibration is never exact and there are no official calibration standards or guidelines in the United States. There is general agreement in the modeling profession that the extent of calibration should reflect the intended uses of the model. For example, a more rigorous model calibration would be necessary when the model is used to make detailed design calculations versus general master planning, where a larger margin of error in calibration may be acceptable. Calibration performed several years ago for the purposes of general master planning **is not acceptable** for the modeling SSS. For more information regarding the calibration of distribution system hydraulic models, refer to *Modeling Water Quality in Drinking Water Distribution Systems* (Clark and Grayman, 1998), *Advanced Water Distribution Modeling and Management* (Beckwith et al., 2002), or other reference books.

Calibration Data Collection

Calibration data will vary by system depending on the type and number of facilities involved. In general, calibration data will include:

- Flow and discharge pressure at each pump and/or pumping facility
- Water level in each storage facility (elevated and ground storage)
- Pressure data, either at facilities or other locations in the distribution system
- Flow tests at hydrants
- Friction factor (C-factor) tests
- System-wide demand and diurnal pattern information

Many systems collect operational data using supervisory control and data acquisition (SCADA) systems, chart recorders, or other types of dataloggers. It is important to obtain operational data over a 24-hour time period so that the EPS model can be calibrated for each time step. This data must represent the actual operating conditions during the peak historical month for TTHM formation.

Field studies may also be conducted to obtain flow test and friction factor test data. If possible, such tests should coincide with operational data collection to provide a robust data set. Reference books can provide instructions for conducting these tests.

If the model was previously calibrated to a time that does not coincide with the peak month for TTHM formation (e.g., calibrated to an average day in March and the peak month for

TTHM formation is August), additional data will need to be collected to verify the performance of the model during the peak month for TTHM formation.

The operation of storage facilities in distribution systems has a significant impact on water retention and potential for water quality degradation. Therefore, a simulation of the behavior of all storage facilities during the peak month for TTHM formation is required as part of the modeling SSS. The ability of the calibrated model to predict actual water levels in all storage facilities must be verified.

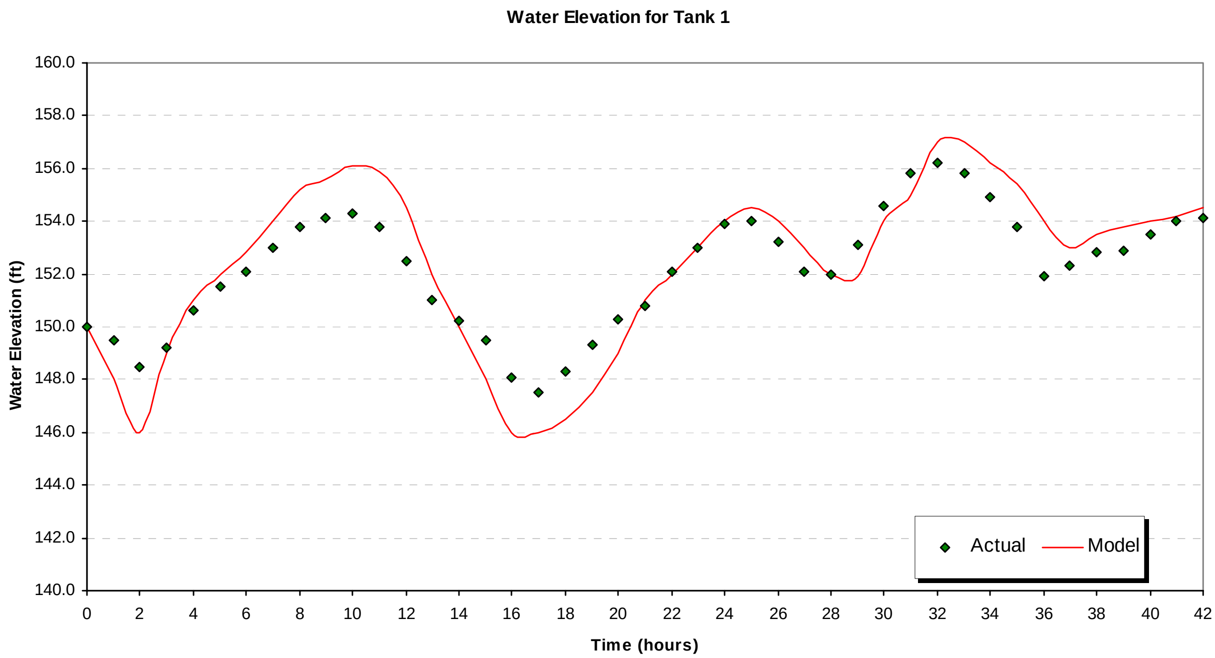
In your modeling study plan you are required to describe your calibration process to verify the adequacy of the model for the purposes of the SSS. If your model is not calibrated at the time you submit your Modeling SSS Plan, you **must** describe the calibration activities that are proposed to take place. You will then be required to submit your final calibration documentation as part of your IDSE report. If you have already completed your calibration, you **must** include the following in your modeling study plan:

- A model results graph of water level versus time for the storage facility with the highest water age in each pressure zone of the system. If a pressure zone has no storage facilities located within its boundaries, no graph is required for that zone. The graph must include both simulated (model) and observed (actual) water levels during the period of highest TTHM formation potential. The submitted graph should show results for a minimum simulation length of 24 hours, with time increments no greater than 1 hour. An example of an acceptable graph is shown in Exhibit 6.5.

- A time series graph of the residence time at the longest residence time storage facility in the distribution system showing the predictions for the entire EPS simulation period (i.e., from time zero until the time it takes for the model to reach a consistently repeating pattern of residence time). An example of an acceptable graph is shown in Exhibit 6.7. This graph will be produced as part of your water age modeling analysis. Guidance on conducting the water age modeling analysis is given in Section 6.2.

If your model simulation results do not match the observed water level variations in the storage facility but you feel that your model is sufficiently calibrated to be used in the SSS, additional justification should be provided in your modeling study plan.

Exhibit 6.5 Sample of an Acceptable Graph for Demonstration of Model Calibration



6.2 Modeling Analysis

Using your calibrated hydraulic model of the distribution system, a water age simulation must be run and analyzed to show 24 hour average residence time predictions throughout the distribution system. Consecutive systems and systems with multiple sources with different water quality should consider how the water age entering the distribution system and differing DBP formation potential will influence model predictions and analysis. Appendix G discusses approaches that can be used to analyze hydraulic models in these situations.

If your model calibration is not complete, a preliminary modeling analysis using the existing model must be conducted and submitted with your modeling study plan. All required calibration activities must then be completed **within 12 months of your required plan submission date**. Documentation of your calibration along with the final modeling analysis using the calibrated model must then be submitted as part of your IDSE Report. If your model is calibrated, you should submit your final water age results in your modeling study plan (see Section 6.4 for guidance).

The following sections provide guidance for the modeling analysis and the completion of the modeling study plan.

6.2.1 Water Age Modeling

For the modeling SSS, water age is being used as a surrogate for TTHM concentration. A water age analysis can be conducted using a hydraulic model without additional input of water quality data. This simulation option calculates the length of time that each parcel of water has been in the system after leaving the source(s). The water age calculation is highly dependent on the operational controls in the model (e.g., tank water levels used to control pump settings). Therefore, the model must be set up to match the operating conditions during the peak month for TTHM formation. This may require adjustments to model demands and controls.

Each water age simulation begins with an initial age of zero at all model nodes. The water age increases as the simulation time increases until fresh water from the source arrives at a given node. Nodes with zero or very small demand, especially at dead ends, will not receive fresh water and therefore will not have an accurate simulation of water age. Similarly, the water age for tanks will be equal to the simulation time until the entire volume of the tank has been refreshed with water from the source. Depending on operating conditions in the simulation, this may take as long as several weeks.

To overcome the effects of the initial conditions in a water age analysis, ensure that the simulation runs for a sufficient length of time. The required length of the water age simulation will vary depending on system characteristics, but can be approximated by the time it would take to fully turn over all water in the worst case storage facility. The average water age for a given storage facility is approximately equal to the inverse of the percent turnover. For example, a tank with an average daily volume turnover of 33% has an average water age of 3 days (100/33 = 3); a tank with an average daily volume turnover of 25% has an average water age of 4 days (100/25 = 4). However, hydraulic models have limited ability to account for tank mixing characteristics. Storage facilities with poor mixing characteristics may have water that is significantly older than the average water age.

An appropriate simulation time should generate a consistent, repeating pattern of water age in the storage facility with the highest average water age. An example of a repeating pattern is shown in the case study example in Section 6.2.2. Once the simulation has been completed, only results from the stable, repeating portion of the simulation (e.g., the last 24 hours) should be used in subsequent analyses. The intent of using a long simulation time for water age is not to replicate multiple different days of operation of the system but only to overcome the effects of initial water age settings (zero at all nodes) on the results.

Because of the length of the simulation for water age, controls should be checked to ensure that they will perform properly throughout the simulation. Time-based controls that refer to the simulation time (e.g. turn on Pump 1 at hour 11) will need to be adjusted to cover the full length of the simulation. Many software packages have an option to use clock time rather than simulation time for controls. The use of clock time (e.g. turn on Pump 1 at clock time 11) will repeat the operation on each day of the simulation at the same time while the use of simulation time will only perform the operation only once during the entire run. Logical controls (e.g. turn on Pump 1 when Tank 1 level is 20 feet) will generally perform fine in a longer simulation, but should be checked.

Water age simulation is also sensitive to the time step used for calculations. In most software packages this is referred to as the water quality time step. In general, the accuracy of the simulation increases as the time step is decreased. However, the use of very small time steps can result in longer processing time for larger models. A time step on the order of 1 to 5 minutes is generally good for water age simulation, depending on the system configuration. Trial runs with different time steps can be conducted to determine if the water age simulation is sensitive to the time step selected.

Once the water age simulation is completed, the model results from the stable (repeating) part of the simulation can be used to calculate an average water age at each node in the distribution system. If your model calibration is not complete, the results of a modeling analysis showing the preliminary (over 24 hours) water age results throughout the distribution system **must** be submitted with your model study plan. In this case, the modeling analysis must be verified after model calibration and the revised results must be submitted with your IDSE report. If your model calibration is complete, you should submit your final water age results with the model study plan (in lieu of the preliminary results). In either case, EPA recommends that you submit water age results in tabular format to minimize security risks to your system.

6.2.2 Modeling Analysis Example

This case study is based on the NET3.NET example from the EPANET 2 modeling package. This package can be downloaded from: www.epa.gov/ORD/NRMRL/wswrd/epanet.html. The same analysis can be completed using most modeling software packages, although the exact process may differ slightly.

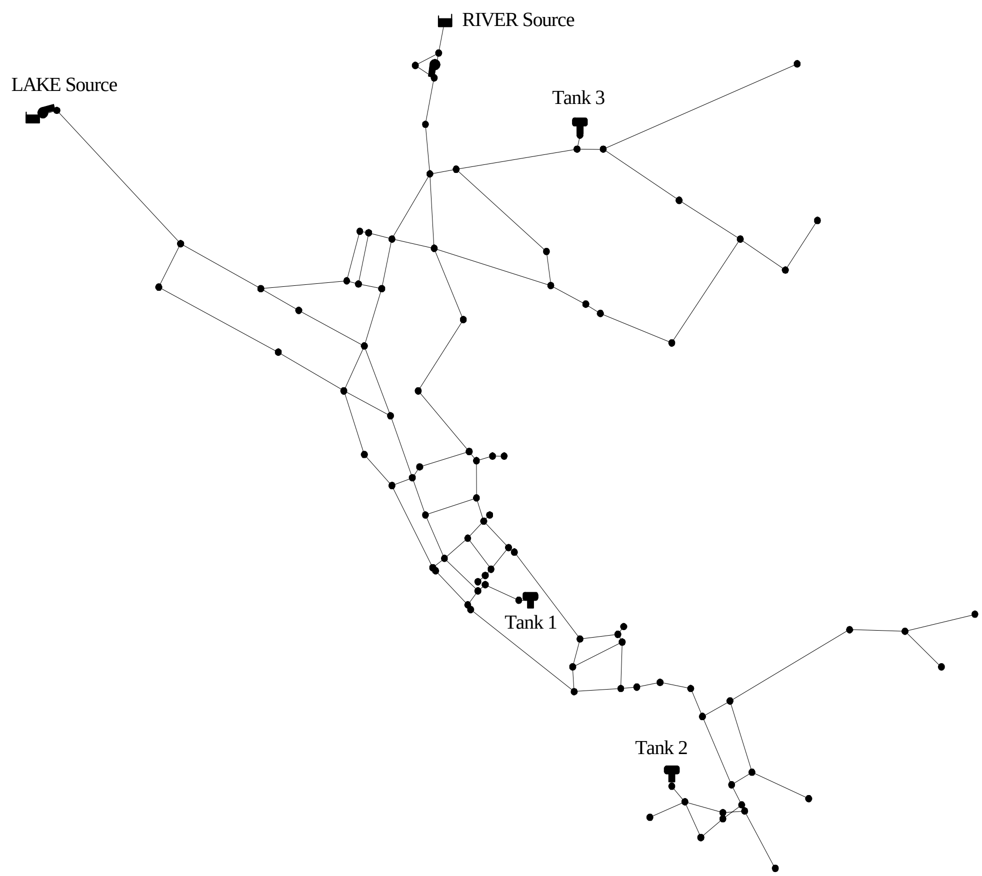
The system, shown in Exhibit 6.6, contains two sources and three storage tanks. The treatment plant at the LAKE source operates only from 6 AM to 8 PM while pumping from the RIVER source is controlled by the level in Tank 1. The sources have similar DBP concentrations and formation potentials and therefore can be considered to have the same effect on the final concentrations observed in the distribution system. For a more complex example for a system with different source characteristics, see Appendix G.

The model was already calibrated for summer conditions. The system data were then modified to reflect the demands and operating conditions that were expected to occur during the peak month for TTHM formation. This required the following change to the Simple Control rule (time based) that was applied to the hours of operation for the pump at the LAKE source (Link 10):

```
Link 10 OPEN AT CLOCKTIME 6 AM
Link 10 CLOSED AT CLOCKTIME 8 PM
```

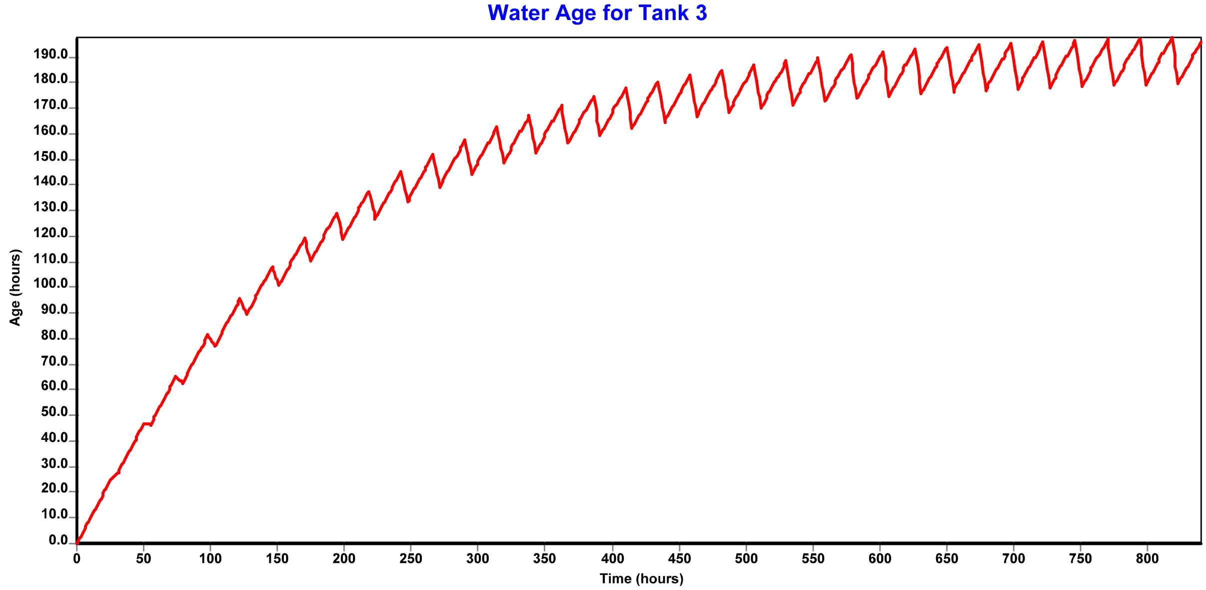
The calibration was verified for the peak month for TTHM formation by producing the tank level graph depicted in Exhibit 6.5. The fit in this graph verifies that the previous calibration is adequate to simulate operations during the peak month of TTHM formation.

Exhibit 6.6 Schematic of the Case Study Distribution System



Water age simulations were then completed using increasing simulation durations (e.g., 120 hours, 240 hours, etc.) until it was apparent that the water age in the storage tanks had equilibrated. The default water quality time step of 5 minutes was used for each of these simulations. The largest tank, Tank 3, was found to take the longest time to equilibrate. Exhibit 6.7 shows the time history of water age in this tank over an 840 hour simulation period.

Exhibit 6.7 Water Age Graph for the Tank with the Highest Water Age



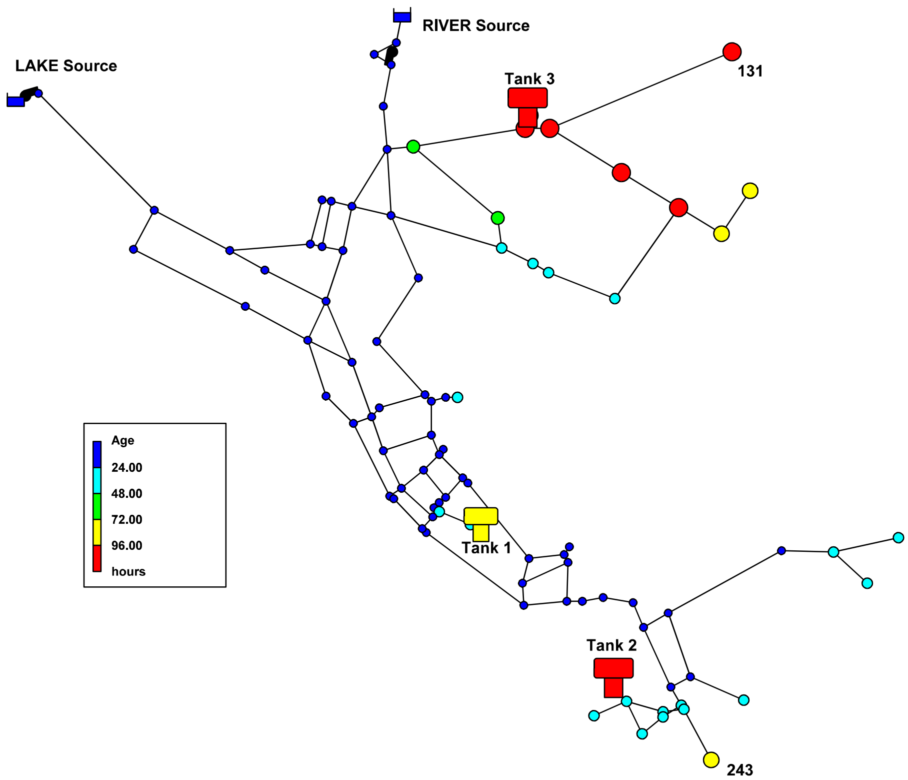
To make sure that this result was not sensitive to the water quality time step used, an additional run was made using a reduced time step. Results from the smaller time step matched those for the 5 minute time step.

Next, an analysis was conducted to find the average water age at each location in the network. To do this, the following modifications were made to the network's data:

1. the water quality time step was kept at 5 minutes
2. the simulation duration was kept at 840 hours
3. the Report Start Time was set to 792 hours (i.e., 48 hours before the end of the simulation)
4. the Statistic being reported by the program was set to AVERAGE (so that the average age over the last 48 hours of the simulation would be reported).

The resulting average water age throughout the network is displayed graphically in Exhibit 6.8. EPA suggests that you submit your 24 hour average residence time predictions in tabular format without identifying all nodes on your distribution system schematic to avoid creating a security risk for your system. An example of this is provided in Appendix F. However, you will probably want to rely on graphic output (e.g., Exhibit 6.8) as you evaluate your model to select SSS monitoring locations as described in Section 6.3.

Exhibit 6.8 Locational Average Water Age Throughout the Study Area



6.3 Determining SSS Monitoring Requirements and Schedule

As part of the SSS using a distribution system hydraulic model, you must collect TTHM and HAA5 samples from the distribution system during the peak month for TTHM formation. The number of monitoring locations must equal or exceed the required number of locations required for IDSE standard monitoring. Stage 1 DBPR compliance monitoring locations can not be selected as locations for your SSS monitoring. The types of locations (near entry point, high TTHM, high HAA5, and average residence time) must also match the requirements for IDSE standard monitoring. See Exhibit 6.9 to determine your monitoring location criteria according to your system size and source water type.

Exhibit 6.9 Requirements for Modeling SSS Sampling

Source Water Type	Population Size Category[1]	Distribution System Monitoring Locations[2]				
		Total Number of Samples	Near Entry Points	Average Residence Time	High TTHM Locations	High HAA5 Locations
Subpart H	<500 consecutive systems	2	1	....	1	....
	<500 non-consecutive systems	2	....	....	1	1
	500-3,300 consecutive systems	2	1	....	1	....
	500-3,300 non-consecutive systems	2	....	....	1	1
	3,301-9,999	4	....	1	2	1
	10,000-49,999	8	1	2	3	2
	50,000-249,999	16	3	4	5	4
	250,000-999,999	24	4	6	8	6
	1,000,000-4,999,999	32	6	8	10	8
	≥5,000,000	40	8	10	12	10
Ground Water	<500 consecutive systems	2	1	....	1	....
	<500 non-consecutive systems	2	....	....	1	1
	500-9,999	2	....	....	1	1
	10,000-99,999	6	1	1	2	2
	100,000-499,999	8	1	1	3	3
	≥500,000	12	2	2	4	4

[1] Your monitoring requirements (locations and frequency) are based on the population served by your system.
[2] A dual sample set (i.e., a TTHM and an HAA5 sample) must be taken at each monitoring location during each monitoring period.

You should review all available compliance, study, or operational data to determine the peak historical month for TTHM formation for your system. If you have monthly or quarterly TTHM monitoring data, EPA recommends that you use this data as the basis for your historical month. If you do not have monthly or quarterly data, EPA recommends that you select the month with warmest water temperature as your peak month for TTHM formation. In some cases, you may find data in addition to TTHM and temperature data helpful in selecting your peak historical month. For example, some systems may regularly see an increase in total organic carbon (TOC) levels in the spring or fall. If your TTHM monitoring does not capture a seasonal increase in TOC, you may want to consider the month with highest TOC when selecting your peak historical month.

You should include the basis for selecting your peak month for TTHM formation in your Modeling Study Plan (see Section 6.4 for guidance on completing the modeling study plan).

Systems have different requirements for describing sampling plans in their modeling study plans depending on whether they have completed calibration of their models.

- If you have not completed model calibration you must provide the number of samples you plan to take and the planned sampling month in your modeling study plan.

- If your calibration and modeling analysis are complete but sampling is not yet done, you should indicate the proposed SSS sampling locations on your distribution schematic in your modeling study plan.
- If you have completed calibration and sampling, you must indicate the sampled locations on your distribution schematic in your study plan. You should strongly consider submitting the IDSE report along with your modeling study plan.

Note that sampling must be completed by the deadline in your requirements summary sheet.

6.4 Preparing your Modeling Study Plan

After you have verified that your model meets the criteria in Section 6.1.1 through 6.1.4 and have determined the number and timing of your SSS samples, you are ready to prepare your modeling study plan. Every system that conducts a modeling SSS **must** prepare and submit a modeling study plan. You should submit your plan to the Information Processing and Management Center (IPMC) for review by EPA or your state. See Section 1.4 of this guidance manual for information on how to submit your plan to the IPMC.

EPA has developed a **Modeling Study Plan Form (Form 4)**, presented in this section and available electronically as part of the **IDSE Tool.** You are not required to use this form; however, if you choose not to use it, refer to Exhibit 6.2 for a list of the minimum elements you must include in your modeling study plan.

The IDSE Tool creates a custom form for your system and provides links to technical guidance from this manual. The tool is available on EPA's website at http://www.epa.gov/safewater/disinfection/stage2 .

IDSE Tool

If your model is not calibrated but you plan to calibrate your model and complete the modeling analysis as part of the SSS, you must submit your plan with a description of the proposed calibration work to be done. You must also indicate how all requirements will be completed within 12 months of your required plan submission date and provide a description of how you intend to use your model to select monitoring locations. This will allow time to correct deficiencies that might become apparent during the calibration process. A preliminary water age analysis must also be conducted with your existing model and submitted as part of the plan (if your model is calibrated, this should be your final water age analysis). If your model does not meet the requirements in Exhibit 6.1 and you are unable to address all of the questions on Form 4, you should provide information about how you plan to address those issues during the SSS.

Your deadline for submitting your study plan can be found on your requirements summary sheet in Chapter 2. If EPA or your state does not approve or request modifications to your plan, or notify you that your plan is still under review within 12 months after the deadline for plan submission, you may consider the plan approved. **If you have not yet completed calibration of your model, you must continue calibrating your model while your plan is**

being reviewed to meet the requirement that all required calibration must be completed no later than 12 months after your plan submission deadline.

Form 4 includes the following sections:

I. General Information
II. IDSE Requirements
III. Model Description
IV. Peak Month for TTHM Formation
V. Modeling Information
VI. Planned Stage 1 Compliance Monitoring Schedule
VII. Distribution System Schematic
VIII. Attachments

Sections of the form with an asterisk (*) are required by the Stage 2 DBPR. An example of a completed modeling study plan using this form is provided in Appendix F.

I. General Information

I.A. PWS information* - Important definitions for classifying your system are provided in the **definitions section** at the beginning of this guidance manual. If you have any questions on this section, contact EPA or your state.

PWSID - Enter your PWSID identification number here. This number is typically assigned by your state.

PWS Name - Enter the name of your system here.

PWS Address - Enter the primary mailing address for your water system here.

Population Served - Enter the number of people served by your PWS. Remember, this is your RETAIL population served, not including the population served by consecutive systems that purchase water from you.

System Type - Put a check mark in the appropriate box to identify whether your system is a CWS or a NTNCWS. Definitions for CWS and NTNCWS can be found in the **definitions section** at the beginning of this guidance manual.

Source Water Type - Put a check mark in the appropriate box to identify whether your system is a subpart H system or a ground water system. If you use any surface water or GWUDI as a source, mark the subpart H box. Definitions for subpart H system (including GWUDI) and ground water system can be found in the **definitions section** at the beginning of this guidance manual.

Buying/Selling Relationships - Put a check mark in the appropriate box to identify whether your system is a consecutive system, a wholesale system, or neither. If you are both a consecutive and wholesale system (e.g., you buy and sell water), check both boxes. Definitions for consecutive system and wholesale system can be found in the **definitions section** at the beginning of this guidance manual and in **Appendix D**.

I.B. Date submitted* - Enter either the date that you are submitting the form electronically, putting it in the mailbox, or dropping it off with an express delivery service. Be sure to submit your modeling study plan before the deadline found on your requirements summary sheet.

I.C. PWS Operations - This section asks questions about your system to help inform EPA and state personnel during the plan review process.

Residual Disinfectant Type - Put a check mark in the appropriate box to identify the type of disinfectant you most often use **to maintain a residual in your distribution system** (not necessarily the same disinfectant used for primary disinfection at the treatment plant). If you use chloramine but switch to free chlorine for a short time, you should still check chloramine only. If you use chloramine and chlorine regularly in your system (e.g, 4 months of free chlorine and 8 months of chloramines), check both chlorine and chloramine. If you maintain your residual with a disinfectant other than chlorine or chloramines (e.g., chlorine dioxide), you should place a check next to the box marked "Other" and enter the type of disinfectant you use in the blank next to "Other".

Number of Disinfected Sources - Enter the total number of sources that deliver disinfected water to your distribution system. If you connect to a single wholesale system at a number of locations in your distribution system, consider this one source. Multiple wells that are disinfected at a common treatment plant should also be considered one source. Do not count wells that are not disinfected or are disinfected by UV only.

I.D. Contact Person* - Enter the contact information of the person who is submitting the form. This should be the person who will be available to answer questions from EPA and/or the state reviewers.

II. IDSE Requirements*

II.A. SSS Monitoring - Copy the required number of samples from the table in Exhibit 6.9 that corresponds to your source type and the population served by your system.

II.B. IDSE Schedule - Enter the schedule for your system based on the letter that you received from EPA or your state. See Chapter 2 for more information on the letter.

II.C. SSS Monitoring Frequency - You are required to monitor during the peak month of TTHM formation. If you plan to conduct additional monitoring, describe it here.

III. Model Description

III.A. Yes/No Questions* These questions refer to the physical data contained in your model. Circle Y or N to indicate if your model complies with the requirements.

III.B. Model Development and Calibration* Provide a description of the history of development and calibration of your model. Describe what the model has been used to do, such as evaluating operational scenarios, capital improvements planning, or water quality assessment. Discuss the types of decisions that were based on results from the model. An example of this type of description is:

The model was developed in 2004 using GIS data for the water system. The model was calibrated to maximum day flow conditions during July 2004. The calibrated model has been used by our staff to identify improvements needed to serve a new subdivision and to change our tank operating procedures to minimize water age and maintain chlorine residual.

III.C. Demand Data For each question, provide a brief description of the data and methods used to assign customer demands to the model.

III.D. Calibration Activities* For each question, provide a brief description of the data and methods used to calibrate your model. If your model is not currently calibrated but you propose to calibrate the model as part of the SSS, provide a description of the calibration effort you plan to undertake to ensure that calibration is completed within 12 months of your required plan submission date.

If calibration is complete:

- Submit a graph that documents your model calibration by showing simulated tank levels versus observed levels for the storage facility with the highest water age in each pressure zone of your system (see Exhibit 6.5 for an example)*.

IV. Peak Month for TTHM Formation

IV.A. Peak Month for TTHM Formation* - Enter the month that you determined to be your peak month for TTHM formation. See Section 6.3 for guidelines for selecting your peak month for TTHM formation.

IV.B. Justification of Peak Month for TTHM Formation - Describe how you determined in which month TTHM formation is highest in your system. You should describe the types of data used to reach your conclusion.

V. **Modeling Information*** - For each question, provide a brief description of the methods used (or planned) to perform modeling for water age.

- If your model calibration has been completed, the modeling analysis should be described in this section. Submit a graph of water age versus time for the entire simulation duration for the tank with the highest overall water age in the system*

- If your model calibration is not complete, a preliminary modeling analysis must be conducted with your existing model and the results must be submitted with your SSS plan. In this case, the modeling analysis must be verified after model calibration and revised results must be submitted with your IDSE report.

All systems must submit model output showing preliminary (or final) average water age results over a 24-hour period as part of their modeling study plan. The 24-hour period used for the average water age results table should represent a simulation time after the model has achieved a stable, repeating water age pattern (e.g. the last 24 hours of the simulation). EPA recommends that you submit this in tabular format to not pose a security risk to your system.

VI. **Planned Stage 1 DBPR Compliance Monitoring Schedule* -** Enter the projected sampling schedule for the number of Stage 1 DBPR monitoring periods in which you will conduct Stage 1 DBPR monitoring during your system specific study. Verify that site IDs in this table match the IDs on your distribution system schematic. If you are required to monitor at more than 8 Stage 1 DBPR locations you will need to attach additional sheets. You may also want to attach your Stage 1 DBPR monitoring plan.

VII. **Distribution System Schematic*** - Attach a distribution system schematic to your study plan. The schematic must include the location of entry points and their sources, all storage facilities, and locations of completed SSS monitoring (if applicable) and all subpart L compliance monitoring. If you have not selected your SSS sample sites, you must show these sites on a revised version of the schematic when you submit your IDSE report.

Modeling study plans will not be considered confidential business information (CBI) and are subject to the Freedom of Information Act (FOIA). *Therefore**, your distribution system schematic should not contain information that poses a security risk to your system.*** EPA suggests that you submit a **Distribution system schematic with no landmarks or addresses indicated.** In addition to the required information indicated above, you should also include pressure zone boundaries, locations of pump stations, and the map scale.

Schematics should be as clear and easy to read as possible. They should typically be submitted on a scale of between 1:4,000 and 1:8,000; however, larger-scale drawings are acceptable as long as systems components can still be clearly shown. All sizes from 8½ inches x 11 inches to larger, plan-sized sheets are acceptable. If electronic versions are submitted, use one of the following file types:

- Adobe PDF file (*.pdf)
- Microsoft Word (*.doc)
- WordPerfect (*.wpd)
- Image file (*.gif, *.bmp, *.jpg, *.jpeg)

VIII. Attachments - Put a check mark in each of the boxes corresponding to any attachments that you have included in your report.

Note that some of the attachments are required by the Stage 2 DBPR:

- Distribution System Schematic*
- Tabular or spreadsheet documentation that your model meets minimum requirement*
- Graph of predicted tank levels vs. measured tank levels for the storage facility with the highest residence time in each pressure zone* (Required if calibration is complete)
- Time series graph of water age at the longest residence time storage facility in the distribution system showing the predictions for the entire EPS simulation period* (Required if calibration is complete)
- Model output showing preliminary 24 hour average water age predictions for all nodes throughout the distribution system* (Required for all submissions. If your model is calibrated, this should be your final water age predictions.)

If you submit your study plan electronically, you also have the option to submit attachments in hard copy. Include a note in your electronic study plan explaining that attachments are being submitted in hard copy, and mail the hard copy to the IPMC mailing address in your Requirements Summary Sheet. The IPMC will match the hard copy submission with your electronic submission when it is received.

Enter the total number of pages in your study plan (including attachments) in the blank at the bottom of this section. This will allow EPA or your state to ensure that all pages were received.

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Form 4: Modeling Study Plan

I. GENERAL INFORMATION

A. PWS Information*

B. Date Submitted* ___________

PWSID: ____________________

PWS Name: ____________________

PWS Address: ____________________

City: ______________ State: _____ Zip: ____________

Population Served: ____________________

System Type:	Source Water Type:	Buying / Selling Relationships:
☐ CWS	☐ Subpart H	☐ Consecutive System
☐ NTNCWS	☐ Ground	☐ Wholesale System
		☐ Neither

C. PWS Operations

Residual Disinfectant Type: ☐ Chlorine ☐ Chloramines ☐ Other:______________

Number of Disinfected Sources: ___ Surface ___GWUDI ____ Ground ___ Purchased

D. Contact Person*

Name: ____________________

Title: ____________________

Phone #: ______________ Fax #: ______________

E-mail: ____________________

II. IDSE REQUIREMENTS*

A. SSS Monitoring		B. Schedule	C. SSS Monitoring Frequency
Number of Samples per Monitoring Period	___	☐ Schedule 1	☐ During peak month of TTHM formation (1 monitoring period)
Number of Monitoring Periods	___	☐ Schedule 2	
		☐ Schedule 3	☐ Additional (describe) _____________
Total	___	☐ Schedule 4	_________________________________

Form 4: Modeling Study Plan

III. MODEL DESCRIPTION

A. Answer Yes or No to the following questions*
(provide documentation in attached sheets)

1.	Is your model an Extended Period Simulation model?	Y / N
2.	Does your model meet the minimum requirements described below? Attach tables or spreadsheets to demonstrate that your model meets these requirements.	
	Include 75% of pipe volume	Y / N
	Include 50% of pipe length	Y / N
	Include all pressure zones	Y / N
	Include all pipes 12" and larger	Y / N
	Include all 8" and larger pipes that connect pressure zones, influence zones from different sources, storage facilities, major demand areas, pumps, and control valves, or are known or expected to be significant conveyors of water	Y / N
	Include all 6" and larger pipes that connect remote areas of a distribution system to the main portion of the system	Y / N
	Include all storage facilities with standard operations represented in the model	Y / N
	Include all active pump stations with realistic controls	Y / N
	Include all active control valves	Y / N
3.	Is your model (or will it be) calibrated to simulate actual water levels at all storage facilities and represent the current distribution system configuration during the period of high TTHM formation?	Y / N
4.	If calibration is complete, does the model simulate 24 hour variation in demand and show a consistently repeating 24 hour pattern of residence time?	Y / N

B. Provide a history of your model development and calibration*, including dates ***(attach additional sheets if needed)***

____

____

Form 4: Modeling Study Plan

III. MODEL DESCRIPTION (Continued)

C. How was demand data assigned to the model? *(attach additional sheets if needed)*

1.	What method was used to assign demands throughout the system?	
2.	How did you estimate diurnal demand variation? How did you determine total system demand?	
3.	How many demand categories did you use?	
4.	How did you address large water users?	

D. Describe all calibration activities* If your model is not currently calibrated, describe how calibration will be completed within 12 months of the required plan submission date using the questions 1-8 as guidance *(attach additional sheets if needed).*

1.	When was the model last calibrated?	
2.	What types of data were used in the calibration?	
3.	When was the calibration data collected?	
4.	What field tests have been performed to collect calibration data?	

Form 4: Modeling Study Plan

III. MODEL DESCRIPTION (Continued)

D. (Continued)

5.	How did you determine friction factors (C-factors)?	
6.	Was the calibration completed for the peak month for TTHM formation? If not, was the model performance verified for the peak month for TTHM formation?	
7.	How well do actual tank levels correlate with predicted tank levels during the peak month for TTHM formation? **See Attachments (Section VIII) for additional submission requirements.**	
8.	If you are using a water quality model, what parameters are modeled? How was the model calibrated?	

IV. PEAK MONTH FOR TTHM FORMATION

A. Peak Month For TTHM Formation* ______________

B. Justification of Peak Month for TTHM Formation

Describe how your system determined which month is the peak month for TTHM formation (*attach additional sheets if needed*):

____

____

____

____

____

____

Form 4: Modeling Study Plan

V. MODELING INFORMATION *

How was the SSS modeling performed? *(attach additional sheets as needed)*

1.	Was modeling done for the operating conditions during the peak month for TTHM formation?	
2.	How were operational controls represented in the model?	
3.	How was water age simulated during the peak month for TTHM formation (time steps, length of simulation, etc.)? If not yet done, indicate how this will be addressed in the IDSE report.	
4.	What are the average water age results for your distribution system? **See Attachments (Section VIII) for additional submission requirements.**	

VI. PLANNED STAGE 1 DBPR COMPLIANCE MONITORING SCHEDULE*

Stage 1 DBPR Monitoring Site ID (from map) [1]	Projected Sampling Date (date or week) [2]			
	Period 1	Period 2	Period 3	Period 4

[1] Verify that site IDs match IDs on your distribution system schematic (See Section VII of this form). Attach additional copies if you are required to monitor at more than 8 Stage 1 DBPR sites.

[2] period = monitoring period. Complete for the number of periods in which you must conduct Stage 1 DBPR monitoring during IDSE monitoring. Can list exact date or week (e.g., week of 7/9/07)

Form 4: Modeling Study Plan

VII. DISTRIBUTION SYSTEM SCHEMATIC*

ATTACH a schematic of your distribution system.

Distribution system schematics are not confidential and should not contain information that poses a ***security risk*** to your system. EPA recommends that you submit the following:

> **Distribution system schematic with no landmarks or addresses indicated.** Show locations of sources, entry points, storage facilities, locations of completed monitoring, and Stage 1 compliance monitoring locations (required). Also include pressure zone boundaries and locations of pump stations. Provide map scale.

VIII. ATTACHMENTS

- ☐ Distribution System Schematic* (Section VII).
- ☐ Tabular or spreadsheet documentation that your model meets minimum requirements***** (Section III.A).
- ☐ Additional sheets for explaining your model (Section III.B).
- ☐ Graph of predicted tank levels vs. measured tank levels for the storage facility with the highest residence time in each pressure zone* (Section III.D). **Required if calibration is complete.**
- ☐ Time series graph of water age at the longest residence time storage facility in the distribution system showing the predictions for the entire EPS simulation period* (Section V). **Required if calibration is complete.**
- ☐ Additional sheets for explaining how you selected the peak historic month for TTHM formation (Section IV).
- ☐ Model output showing preliminary 24 hour average water age predictions for all nodes throughout the distribution system* (Required for all submissions. If your model is calibrated, this should be your final water age predictions.) (Section V).
- ☐ Additional sheets describing the planned Stage 1 DBPR Compliance Monitoring Schedule (Section VI).

Total Number of Pages in Your Plan _____

Note: All items marked with an asterisk (*) are required by the rule.

6.5 Selecting SSS Monitoring Sites and Conducting Monitoring

If EPA or your state does not approve or request modifications to your plan, or notify you that your plan is still under review **within 12 months** after the deadline for plan submission, **you may consider the plan approved**. Follow your approved study plan as you select SSS monitoring sites and conduct monitoring. Once your calibration and modeling analysis is completed (Sections 6.1.4 and 6.2) the next step is to select your SSS monitoring locations using the model results and supplemental data. After the locations are selected, you will collect samples during the peak month of TTHM formation and use this data, along with your model results, to select your Stage 2 DBPR Sites.

6.5.1 Select SSS Monitoring Locations

As discussed in Section 6.3, systems should determine the number of SSS monitoring locations for their system type and size based on the information provided in Exhibit 6.9.

You should keep track of your decision making process as you select SSS monitoring locations and then select Stage 2 DBPR compliance monitoring locations because it will help you justify your Stage 2 compliance monitoring site selection. When you prepare your IDSE report, you will be required to provide justification for the selection of each Stage 2 DBPR compliance monitoring site based on model results, monitoring results and additional data analysis.

Depending on your system size and source water type, you will select up to four different kinds of SSS monitoring sites: near entry point sites, average residence time sites, high TTHM sites, and high HAA5 sites. Guidance for near entry point sites is provided in Section 6.5.1.1. Section 6.5.1.2 provides guidelines for using water age estimates from your model to select average residence time and high TTHM sites. Section 6.5.1.3 provides additional considerations for selecting high HAA5 sites. Lastly, Section 6.5.1.4 provides a discussion of overarching issues for consideration when you select your final SSS monitoring sites.

6.5.1.1 Identify Near Entry Point Monitoring Locations

Data from sites near the entry points to the distribution system represent minimum residence time and can be used as a baseline for interpreting changes in water quality as water travels through the system. EPA recommends that you use the following procedure to select near entry point monitoring sites.

Step 1. Determine How Many Near Entry Point Sites You Need for SSS Monitoring

Determine how many near entry point monitoring sites you are required to have by referring to Exhibit 6.9. Remember that SSS sampling requirements for models are based on the population served by your individual system, not the largest population in your combined distribution system.

Step 2. Determine How Many Entry Points are in Your System

For the purposes of the IDSE, entry points are the locations where disinfected water enters your distribution system. Entry points can convey treated surface water, disinfected water from wells, or purchased water from a wholesale system (as long as it has been disinfected). Entry points generally include seasonal or intermittent connections. If a well is not disinfected or is disinfected using ultraviolet light (UV) only, you should not consider it an entry point for the purposes of the IDSE.

Step 3. Compare Results from Step 1 to Step 2

- If the number of near entry point sites required matches the number of entry points in your system, select a sampling location near each entry point.

- If your system has FEWER entry points than required near entry point SSS monitoring locations, you **must** replace the unassigned near entry point sites with high TTHM and HAA5 sites to maintain the required total number of SSS monitoring sites for models. If you have an odd number of unused near entry point sites, select an additional high TTHM site. See Chapter 7, Section 7.1.1 of this guidance manual for an example of how systems used this procedure to replace near entry point sites with high TTHM and high HAA5 sites.

- If your system has MORE entry points than required near entry point SSS monitoring locations, you **must** take samples near entry points to the distribution system having the highest annual water flows. Section 7.1.1 of this guidance manual also includes an example of selecting entry points with the highest annual water flows.

The Stage 2 DBPR does not define near entry point sites explicitly. EPA recommends that you locate your near entry point sites ***between the entrance to the distribution system and no later than first customer***. If you are a consecutive system, a sample tap at the master meter would be an appropriate near entry point site. If you do not have a sample tap at your master meter, consider using the first customer as your near entry point site.

6.5.1.2 Use Your Model to Identify Average Residence Time and High TTHM Locations

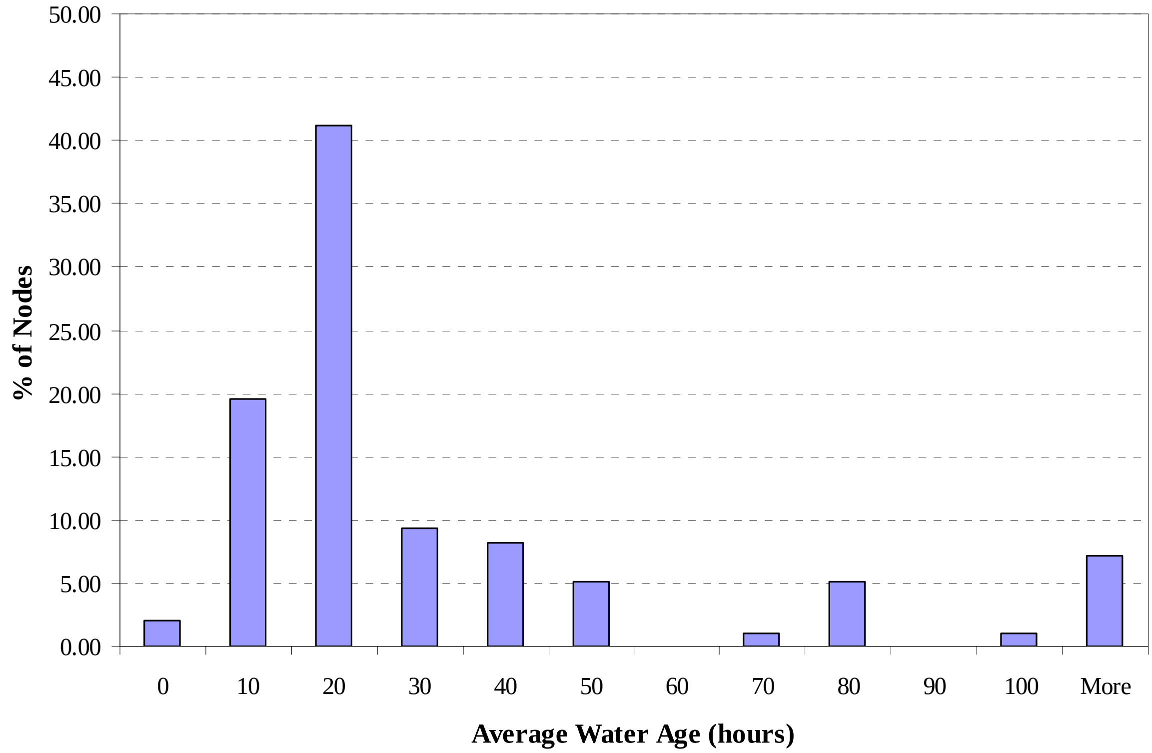
Identifying Average Residence Time Sites

Average residence time is the average age of water delivered to customers in a distribution system. Average residence time is *not* simply one-half the maximum residence time. Ideally, it should be a flow-weighted or population-weighted estimate. The model results for water age/DBP concentration can be used to determine the average residence time for your system. One option for doing this is to list the water age/DBP concentration results in ranked order for the entire system, as shown in Exhibit 6.10. This will help you to plot a histogram of the results as shown in Exhibit 6.11. A histogram plot sorts the water age results into groups and shows the percentage of nodes with water ages falling within the given range. From the histogram it can be seen that the greatest number of nodes have water ages falling in the 20 hour bin (bin range = 15 to 25 hours) and therefore the most frequently occurring water age is 20 hours. Using this method, 20 hours would be a reasonable average water age estimate for the system.

Exhibit 6.10 Ranking of Water Age Results

Rank	Node ID	Water Age (hours)
1	RIVER	0
2	LAKE	0
3	10	0.03
4	60	0.08
	...	
25	267	10.36
26	275	10.39
27	159	10.54
	...	
47	197	12.26
48	211	14.70
49	181	14.87
	...	
71	149	30.58
72	247	30.62
73	231	31.31
	...	
95	Tank 2	122.41
96	131	135.44
97	Tank 3	189.26

Exhibit 6.11 Histogram of Water Age Results



Identify High TTHM Sites

It is not the intent of IDSE monitoring to identify sites with maximum daily or hourly TTHM concentrations. Instead, you should choose candidate sites to represent areas of the distribution system that you expect to have high average TTHM concentrations as compared to other areas in the system. Increased water age typically leads to higher TTHM concentrations. This principle is the basis of the guidance provided for selecting high TTHM sites using your model. If you choose to consider additional factors in identifying high TTHM locations, Section 7.1.1 Step 4 describes typical water quality characteristics of high TTHM sites.

High TTHM sites can be identified by ranking the average water age results for nodes in the model. For model results that directly simulate TTHM concentration, nodes can be ranked by concentration to identify representative high locations. Areas in the distribution system where water is mixed or blended from two different supply points can result in an area of stagnant water, often with high water age and potential for high TTHM concentration. You should select sites from your model with the highest water age or TTHM concentration.

Color coded maps such as those shown in the case study example in Section 6.2.2 can be helpful in interpreting the model results to identify representative high TTHM locations. Many software and GIS packages can be used to plot water age/TTHM concentration results along with other water quality data to produce a graphical representation of the system.

You should also consider the following issues as you use your model to select high TTHM locations:

- Water age at zero-demand nodes, particularly dead ends, may not be accurate.

- The accuracy of water age estimates from a model generally decreases as the model moves from large diameter mains to small diameter mains to subdivision piping and dead-ends. This is due to the increasing uncertainty in water usage rates as the system moves away from large, aggregate demands to smaller demands exerted by a few customers or a single customer.

If the model is skeletonized, the model results for high water age/TTHM concentration areas should be compared to maps of the actual distribution system piping and to actual customer locations in those areas before sample locations are selected. You should try to assure that the sample location is representative of the actual distribution system, not the model, in cases where actual pipes may not all be included in the model in the high residence time areas.

6.5.1.3 Use Your Model and Other Data to Identify High HAA5 Sites

As with high TTHM SSS monitoring sites, it is not the intent of IDSE monitoring to identify sites with maximum daily or hourly HAA5 concentrations. Instead, you should choose high HAA5 SSS monitoring sites to represent areas of the distribution system that you expect to have high average HAA5 concentrations as compared to other areas in the system. Higher temperatures and increased residence time can lead to higher HAA5 concentrations. However, HAA5 can biodegrade when disinfectant residual levels are low or non-existent. Therefore, a high HAA5 site will not necessarily be the site with the longest residence time. This principle is the basis for the guidance provided for selecting candidate sites. If you choose to consider additional factors in identifying high HAA5 locations, Section 7.1.1 Step 5 describes typical water quality characteristics of high HAA5 sites. You may use the 3-step procedure below to select high HAA5 sites.

Step 1: Identify areas with high water age

Similar to high TTHM sites, the sites with high water age can be identified by ranking the water age results for nodes in the model. For model results that simulate HAA5 formation, nodes can be ranked by concentration to identify representative high locations. Areas in the distribution system where water is mixed or blended from two different supply points can result in an area of stagnant water, often with high water age. You should select sites from your model with the representative high water age or HAA5 concentration that were not already selected as high TTHM sites. The next paragraph will provide guidance on eliminating those locations where biodegradation is likely.

Color coded maps such as those shown in the case study example in Section 6.2.2 can be helpful in interpreting the model results to identify representative high HAA5 locations. Many software and GIS packages can be used to plot water age/HAA5 concentration results along with other water quality data to produce a graphical representation of the system.

Step 2: Eliminate sites where you suspect biodegradation

Analysis of disinfectant residual is important in determining potential for biodegradation of HAA5. Sources of disinfectant residual data may include regular compliance monitoring sites (e.g., SWTR or Stage 1 DBPR compliance monitoring sites), operational sample sites, or special sites sampled in response to customer complaints.

Low disinfectant residuals relative to the system average generally indicate longer residence times, and may correlate with higher HAA5 concentrations. However, you should eliminate any areas that regularly or typically in the summer months have free chlorine residuals less than **0.2 mg/L** or with chloramine residuals less than **0.5 mg/L**. Sites with residuals below these minimum levels are more likely to have significant biological activity and are therefore more likely to have biodegradation of HAA5. Because disinfectant residuals typically decay faster during the summer, a review of data from the summer months may be more useful in identifying areas with consistently low residuals. HPC data may also be helpful in determining whether biodegradation of HAA5 is occurring in your system.

Step 3. Verify Sites Using a Map

If the model is skeletonized, the model results for high water age/DBP concentration areas should be compared to maps of the actual distribution system piping and to actual customer locations in those areas before sample locations are selected. Systems should try to assure that the sample location is representative of the actual distribution system, not the model, in cases where actual pipes may not all be included in the model in the high residence time areas.

6.5.1.4 Finalize SSS Monitoring Locations

To finalize the selection of SSS monitoring locations, you should plot all your sites on a map and check that the sites meet all the criteria shown in the following steps. Color-coding and other mapping options may be helpful in this process.

Step 1: Confirm that sites match expectations

The purpose of this step is to confirm that your sites cover key areas. The following questions may be useful as you evaluate all SSS monitoring sites together on the map:

- Are high TTHM SSS monitoring sites located in the extremities of the distribution system?
- Are high HAA5 SSS monitoring sites located in the extremities where there are no indications of biological activity or low disinfectant residual?
- Are high TTHM and HAA5 SSS monitoring sites generally downstream of storage facilities and booster disinfection stations?

- Are there any other areas where you suspect water age is high that are not represented with a high TTHM (and possibly high HAA5) SSS monitoring site?

Step 2. Consider geographic coverage and other factors to finalize site selection

The following issues should be considered in making final choices for SSS monitoring sites:

- **Look for geographic representation**. Select sites that are geographically diverse from the other SSS monitoring sites and existing Stage 1 compliance monitoring locations. EPA recommends that you locate at least one of the high TTHM SSS monitoring sites in a remote area of the distribution system. If your distribution system contains hydraulically isolated portions, you should represent as many of these as possible with at least one SSS site. If you are only required to select one high TTHM site, it is strongly recommended that you locate this site far away from the treatment plant, near the last group of customers (but prior to the last fire hydrant).

- **Look for hydraulic representation**. Select SSS monitoring sites in hydraulically different areas. Even if sites are geographically near each other, they may represent different pressure zones. You should also select sites that represent mixing zones if multiple sources with different water quality characteristics are used.

- **Use sites that "multi-task"**. Prioritize sites that meet the multiple siting criteria and those identified based on more than one data source. For example, a candidate high TTHM SSS monitoring site based on water age model results that has low disinfectant residual historically, is near the edge of the distribution system and is downstream of a tank would be an excellent SSS monitoring site.

- **Select sites that are projected to have high water age** during the time of the day when sampling is normally done.

- **Consider site access**. Try to select SSS monitoring sites for which access will not be an issue. Each site should remain accessible over the long term in case the site is selected for Stage 2 DBPR compliance monitoring.

- **Select the best site in an area with several choices**. If you have more than enough sites in a given area of the distribution system and no other data favors one over the other, use historical TTHM or HAA5 data (if available) to prioritize sites. For example, if disinfectant residual data are the same for three sites over the same periods, then the DBP data can be used to select a high TTHM/HAA5 SSS monitoring site. Remember that you *cannot* use Stage 1 DBPR compliance monitoring sites as SSS monitoring sites.

6.5.2 Special Case: Using DBP Formation Modeling to Select Sites

DBP modeling results using chemical constituent reactions can also be used to assist in selection of the SSS sampling locations. Systems should note that any DBP modeling would be used in addition to completing the modeling SSS requirements for analysis and submittal of water age results.

Most modeling software packages provide an option to model decay/formation of chemical constituents including DBPs with user-specified kinetic coefficients. To calibrate a model for a chemical constituent, field and laboratory tests are necessary to identify the kinetic coefficients (e.g. THM formation rate coefficient and limiting concentration) and to verify the results at different locations in the distribution system.

For a DBP formation simulation, the necessary input data includes:

- the DBP concentration leaving the source
- a first-order rate constant based on laboratory tests
- an ultimate formation potential (maximum concentration) of the DBP

As with the water age analysis, DBP modeling will begin each simulation with a zero concentration at every node unless the user specifies an initial concentration. Historical data could be used to determine initial concentrations throughout the distribution system. A long simulation, similar to one required for water age, could also be used to ensure that the results are not impacted by the initial concentration.

TTHM and HAA5 are usually modeled separately in distribution systems because they often have different formation rate constants and initial concentrations. HAAs may biodegrade in the distribution system but there is currently no mechanism in the modeling software to simulate both the formation and degradation simultaneously. In that case, HAA modeling may be better suited to general predictions of maximum possible concentration in the absence of degradation and may not calibrate well to actual field data.

6.5.3 Conducting Monitoring

This section presents sampling requirements and tips for sample collection for conducting monitoring for your SSS model.

REMINDER: you must continue to collect samples and comply with the Stage 1 DBPR during the IDSE. Results from SSS monitoring should **not** be used for making Stage 1 compliance determinations.

You must collect a **dual sample set** (i.e., two samples) at each location during the peak month for TTHM formation. One sample must be analyzed for TTHM and the other must be analyzed for HAA5. Two samples are required because the analytical methods used for the two groups of contaminants require different sample preservation methods. You must use EPA-approved methods for analysis of your TTHM and HAA5 samples. More information on EPA-approved methods can be found in Appendix C.

As you conduct SSS monitoring, you should keep in mind the following tips for sample collection:

- **Use appropriate sample bottles.** You should use sample bottles that already contain the appropriate dechlorinating agent and preservative for sample collection. You should contact your lab for a recommended sampling and preservation protocol. A typical sampling protocol can be found in Appendix C.

- **Flush your sample tap.** If you collect samples from a tap, you should open the cold water tap and allow the line to flush until the water temperature has stabilized (usually about 3-5 minutes). If you collect a sample at a hydrant or blow-off, the flushing time only needs to be long enough to purge the connecting line to the main. The purpose of this step is to ensure the sample does not represent stagnant water that has been sitting for a long time in the water line between the street and the faucet. The sample should represent the water flowing through the distribution system at the chosen sampling point.

- **Collect cold water samples.** If you collect indoor samples you should collect them from a cold water line.

- **Collect additional water quality data.** You may wish to collect additional water quality data, such as disinfectant residual and temperature data, at the time of DBP sample collection. This information can be helpful as you interpret monitoring results (e.g., unusually low residual at a location could mean unusually high residence time).

- **Re-sample if a sample is lost or broken.** If a sample bottle is lost or broken after sample collection, you should re-sample as soon as possible after the loss occurs. Only the lost sample needs to be recollected, not the entire sample set that was collected together. Make sure to note the loss of sample and resample date as a deviation in your IDSE report.

6.6 Selecting Stage 2 DBPR Compliance Monitoring Sites and Schedule

The purpose of the IDSE is to select Stage 2 DBPR compliance monitoring locations that reflect sites with representative high TTHM and HAA5 concentrations in the distribution system. After completion of the modeling analysis, selection of SSS monitoring locations and sampling during one monitoring period, the Stage 2 DBPR compliance monitoring sites must be selected for use in future compliance monitoring.

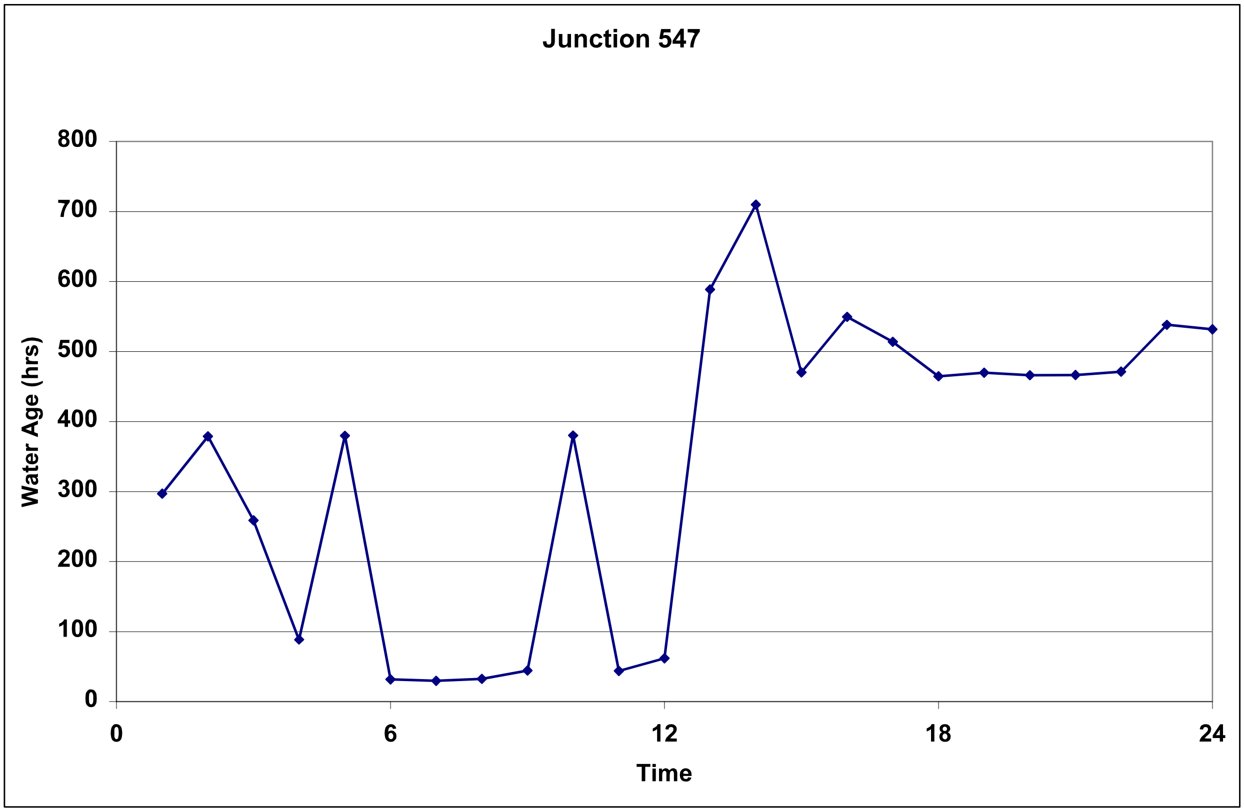
This section provides technical guidance for selecting Stage 2 Compliance Monitoring Sites. Justification for each site is required to be submitted in the IDSE report for a modeling SSS (See Section 6.7).

6.6.1 Analyzing Model Results at Monitoring Locations

To assist in the final selection of Stage 2 DBPR sampling locations, model results should be examined for each SSS monitoring location and each Stage 2 DBPR compliance monitoring location . It is recommended that you plot water age versus time for a minimum period of 24 hours at a time in the simulation when results have stabilized and are repeatable (e.g. last 24 hours of the simulation period) for each monitoring location. Note that you are required to submit a graph of water age for each monitoring location that is selected as a Stage 2 DBPR compliance monitoring site as part of the IDSE Report. As with all model analyses in the SSS, the typical operations in the peak month for TTHM formation must be represented. An example of an acceptable graph is given in Exhibit 6.12.

IMPORTANT NOTE: For security reasons, the graphs of water age for each selected Stage 2 compliance monitoring site should not be identified by site location number. A blind numbering system should be used on each graph that you can discuss with EPA or your state if they contact you with questions about your IDSE report.

Exhibit 6.12 Example of Typical Water Age Variation over Time



6.6.2 Analyzing SSS Monitoring Results

You must calculate the locational running annual average (LRAA) for each SSS monitoring site and Stage 1 DBPR compliance monitoring site in order to select Stage 2 DBPR compliance monitoring sites. The LRAA for each SSS monitoring site is equivalent to the single sample result taken during the peak month for TTHM formation (unless you conducted additional sampling). The LRAA for each Stage 1 DBPR compliance monitoring site should be the LRAA for the year in which you were required to complete SSS monitoring. It will be based on either one or four data points depending on your Stage 1 compliance monitoring frequency. You should consider using a spreadsheet to store your data and calculate your LRAAs.

6.6.3 Comparison of Modeling and Sampling Results

As part of the site selection process, you should compare modeling results to sampling results. Because of the dynamic nature of distribution systems, it is not expected that every sample will exactly match the model results. However, the sample data should generally demonstrate that the SSS monitoring locations correspond to the areas of the distribution system they were chosen to represent. Sampling results that do not fit with the predicted water age or DBP modeling results should be noted. This check is intended to look for trends that indicate the selected sites may not be appropriate and determine whether additional model analysis should be completed. For example, if many of the average residence time sites have TTHM concentrations that are significantly greater than at the high TTHM sites, this may indicate a problem with the model predictions. In this case it would be appropriate to revisit the model analysis to make sure the completed sampling represents high TTHM and HAA5 concentrations in the distribution system.

Systems should explain any discrepancies between the modeling and sampling results and describe any follow-up actions taken to investigate. In this case, systems should consider the following scenarios when analyzing their modeling and sampling results:

- The time of sample collection should be noted and compared to the water age graph to determine if the sample time coincided with the time of maximum water age. DBP concentrations can vary over time and while the average simulated concentration might be considered high, the concentration at certain times of the day may be relatively low.
- Operational events such as main breaks and flushing can change the typical flow patterns in a system and thereby affect the DBP concentrations.
- Additional field data collected during the sampling period (e.g. chlorine residual, heterotrophic plate count) may help to explain discrepancies between modeling and sampling results.
- Systems may choose to resample at the site(s).
- Verify that the model represents the current configuration of the distribution system. Unexpected sampling results may indicate inconsistencies in the model.

6.6.4 Select Final Compliance Monitoring Sites

You must first use the **site selection protocol in Exhibit 6.13** to identify Stage 2 compliance monitoring locations based on your LRAAs. The number of required Stage 2 compliance monitoring sites for your system can be found on page 2 of the **System Specific Study Requirements - Attachment** sheet in Chapter 2. If you complete all steps in the protocol and need additional compliance monitoring sites for the Stage 2 DBPR, repeat the protocol until the required number of sites has been selected. If you arrive at Step 3 or Step 7 and have no more Stage 1 DBPR sites from which to select, continue to the next step. You can also use **Worksheet 6.1** to help you organize your data.

You should compare Stage 2 sites selected using the protocol to model results for water age. In general, TTHM and HAA5 results and modeled water age are the most important factors in site selection. You should consider both predicted average water age and the 24-hour variation in water age. If you are choosing between two sites where one has large variations in water age throughout the day and the other is relatively consistent, you should select the site with consistent water age. Sites with discrepancies between model results and SSS monitoring results can be selected as Stage 2 DBPR compliance monitoring sites if justification is provided in the IDSE report.

The Stage 2 DBPR allows you to consider additional factors when selecting Stage 2 compliance monitoring locations. As you work through the site selection protocol, you should consider other factors that may lead you to select a site with a similar or slightly lower water age and/or LRAA. For example:

- The site provides more complete geographic coverage of the entire distribution system
- The site allows you to maintain a historical record
- Sampling at that site provides the opportunity to collect other water quality or operational data (e.g., chloramine systems may want to collect nitrate or nitrite data at that site)

Your IDSE report **must** include the basis (analytical results and modeling) and justification you used to select these Stage 2 DBPR compliance monitoring sites. This is particularly important for sites where there was a discrepancy between the model and the monitoring results. You should first explain why you selected the site for SSS monitoring, and then why you selected the site for Stage 2 compliance monitoring using modeling results and sample data. An example of how you might justify a site is given below.

> *This site has the highest water age of all nodes and had the highest TTHM levels of all samples collected during our SSS monitoring. Therefore, it was selected as our first high TTHM site.*

It is possible that EPA or your state may not concur with your justification and may require you to select different Stage 2 compliance monitoring sites.

Worksheet 6.1 Stage 2 DBPR Site Selection Worksheet for a Modeling SSS **Page 1 of 1**

Instructions:

1) Enter the number of required Stage 2 DBPR compliance monitoring sites based on your ***System Specific Study Requirements - Attachment*** summary sheet from Chapter 2.

2) Enter the Site ID and LRAA for each SSS monitoring and Stage 1 compliance monitoring location. You may want to sort your entries in order by TTHM LRAA or HAA5 LRAA values.

3) As you work through the site selection protocol in Exhibit 6.13, fill in the "Stage 2 Site Type" column each time you select a site to indicate whether the site is a high TTHM, high HAA5, Existing Stage 1 DBPR Compliance Monitoring Site, or selected using criteria other than the protocol.

No. of Stage 2 DBPR Compliance Monitoring Sites Required

_____Highest TTHM _____Highest HAA5 ____Existing Stage 1 _______TOTAL

Site ID	LRAA TTHM (mg/L)	LRAA HAA5 (mg/L)	Stage 2 DBPR Site Type*
Example	*0.075*	*0.045*	*Highest TTHM*

* Enter Highest TTHM, Highest HAA5, or existing Stage 1 DBPR

Exhibit 6.13 Protocol for Selecting Stage 2 DBPR (Subpart V) Compliance Monitoring Sites

	Steps[1] [required by rule]	Stage 2 Compliance Monitoring Sites Selected [2]
1	Select the location with the highest TTHM LRAA	1st highest TTHM site
2	Select the remaining location with the highest HAA5 LRAA	1st highest HAA5 site
3	<u>For subpart H systems</u>: Select the remaining existing Stage 1 DBPR average residence time compliance monitoring location with the highest HAA5 LRAA <u>For ground water systems</u>: Select the remaining existing Stage 1 DBPR maximum residence time compliance monitoring location with the highest HAA5 LRAA *Skip this step if you have no more Stage 1 DBPR sites*	1st Stage 1 DBPR site
4	Select the remaining location with the next highest TTHM LRAA.	2nd highest TTHM site
5	Select the remaining location with the next highest TTHM LRAA	3rd highest TTHM site
6	Select the remaining location with the next highest HAA5 LRAA	2nd highest HAA5 site
7	<u>For subpart H systems</u>: Select the remaining existing Stage 1 DBPR average residence time compliance monitoring location with the highest TTHM LRAA <u>For ground water systems</u>: Select the remaining existing Stage 1 DBPR maximum residence time compliance monitoring location with the highest TTHM LRAA *Skip this step if you have no more Stage 1 DBPR*	2nd Stage 1 DBPR site
8	Select the remaining location with the next highest HAA5 LRAA	3rd highest HAA5 site
If you need more Stage 2 DBPR compliance monitoring locations, Go back to ***Step 1*** *of this protocol and repeat the steps until you have selected the required number of total sites.*		

1. All steps are based on your calculated LRAAs for your SSS monitoring sites and Stage 1 DBPR compliance monitoring sites. This means that your existing Stage 1 DBPR sites can be selected in steps *other than* 3 or 7. Stop when you reach your required number of Stage 2 DBPR compliance monitoring sites.
2. You cannot select the same site as a highest TTHM and a highest HAA5 compliance monitoring site.

6.6.5 Determining Your Stage 2 DBPR Compliance Monitoring Schedule

The first step in determining your Stage 2 DBPR compliance monitoring schedule is to select your peak historical month. You should use the peak month for TTHM formation selected in your SSS modeling plan unless new data suggest another month. Refer to Section 6.3 for more information on determining peak historical month.

You **must** conduct Stage 2 DBPR compliance monitoring during the peak historical month. If you are a ground water system that serves more than 9,999 people or you are a surface water system that serves more than 499 people, you must also conduct Stage 2 compliance sampling at 90 day intervals before and/or after the peak historical month.

The intent of the required time interval is to ensure that samples are representative of the quality of water over an extended period and do not over-emphasize either high or low concentrations of TTHM or HAA5 that might occur seasonally. For example, a system on quarterly monitoring could sample in the **third full week of every third month**. It is not necessary to sample all sites on the same day.

6.7 Preparing the IDSE Report

Every system that conducts a modeling SSS **must** prepare and submit an IDSE Report. If you will have completed all requirements of the IDSE by your plan submittal deadline, you may submit completed forms or documentation for both the Modeling SSS Plan and IDSE Report for a Modeling SSS at the same time. You should submit the report to the Information Processing and Management Center (IPMC) for review by EPA or your state. See Section 1.4 of this guidance manual for information on how to submit your report to the IPMC.

EPA has developed an **IDSE Report for a Modeling SSS Form (Form 5)**, presented in this section and available electronically as part of the **IDSE Tool.** You are not required to use this form; however, if you choose not to use it, refer to Exhibit 6.14 for a list of the minimum elements you must include in your IDSE report. If any information has changed since submittal of your modeling study plan, revised information must be submitted with the report. A major component of the modeling study plan is to report on the final calibration of the hydraulic model and its suitability for use in the required modeling analysis. If you use Form 5 in this section, your IDSE report will contain all required information about your model.

The IDSE Tool creates a custom form for your system and provides links to technical guidance from this manual. The tool is available on EPA's website at http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

Exhibit 6.14 Minimum Requirements for IDSE Report for a Modeling SSS

If you do not choose to use the IDSE Report for a Modeling SSS Form (Form 5), the following information must be provided in your IDSE Report:

- Analytical results from Stage 1 DBPR compliance monitoring and SSS monitoring in a tabular or spreadsheet format.
- An updated system schematic, if changed from your modeling study plan (Required if you did not indicate SSS monitoring locations in your study plan).
- Final information on model requirements, calibration, and modeling analysis, if changed or new since submittal of your study plan, including tables and graphs.
- A 24-hour time series graph of residence time for each Stage 2 DBPR compliance monitoring location selected.
- Selected Stage 2 DBPR compliance monitoring locations and timing, including the basis (analytical results and modeling) and justification for selection of those locations.
- Population served and system type (subpart H or ground water) if changed from your modeling study plan.
- An explanation of any deviations from your approved study plan.

Before you begin Stage 2 DBPR compliance monitoring, you will also be required to prepare a Stage 2 DBPR compliance monitoring plan. In addition, if you are a subpart H system serving >3,300 people, you must submit a copy of your Stage 2 compliance monitoring plan to the state. If you include **compliance calculation procedures** in your IDSE report, the report can meet the requirement of the plan, and you do not have to prepare or submit a separate plan. As a guide for specifying your compliance calculation procedures, refer to the Stage 1 DBPR, 141.133(b), and your Stage 1 compliance monitoring plan. Check with your state, as they may have different requirements under the Stage 2 DBPR. If you are a consecutive or wholesale system, your state may choose to use its special primacy authority to modify your Stage 2 compliance monitoring requirements. In this case, you should check with the state to see if they are going to use this authority. You should develop your IDSE report for the total number of required Stage 2 compliance locations for your system.

The IDSE Report for a Modeling SSS Form (Form 5) includes the following sections:

I. General Information
II. SSS and Stage 2 DBPR Requirements
III. Modeling Information
IV. SSS Monitoring Location Selection
V. SSS and Stage 1 DBPR Compliance Monitoring Results
VI. Selection of Stage 2 DBPR Compliance Monitoring Locations
VII. Justification of Stage 2 DBPR Compliance Monitoring Sites
VIII. Peak Historical Month
IX. Proposed Stage 2 DBPR Compliance Monitoring Dates
X. Distribution System Schematic
XI. Attachments

If you are submitting an SSS plan and IDSE report at the same time, you must submit the portions listed in bold above. Sections of the form with an asterisk (*) are required by the Stage 2 DBPR. An example of a complete IDSE report for a modeling SSS using this form is in Appendix F.

I. General Information

I.A. PWS Information* - If nothing has changed since you completed your modeling study plan, copy information from your plan into this section. If your system characteristics have changed, see Section 6.4 of this chapter for guidance on completing this section.

I.B. Date Submitted* - Enter either the date that you are submitting the form electronically, putting it in the mailbox, or dropping it off with an express delivery service. Be sure to submit your IDSE report before the deadline found on your requirements summary sheet.

I.C. PWS Operations - This section asks questions about your system to help inform EPA and state personnel during the plan review process. If nothing has changed since you completed your modeling study, copy information from your plan into this section. If your system characteristics have changed, see Section 6.4 of this chapter for guidance on completing this section.

I.D. Contact Person* - Enter the contact information of the person who is submitting the report. This should be the person who will be available to answer questions from EPA and/or state reviewers.

II. SSS and Stage 2 DBPR Requirements*

II.A. Number of Required Stage 2 DBPR Compliance Monitoring Sites - Refer to the ***System Specific Study Requirements - Attachment*** in Chapter 2. Copy the numbers from the table that correspond to your source type and the population served by your system.

II.B. IDSE Schedule - This should be the same schedule you entered for your modeling study plan. See Section 6.3 of this chapter for guidance.

II.C. Stage 2 DBPR Compliance Monitoring Frequency **-** Refer to the ***System Specific Study Requirements - Attachment*** in Chapter 2. From the "Stage 2 Compliance Monitoring Requirements" table, locate the monitoring frequency that corresponds to your source type and the population served by your system. Put a check mark in the box corresponding to that monitoring frequency.

II.D. Number of Required SSS Samples - Enter the number of samples you were required to collect during the peak month for TTHM formation.

III. Modeling Information

Systems with an approved model calibration as part of their modeling study plan do not need to complete this section. If any of your information submitted as part of the modeling study plan has changed, provide updated information in this section.

III.A. How was demand data assigned to the model? For each question, provide a brief description of the data and methods used to assign customer demands to the model.

III.B. Describe all calibration activities undertaken.* For each question, provide a brief description of the data and methods used to calibrate your model.

If you did not complete calibration prior to your study plan submittal or if your calibration has changed, submit a graph that documents your model calibration by showing simulated tank levels versus observed levels for the storage facility with the highest water age in each pressure zone of your system (see Exhibit 6.5 for an example)*.

Systems with an approved model calibration as part of their modeling study plan do not need to complete this section.

III.C. How was the SSS modeling performed?*

Systems with an approved model analysis as part of their modeling study plan do not need to complete this section unless their information has changed.

Systems who conducted their water age modeling analysis after submitting their modeling study plan should answer all questions.

- **Submit model output showing final average water age results over a 24-hour period***. The 24-hour period used for the average water age results table should represent a simulation time after the model has achieved a stable, repeating water age pattern (e.g. the last 24 hours of the simulation). EPA recommends that you submit this in tabular format to not pose a security risk to your system.

- **Submit a graph of water age versus time for the entire simulation duration for the tank with the highest overall water age in the system*.**

IV. SSS Monitoring Location Selection - Provide an explanation of the approach used to analyze water age results to select SSS monitoring locations. Describe how sites were ranked for water age (e.g. percentile, highest to lowest, etc.). Include any additional data that was used to assist in the analysis, such as residual disinfectant concentration. Describe practical considerations such as accessibility, coverage of geographic areas, or coverage of hydraulic zones that factored into the decision.

V. SSS and Stage 1 DBPR Compliance Monitoring Results*

V.A. TTHM Results - Enter the TTHM results for each monitoring site for each monitoring period in which you collected data. For each sample result, enter the date on which sampling was conducted. You should enter all SSS monitoring results as well as all Stage 1 DBPR compliance monitoring results collected during the IDSE period. If you collected samples during a single monitoring period, your LRAAs for those sites will be the same as the monitoring results. For each site ID, identify the location type (High TTHM, High HAA5, Average, Entry Point).

V.B. HAA5 Results - Enter the HAA5 results for each monitoring site for each monitoring period in which you collected data. For each sample result, enter the date on which sampling was conducted. You should enter all SSS monitoring results as well as all Stage 1 DBPR compliance monitoring results collected during the IDSE period. If you collected samples during a single monitoring period, your LRAAs for those sites will be the same as the monitoring results. For each site ID, identify the location type (High TTHM, High HAA5, Average, Entry Point).

V.C. Where were your TTHM and HAA5 samples analyzed? - Put a check mark in the appropriate box to identify whether your system analyzed TTHM and HAA5 samples in an in-house laboratory or sent the samples to a certified laboratory for analysis.

If you analyzed your TTHM and HAA5 samples in an in-house laboratory, check the appropriate box to identify whether your laboratory is certified. If you sent your TTHM and HAA5 samples to a certified laboratory, enter the name of the laboratory in the blank. If you used more than one laboratory (e.g., if you used different laboratories for SSS samples and Stage 1 DBPR compliance samples), list both laboratories, or check "in-house" and list the name of the laboratory if applicable.

V.D. What method(s) was used to analyze your TTHM and HAA5 samples? Put a check mark in the appropriate box to indicate the analytical method used to measure the TTHM and HAA5 concentrations of your SSS and Stage 1 DBPR compliance samples. If more than one method was used (e.g., if you used different laboratories for SSS samples and Stage 1 DBPR compliance samples), check more than one method. If you do not know what method was used, contact your laboratory.

VI. Selection of Stage 2 DBPR Compliance Monitoring Locations - Describe the comparison of sampling and modeling results. Provide a description of the comparison between sampling and modeling results, including any follow-up investigations done to resolve discrepancies. See Section 6.3.3 for more information.

- **You must submit a graph of water age versus time for each site selected***. You should show the selected sites on the distribution system schematic and assign each site a unique site ID (see Section XI). For security reasons, the graphs of water age for each selected Stage 2 compliance monitoring site should not be identified by site location number. A blind numbering system should be used on each graph, which you can discuss with EPA or your state if they contact you with questions about your IDSE report.

VII. Justification of Stage 2 DBPR Compliance Monitoring Sites* - Enter the site ID from the distribution schematic and the site category (highest TTHM, highest HAA5, or Stage 1 DBPR). You must provide a justification for each site including the modeling and sampling results that led you to select it. See Section 6.4.4 of this manual for guidance. For example, a justification for a highest HAA5 site might be:

High average water age, high HAA5 results during monitoring, measurable residual in historical TCR data, located in East Pressure Zone

Note that there is only space for 8 monitoring sites on this sheet. If you need more space, attach additional sheets.

VIII. Peak Historical Month

VIII.A Peak Historical Month for TTHM and HAA5* - Enter the month that you determined to be your peak historical month for TTHM and HAA5.

VIII.B <u>Is Your Peak Historical Month the Same as Your Peak Month for TTHM Formation in Your Modeling Study Plan?</u> - Put a check mark in the appropriate box to identify whether your system is using the same peak. If your SSS monitoring results or other factors prompted you to select a different peak month. explain how you selected a new peak month. Note that the modeling SSS was based on using the peak month for TTHM formation for the modeling analysis. However, compliance with Stage 2 DBPR is based on the peak historical month for TTHM and HAA5. You should use the same peak historical month that you used for your SSS monitoring unless you have convincing data to do otherwise.

IX. **Proposed Stage 2 DBPR Compliance Monitoring Schedule*** - Enter the ID for each Stage 2 DBPR compliance monitoring site in the table (these should match the ID's you enter in Section VII and on your schematic). Enter your proposed sampling schedule for the number of monitoring periods identified in Section II.C. The entry can be a specific date or week and can be in a number of different formats. For example:

- 7/9/07
- 2nd week in Nov '07
- Week of 7/9/07

Remember that at least one monitoring period must be during the peak historical month identified in Section VIII.A. Note that there is only space for 8 monitoring sites on this sheet. If you are a subpart H system serving more than 249,999 people you are required to monitor at more than 8 sites. Therefore, you will need to attach additional sheets.

X. **Distribution System Schematic*** A distribution system schematic is required *only if it has changed from your approved modeling study plan.* If it has changed, you must attach a distribution system schematic. **If you did not show your SSS monitoring locations on the distribution system schematic you submitted with your model study plan, you must submit a revised distribution system schematic**. See Section 6.4 of this manual for guidance.

XI. **Attachments** - Put a check mark in each of the boxes corresponding to any attachments that you have included in your report.

Note that there is only space for 8 monitoring sites in Section V and Section VII. If you need additional space you can attach additional sheets.

Note that some of the attachments are required by the rule.

If you deviated from your approved study plan, you must attach an explanation of all deviations.

If you submit your IDSE report electronically, you also have the option to submit attachments in hard copy. Include a note in your electronic IDSE report explaining that attachments are being submitted in hard copy, and mail the hard copy to the IPMC mailing address in your Requirements Summary Sheet. The IPMC will match the hard copy submission with your electronic submission when it is received.

If you are a subpart H system serving >3,300 people, you must submit a copy of your Stage 2 compliance monitoring plan to the state. If you include **compliance calculation procedures** in your IDSE report, the report can meet the requirement of the plan, and you do not have to prepare or submit a separate plan. As a guide for specifying your compliance calculation procedures, refer to the Stage 1 DBPR, 141.133(b), and your Stage 1 compliance monitoring plan. Check with your state, as they may have different requirements under the Stage 2 DBPR.

Enter the total number of pages in your IDSE report (including attachments) in the blank at the bottom of this section. This will allow EPA or your state to ensure that all pages were received.

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Form 5: IDSE Report for a Modeling SSS

I. GENERAL INFORMATION

(Skip this section if you are submitting the plan and report at the same time)

A. PWS Information*

PWSID: ______________________

PWS Name: ______________________

PWS Address: ______________________

City: ______________________ State: _____ Zip: _________

Population Served: ______________________

B. Date Submitted*

____

System Type:	Source Water Type:	Buying / Selling Relationships:
☐ CWS	☐ Subpart H	☐ Consecutive System
☐ NTNCWS	☐ Ground	☐ Wholesale System
		☐ Neither

C. PWS Operations

Residual Disinfectant Type: ☐ Chlorine ☐ Chloramines ☐ Other:__________

Number of Disinfected Sources: ___ Surface ___GWUDI ___Ground ___Purchased

D. Contact Person*

Name: ______________________

Title: ______________________

Phone Number: ______________________ Fax: ______________

E-mail: ______________________

II. SSS AND STAGE 2 DBPR REQUIREMENTS*

A. Number of Required Stage 2 DBPR Compliance Monitoring Sites _____ TOTAL

Highest TTHM:_______ Stage 1 DBPR:_______

Highest HAA5:_______

B. IDSE Schedule

☐ Schedule 1

☐ Schedule 2

☐ Schedule 3

☐ Schedule 4

C. Stage 2 DBPR Compliance Monitoring Frequency

☐ Once during peak historical month

☐ Every 90 days (4 monitoring periods)

D. Number of Required SSS Samples

______ TOTAL

III. MODELING INFORMATION

(Skip this section if you submitted a modeling study plan with an approved model calibration and your information has not changed, or if you are submitting your plan and report at the same time)

A. How was demand data assigned to the model? (*attach additional sheets if needed*)

1.	What method was used to assign demands throughout the system?	
2.	How did you estimate diurnal demand variation? How did you determine total system demand?	
3.	How many demand categories did you use?	
4.	How did you address large water users?	

B. Describe all calibration activities undertaken* (*attach additional sheets if needed*)

1.	When was the model last calibrated?	
2.	What types of data were used in the calibration?	
3.	When was the calibration data collected?	
4.	What field tests have been performed to collect calibration data?	

Form 5: IDSE Report for a Modeling SSS

III. MODELING INFORMATION (Continued)

5.	How did you determine friction factors (C-factors)?	
6.	Was the calibration completed for the peak month for TTHM formation? If not, was the model performance verified for the peak month for TTHM formation?	
7.	How well do actual tank levels correlate with predicted tank levels during the peak month for TTHM formation? **Submit a graph of predicted tank levels vs. measured tank levels for the storage facility with the highest water age in each pressure zone.***	
8.	If you are using a water quality model, what parameters are modeled? How was the model calibrated?	

Form 5: IDSE Report for a Modeling SSS

III. MODELING INFORMATION (Continued)

C. How was the SSS modeling performed?* (*attach additional sheets as needed*)

1.	Was modeling done for the operating conditions during the peak month for TTHM formation*?	
2.	How were operational controls represented in the model?	
3.	How was water age simulated during the peak month for TTHM formation (time steps, length of simulation, etc.)?	
4.	What are the average water age results for your distribution system? **Submit final model output showing 24-hour average residence time throughout the distribution system*.** **Submit graph of water age at the longest residence time storage facility in the distribution system showing the predictions for the entire EPS simulation period*.**	

Form 5: IDSE Report for a Modeling SSS

IV. SSS MONITORING LOCATION SELECTION

How were the SSS monitoring locations selected? ***(attach additional sheets as needed)***

1.	What model results were used as the basis for selection?	
2.	What criteria were used in selecting average residence time, high TTHM, and high HAA5 sites?	
3.	What additional data was used in the analysis, and how was it used?	
4.	How did you look at practical considerations like accessibility of sampling locations?	
5.	How did you verify that your selected sampling locations corresponded to the selected node in your model?	

Form 5: IDSE Report for a Modeling SSS

V. SSS AND STAGE 1 DBPR COMPLIANCE MONITORING RESULTS*

A. TTHM Results

Site ID & Category	Data Type	TTHM (mg/L)				LRAA
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					

Attach additional sheets as needed for SSS and Stage 1 DBPR results.

Form 5: IDSE Report for a Modeling SSS

V. SSS AND STAGE 1 DBPR COMPLIANCE MONITORING RESULTS* (Continued)

B. HAA5 Results

Site ID & Category	Data Type	HAA5 (mg/L)				LRAA
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					

Attach additional sheets as needed for SSS and Stage 1 DBPR results.

Form 5: IDSE Report for a Modeling SSS

V. SSS AND STAGE 1 DBPR COMPLIANCE MONITORING RESULTS* (Continued)

C. Where were your TTHM and HAA5 samples analyzed?

☐ In-House

Is your in-house laboratory certified? ☐ Yes ☐ No

☐ Certified Laboratory

Name of certified laboratory: ______________________________

D. What method(s) was used to analyze your TTHM and HAA5 samples?

TTHM	HAA5	
☐ EPA 502.2	☐ EPA 552.1	☐ EPA 552.2
☐ EPA 524.3	☐ EPA 552.3	☐ SM 6251 B
☐ EPA 551.1		

VI. SELECTION OF STAGE 2 DBPR COMPLIANCE MONITORING LOCATIONS

Describe the comparison of sampling and modeling results (*attach additional sheets as needed*):

1.	How well did the sampling results correspond to the modeling results?	
2.	For samples that did not match well with model results, what follow-up investigations were performed?	
3.	Were additional samples collected? (Include data on table in Section IV)	
4.	**Submit a graph of water age versus time for each selected sampling location*.**	

VII. JUSTIFICATION OF STAGE 2 DBPR COMPLIANCE MONITORING SITES*

Stage 2 Compliance Monitoring Site ID	Site Type	Justification
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	

Attach additional copies of this sheet if you need more room.

Form 5: IDSE Report for a Modeling SSS

VIII. PEAK HISTORICAL MONTH

A. Peak Historical Month* ______________

B. Is Your Peak Historical Month the Same as your Peak Month in Your Modeling Study Plan?

☐ Yes ☐ No

If no, explain how you selected your new peak historical month *(attach additional sheets if needed)*:

____

____

____

____

____

____

IX. PROPOSED STAGE 2 COMPLIANCE MONITORING SCHEDULE*

Stage 2 Compliance Monitoring Site ID	Projected Sampling Date (date or week)[1]			
	period 1	period 2	period 3	period 4

[1] *period = monitoring period. Complete for the number of monitoring periods from Section II.C.*

Attach additional copies of this sheet if you need more room.

Form 5: IDSE Report for a Modeling SSS

X. DISTRIBUTION SYSTEM SCHEMATIC*
*(Skip this section if you submitted a modeling study plan and your distribution system schematic **was complete** and has not changed from your approved modeling study plan, or if you are submitting the plan and report at the same time)*

ATTACH a schematic of your distribution system. If your schematic has changed or if you did not show your SSS monitoring locations on the distribution system schematic you submitted with your model study plan (Form 4), you must submit a revised distribution system schematic.

XI. ATTACHMENTS

- ☐ Tabular or spreadsheet documentation that your model meets minimum calibration requirements if updated since approved modeling study plan* (Section III).
- ☐ Additional sheets for explaining model information/results, including required graphs if not submitted as part of an approved modeling study plan* (Section III).
- ☐ Additional sheets for sampling results, if needed (Section V).
- ☐ Additional sheets for selection of Stage 2 DBPR compliance monitoring sites (Section VI).
- ☐ Graph of water age versus time for all Stage 2 DBPR sites selected* (Section VI).
- ☐ Additional sheets for justification of Stage 2 DBPR Compliance Monitoring Sites, if needed (Section VII). **REQUIRED if you are a subpart H system serving more than 249,999 people**.
- ☐ Additional sheets for explaining how you selected the peak historical month (Section VIII).
- ☐ Additional sheets for proposed compliance monitoring schedule (Section IX). **REQUIRED if you are a subpart H system serving more than 249,999 people**.
- ☐ Explanation of deviations from approved study plan.
- ☐ Distribution system schematic* (Section X). **REQUIRED if it has changed from your approved model study plan or if monitoring locations were not shown**.
- ☐ Compliance calculation procedures (for Stage 2 Compliance Monitoring Plan).

Total Number of Pages in Your Report: ______

Note: All items marked with an asterisk (*) are required by the rule.

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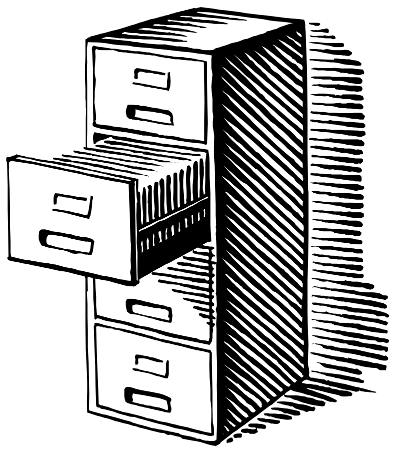
6.8 Recordkeeping



The IDSE report for a modeling SSS must be kept on file for **10 years** after the date it is submitted. If EPA or your state modifies the recommendations made in your report or approves alternative Stage 2 DBPR compliance monitoring locations, you must also keep a copy of EPA or your state's notification on file for 10 years after the date of the notification. You must make your IDSE report and any notification available for review by your state or the public.

The modeling study plan, including any modifications by EPA or your state, must also be kept on file for as long as you are required to retain your IDSE report for a modeling SSS. You must make the plan and any modifications available for review by your state or the public.

6.9 Next Steps: Preparing the Stage 2 DBPR Compliance Monitoring Plan

As the final step before you can begin compliance monitoring for the Stage 2 DBPR, you must develop and implement a **Stage 2 DBPR monitoring plan** by the deadline provided in your requirements summary sheet. The plan will be similar to your Stage 1 DBPR monitoring plan in that it will identify how you intend to sample for compliance with Stage 2. You must keep your plan on file for state and public review. If you are a subpart H system serving > 3,300 people, you **must** submit your plan to EPA or your state prior to when you are required to start monitoring.

Exhibit 6.15 contains the minimum requirements for what must be included in your Stage 2 DBPR compliance monitoring plan. Because compliance monitoring plans are not addressed as part of the IDSE provisions of the Stage 2 DBPR, ***EPA has not included detailed guidance for developing Stage 2 compliance monitoring plans in this guidance manual***. EPA plans to develop other manuals and training that address the compliance monitoring provisions of the Stage 2 DBPR.

See EPA's website http://www.epa.gov/safewater/disinfection/stage2 for a up-to-date inventory of Stage 2 DBPR guidance manuals and training materials, or call the Safe Drinking Water Hotline at 1-800-426-4791.

Exhibit 6.15 Required Contents of Stage 2 DBPR Compliance Monitoring Plans

All Systems	Additional Requirements for Consecutive and Wholesale Systems [1]
• Monitoring locations • Monitoring dates • Compliance calculation procedures	• If your state has used its special primacy authority to modify your monitoring requirements, you must include monitoring plans for other systems in your combined distribution system

1. See Appendix D of this manual for guidance specifically for consecutive and wholesale systems

7.0 Standard Monitoring

This chapter covers:

Standard monitoring is one year of increased distribution system monitoring to find locations with high total trihalomethane (TTHM) and haloacetic acid-five (HAA5) concentrations. Results from standard monitoring will be used in conjunction with results from Stage 1 compliance monitoring to select Stage 2 compliance monitoring locations. Any system can conduct standard monitoring to meet the IDSE requirements of the Stage 2 Disinfectants and Disinfection Byproducts Rule (DBPR).

If you have not already done so, you should complete the **flowchart** in Exhibit 2.3 of this guidance manual. Depending on your system size and available data, you may have another option for complying with IDSE requirements. The flowchart will help you select the most appropriate IDSE option for your system and will direct you to a 2-page ***Requirements Summary Sheet*** for your schedule. You will also be directed to the ***Standard Monitoring Requirements - Attachment*** sheet containing detailed requirements for standard monitoring and Stage 2 compliance monitoring (e.g., number of samples and sampling frequency). You should keep these sheets handy as you work through this chapter.

This chapter provides guidelines on how to select standard monitoring sites, prepare a standard monitoring plan, conduct standard monitoring, select Stage 2 DBPR compliance monitoring sites, and prepare the IDSE report. Appendices H and I support this chapter by providing example standard monitoring plans and reports. Guidance for standard monitoring is also available in the EPA manual, *Initial Distribution System Evaluation Guide for Systems Serving < 10,000 People*. This guide is specifically targeted to small systems and contains an example monitoring plan and report for a small surface water system.

It is important that **consecutive and wholesale systems** communicate with each other throughout the IDSE process. If you are a consecutive or wholesale system, refer to **Appendix D** for specific issues that you should consider.

IMPORTANT: Results from IDSE standard monitoring **should not** be used to determine compliance with maximum contaminant levels (MCLs) of the Stage 1 DBPR. Results must, however, be included in the range of levels that you report in your Consumer Confidence Report. During the entire IDSE period, you **must** continue to monitor according to your Stage 1 DBPR monitoring plan and comply with Stage 1 DBPR MCLs at your Stage 1 sites.

7.1 Selecting Standard Monitoring Sites and Preparing Your Standard Monitoring Plan

Every system that conducts IDSE standard monitoring **must** prepare and submit a Standard Monitoring Plan. You should submit the plan to the Information Processing and Management Center (IPMC) for review by EPA or your state. See Section 1.4 of this guidance manual for information on how to submit your plan to the IPMC.

This section contains EPA's recommended technical approach for selecting standard monitoring sites. It also contains the recommended approach for selecting the peak historical month and scheduling standard monitoring. Lastly, this section provides guidance on completing the IDSE standard monitoring plan.

EPA has developed a **Standard Monitoring Plan Form (Form 6)**, presented in Section 7.1.3 and available electronically as part of the **IDSE Tool.** You are not required to use this form; however, if you choose not to use it, refer to Exhibit 7.1 for a list of the minimum elements you must include in your standard monitoring plan. The IDSE Tool is available on EPA's website at http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

Exhibit 7.1 Required Elements of Your Standard Monitoring Plan

- The population served by your system
- Your system type (subpart H or ground water)
- A distribution system schematic showing
  - entry points
  - sources
  - storage facilities
  - locations and dates of all projected standard monitoring and Stage 1 DBPR compliance samples
- Peak historical month
- Justification of standard monitoring site selection and a summary of data you relied on to justify standard monitoring site selection

7.1.1 Recommended Approach for Selecting Standard Monitoring Sites

You are required to select **up to four types** of standard monitoring sites for the IDSE:

- near entry point
- average residence time
- high TTHM
- high HAA5

Before you continue reading this chapter of the manual, you should use the IDSE Standard Monitoring Table in the ***Standard Monitoring Requirements - Attachment*** sheet from Chapter 2 to determine how many of each type of site is required for your system. Remember that IDSE standard monitoring requirements (i.e., the number of monitoring sites and sampling frequency) are based on the population served by your individual system, not the largest population in your combined distribution system.

EPA's recommended **8-Step technical approach** for selecting standard monitoring sites is summarized below and depicted graphically in Exhibit 7.2. The remainder of this section contains detailed guidance for each of these eight steps.

1. **Gather water quality data and system operating information** including Stage 1 and historic DBP data from the last several years. You may also want to use advanced tools (e.g., hydraulic model, tracer study data) if available.

2. Use data sources and tools to select **near entry point sites**.

3. Use data sources and tools to select **candidate average residence time sites**. Try to identify at least twice as many candidate sites as are required for standard monitoring.

4. Use data sources and tools to select **candidate high TTHM sites**. Try to identify at least twice as many candidate sites as are required for standard monitoring.

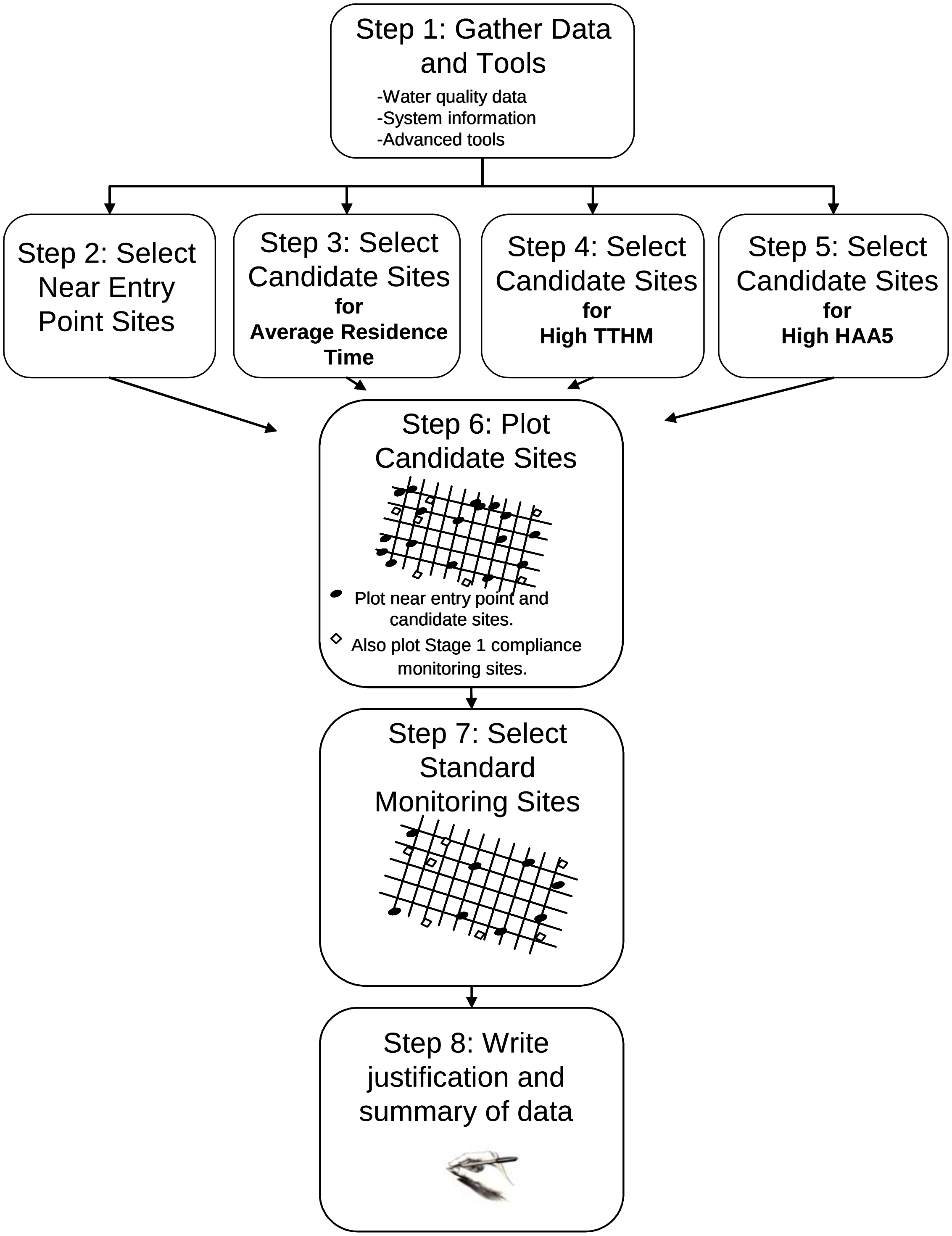
5. Use data sources and tools to select **candidate high HAA5 sites**. Try to identify at least twice as many candidate sites as are required for standard monitoring.

6. **Plot the near entry point sites and all candidate sites on a map of your distribution system**. You should include your Stage 1 DBPR compliance monitoring sites on the map so that you do not inadvertently select them as standard monitoring sites. You may want to color-code candidate sites (e.g., by type of site or data source).

7. Consider geographic coverage and other factors to **select standard monitoring sites from candidate sites.**

8. Write your **justifications** for site selection and **summary of data** that you relied on to select standard monitoring sites.

Exhibit 7.2 Recommended Approach to Selecting Standard Monitoring Sites



Remember that Stage 1 DBPR compliance monitoring sites ***cannot*** be used as standard monitoring sites.

Step 1: Gather Data and Tools

There are many kinds of data and tools that can be useful in selecting standard monitoring sites. Exhibit 7.3 shows the types of information typically available to water systems and for which types of sites they should be used.

One of the most important tools you can use to select standard monitoring sites is an up-to-date, detailed **map of your distribution system**. When you submit your standard monitoring plan, you are required to include a schematic of your distribution system showing all entry points, sources and storage facilities. Other useful map features include the layout of pipes, locations pump stations, pressure zone boundaries, locations of large users, and population density information. For security reasons, EPA recommends that you remove any information that could pose a security risk from your standard monitoring plan submittal. You may wish to use a separate, working version of your distribution system map for selecting sites, then transfer your information to a less detailed map for your standard monitoring plan submittal.

It is important that you consider available water quality data from your distribution system when selecting standard monitoring sites. In general, your water quality data should be less than 10 years old and should represent current system configurations to the extent possible. Most systems have collected disinfectant residual data from their distribution system, and this data can be very useful for selecting standard monitoring locations. EPA has provided additional guidelines for evaluating disinfectant residual data in Step 3.

Systems with multiple entry points that have different source water characteristics may find source water data quite useful for selecting standard monitoring sites. For instance, if a system has one surface water source and one ground water source, entry point sampling may indicate the surface water source produces much higher TTHM and HAA5 levels than the ground water source. Therefore, the water system may use this information to justify why a significant proportion of distribution system sample sites are served by the surface water plant.

Some systems, such as those that serve resort communities, have dramatic fluctuations in flow as well as population. If your system experiences widely varying demands on a **seasonal basis,** you should evaluate data and operational information for different seasons separately. When you are selecting sites, make sure that you select sites that represent the different operating scenarios of your system.

Exhibit 7.3 Data and Tools for Selecting Different Types of Standard Monitoring Sites

Type of Information	Type of Standard Monitoring Site			
	Near Entry Point	Average Residence Time	High TTHM	High HAA5
System Configuration				
Pipe layout, location of storage facilities		x	x	x
Location of sources	x	x	x	x
Pressure Zones		x	x	x
Information on Population Density		x	x	x
Locations of Large Customers		x		
Water Quality and Operational Data				
Disinfectant Residual Data		x	x	x
Stage 1 DBP Data			x	x
Other DBP Data			x	x
Microbiological Monitoring Data (e.g., HPC)				x
Tank Level Data, Pump Run Times		x	x	x
Customer Billing Records		x	x	x
Advanced Tools				
Water Distribution System Model		x	x	x
Tracer Study		x	x	x

Water distribution system models (e.g., hydraulic models and water quality models) and tracer studies can be very useful in selecting average residence time and high TTHM and HAA5 sites. Hydraulic models can be used to estimate typical residence time at various locations in your distribution system. A tracer study can provide a snapshot of water age at different locations in your distribution system. These tools have limitations, however, and should be used with caution. Some general guidelines are provided below.

- If your hydraulic model has not been recently calibrated or is highly skeletonized, you may want to rely on other types of information for selecting sites, or use modeling results in conjunction with other data.

- It is important that the hydraulic model and tracer study represent the current distribution system configuration. If your system has undergone major changes (e.g., new tank, new pump station, major system improvement projects) since the model was developed or the tracer study was conducted, consider using other data and tools to select standard monitoring sites.

Chapter 6 provides detailed guidelines on using distribution system hydraulic models for the IDSE and includes a list of technical references. Several books on distribution system modeling also contain information on tracer studies, such as the AWWA Manual M32, *Computer Modeling of Water Distribution Systems*, 2nd Edition, 2005 and *Advanced Water Distribution Modeling and Management* (Beckwith et al., 2002).

A key resource available to many systems is the experience and knowledge of **water system personnel.** Because distribution system operations and configuration are not always well documented, experienced operations personnel can provide valuable insights to the site selection process.

Step 2: Identify Near Entry Point Standard Monitoring Sites

Data from sites near the entry points to the distribution system represent minimum residence time and can be used as a baseline for interpreting changes in water quality as water travels through the system. EPA recommends that you use the following procedure to select near entry point standard monitoring sites.

Step 2a. Determine How Many Near Entry Point Sites You Need for Standard Monitoring

Determine how many near entry point standard monitoring sites you are required to have by referring to the ***Standard Monitoring Requirements - Attachment*** sheet in Chapter 2. Remember that IDSE monitoring requirements (i.e., the number of monitoring sites and sampling frequency) are based on the population served by your individual system, not the largest population in your combined distribution system. Note the special requirements for small consecutive systems to monitor at their consecutive system entry point.

Step 2b. Determine How Many Entry Points are in Your System

For the purposes of the IDSE, entry points are the locations where disinfected water enters your distribution system. Entry points can convey treated surface water, disinfected water from wells, or purchased water from a wholesale system (as long as it has been disinfected). Entry points generally include seasonal or intermittent connections. If a well is not disinfected or is disinfected using ultraviolet light (UV) only, you should not consider it an entry point for the purposes of the IDSE.

Step 2c. Compare Results from Step 2a to Step 2b

- If the number of near entry point sites required matches the number of entry points in your system, select a standard monitoring location near each entry point.

- If your system has FEWER entry points than required near entry point standard monitoring locations, you **must** replace the unassigned near entry point sites with high TTHM and HAA5 standard monitoring sites to maintain the required total number of standard monitoring sites for the IDSE. If you have an odd number of unused near entry point sites, select an additional high TTHM site. See Example 7.1 for how a hypothetical system used this procedure to replace near entry point sites with high TTHM and high HAA5 sites for standard monitoring.

Example 7.1 System with Fewer Entry Points than Required Near Entry Point Standard Monitoring Sites

A system has one surface water source and serves 260,000 people. According to the ***Standard Monitoring Requirements - Attachment*** sheet in Chapter 2, the system must select 4 near-entry point sites, 6 average residence time sites, 8 high TTHM sites, and 6 high HAA5 sites. However, the system has only one source with one entry point. This system must select its 1 near entry point site. Then it must replace the remaining 3 near entry point sites as follows: 2 high TTHM sites and 1 high HAA5 site. The system must therefore collect a total of 10 high TTHM sites, 7 high HAA5 sites, and 6 average residence time sites to go along with its 1 near entry point site.

- If your system has MORE entry points than required near entry point standard monitoring locations, you **must** take samples near entry points to the distribution system having the highest annual water flows.

  Annual flows may be calculated based on measured flows if your system has a flow meter for each entry point location, pump or hour meter records, or other means. If you have a totalizing flow meter at an entry point, you may use the most recent year's readings from each meter if the measurements are representative of normal operating conditions. For entry points where a totalizing water meter is not available, you may use pump records or other water meter records to estimate the annual flow. You should begin by determining the average daily flow for each entry point. Then multiply the average daily flow at each entry point by the number of days that the entry point was in use to determine the annual flow. See Example 7.2 on the next page for how a hypothetical system used this procedure. Consecutive systems may need to check with wholesalers or check records of billings/deliveries from wholesalers.

The Stage 2 DBPR does not define near entry point sites explicitly. EPA recommends that you locate your near entry point sites ***between the entrance to the distribution system and no later than first customer***. If you are a consecutive system, a sample tap at the master meter would be an appropriate near entry point site. If you do not have a sample tap at your master meter, consider using the first customer as your near entry point site.

Example 7.2 System with More Entry Points than Required Near Entry Point Sample Sites

A system has two ground water sources and serves 15,000 people. According to the ***Standard Monitoring Requirements - Attachment*** sheet in Chapter 2, the system must select 1 near entry point site. For the most recent year, approximately 70 percent of the system's water came from Well A and the remaining 30 percent came from Well B. This system should locate its near entry point site near Well A because this source has the higher annual flow.

Step 3: Identify Candidate Average Residence Time Sites

Average residence time is the average age of water delivered to customers in a distribution system. Average residence time is *not* simply one-half the maximum residence time. Ideally, it should be a flow-weighted or population-weighted estimate. EPA recognizes that locating average residence time sites can be complex. A system map, used in conjunction with disinfectant residual data and possibly hydraulic modeling (if available) can help you to identify areas that represent average water age.

EPA recommends that you use tools and data sources available to select **at least twice** as many candidate average residence time sites as required for standard monitoring. You may want to map and color-code your candidate sites as you select them to ensure that your distribution system is fully represented. Later, you can use additional criteria to select the most representative standard monitoring sites from these candidate sites (see Step 7).

Step 3a: Use a Hydraulic Model or Tracer Study Data, if Available

One of the best ways to identify candidate average residence time sites is by using a hydraulic model. If run in extended period simulation mode, the model should be able to provide estimates of typical residence time for each node in the model. See Chapter 6 for more information on estimating residence time using hydraulic models. Also refer to Step 1 for cautions on using model results.

A tracer study can provide a snapshot of water age at different locations in your distribution system. You can use tracer study results along with information on population density and locations of large users (see Step 3c) to identify the average residence time of water in your distribution system. Remember, though, that tracer studies done in the past may no longer be representative of your system.

Step 3b: Examine Disinfectant Residual Data

You can identify approximate average residence time locations in your distribution system by calculating the **average disinfectant residual concentration** in your system and identifying sites with residual concentrations near the average. When calculating average disinfectant residual, it is important that you use data from sites that are representative of the entire distribution system. One way to do this is by examining disinfectant residual data collected at TCR monitoring sites. These data should be useful since the TCR requires that monitoring sites represent water throughout the distribution system. Note that if you have booster disinfection, then residual data collected after those locations will skew this analysis. That data should be omitted.

See the guidelines in Exhibit 7.4 for using disinfectant residual data. If you believe that your residual data correlates well with water age, you can use the following analysis to help identify sites with average residence time (also see Example 7.3):

1) Calculate an average disinfectant residual at each of the TCR sites using data from the months with the warmest water temperatures. Chlorine decay is more pronounced in warmer temperatures so it is more common to see larger changes in chlorine residual from one point to the next.

2) Using averages from the individual sites, calculate an overall average distribution system residual concentration.

3) Those sites with an average residual close to the distribution system average can be considered representative of average residence time in the distribution system. Select sites in areas with high population densities with disinfectant residuals close to the system average.

Caution for systems using chloramines

Chloramines are generally more stable than chlorine and may result in only small measured differences throughout the distribution system. In this case, the method described above may not be effective for locating average residence time sites because the change in disinfectant residual concentration is not significant.

Exhibit 7.4 Guidelines for Using Disinfectant Residual Data

When should I use disinfectant residual data?

Disinfectant residual in the distribution system generally decays as water age increases. Residual concentrations typically decay faster in the warmer months, and the magnitude of decay is more pronounced for free chlorine residuals compared to chloramine residuals.

Disinfectant residual can be helpful in locating areas of average and maximum residence time in the distribution system. This information can be used to select candidate average residence time, high TTHM, and high HAA5 sites.

Because disinfectant residual decay can be caused by factors other than residence time, you should be careful when interpreting your data. Other reasons why you might see a loss in disinfectant residual are listed below.

- Certain types of pipe material can exert a disinfectant residual demand. In particular, unlined cast iron pipe can cause residuals to decline.
- Residual decline can be caused by corrosion byproducts and sediment. Customer complaints may indicate that these are occurring in your distribution system.
- Bacteriological activity can result in a significant depletion of disinfectant residual. HPC data is useful for determining whether this is a concern in your distribution system.

What are the sources of disinfectant residual data?

Residual data can be from TCR sites, Stage 1 sites, operational sample sites, or sites sampled following customer complaints.

Which data should I use to help identify candidate average residence time sites?

If you are using residual data to help identify sites with average water age, make sure that data is from locations distributed throughout the system. You may want to use only data from TCR sites, since these sites should be geographically representative of your system. Make sure you don't over emphasize a particular area. You should also use data from the warmest months that show the biggest differences in residual levels.

What if I don't have residual data throughout the system?

You may wish to take more residual data. Take care to ensure that the data is comparable in terms of analytical method, distribution system configuration, and time of the year to the data to which it will be compared.

Example 7.3 Average Disinfectant Residual Calculation

A system with June, July, and August as its warmest months has free chlorine residual data at 10 sites. The residual concentrations are recorded below, and the averages for each site and the system as a whole are calculated as shown. Note that sites #2, #3, and #9 have average chlorine residual concentrations close to the system average. These sites are good candidate average residence time sites.

Site ID	Monthly Average (mg/L)			Site Average (mg/L)
	Jun	Jul	Aug	
#1	1.4	1.3	1.6	1.4
#2	***0.7***	***0.9***	***0.7***	***0.8***
#3	***1.0***	***0.9***	***1.2***	***1.0***
#4	0.6	0.6	0.7	0.6
#5	0.9	1.2	1.4	1.2
#6	0.4	0.5	0.4	0.4
#7	0.2	0.3	0.6	0.4
#8	1.5	1.7	1.7	1.6
#9	***0.9***	***0.7***	***0.8***	***0.8***
#10	0.5	0.3	0.8	0.5
Distribution System Ave	**0.8**	**0.8**	**1.0**	**0.9**

Step 3c: Use Billing Records and a Map or Schematic

You can use billing records and information on population density, together with a map of your system, to rule out locations for average residence time sites. You should examine your customer billing records to determine where your large customers are located. The portions of the distribution system serving large water users will likely have low water age and will not be good candidate sites for average residence time. The portions of the distribution system that are sparsely population will likely have high water age and will also not be good candidates for average residence times. You should consider the locations of storage tanks and the sizes of distribution system mains to the extent possible.

If your system does not have any large individual customers, you should consider locating your candidate sites in moderately developed areas in the approximate geographic center of the distribution system.

Step 4: Identify Candidate High TTHM Sites

It is not the intent of IDSE monitoring to identify sites with maximum daily or hourly TTHM concentrations. Instead, you should choose candidate sites to represent areas of the distribution system where you expect to find the highest TTHM levels throughout the year.

In general, **higher water temperatures** and **increased water age** lead to higher TTHM concentrations in distribution systems. Exhibit 7.5 provides typical characteristics of high TTHM sites, and Appendix A provides additional background information on TTHM formation.

Steps 4a through 4c below discuss how different types of data can be used to select candidate high TTHM sites. Each tool and data source has its own limitations; EPA recommends that you use all of the tools and data sources available to select **at least twice** as many candidate high TTHM sites than required for standard monitoring. Later, you will use additional criteria to select the best standard monitoring sites from these candidate sites and determine whether all standard monitoring sites are representative of the entire distribution system (see Step 7).   You may also want to map and color-code your candidate sites as you select them to ensure that your distribution system is fully represented.

Exhibit 7.5 Typical Characteristics of High TTHM Sites

High TTHM sites are often located
- hydraulically downstream of storage facilities and booster disinfection
- in hydraulic dead-ends, where flow of water is low or stagnant
- near the ends of the distribution system, at or before the last group of customers

Sample sites should <u>not</u> be located
- at a dead-end where there are no customers.
- prior to booster disinfection with chlorine
- after the last hydrant or blow-off point

Step 4a: Use a Hydraulic Model or Tracer Study Data, if Available

Calibrated, system specific hydraulic models can be very useful in identifying locations of maximum water age that would be good candidate high TTHM sites. If run in extended period simulation mode, the model should provide estimates of typical residence time for each node in the model. You should select candidate sites near the nodes with the longest residence times, provided that they are prior to the last fire hydrant and before or at the last group of customers. Chapter 6 of this guidance manual provides more details on estimating residence time using hydraulic models. Also refer to Step 1 for cautions on using model results.

A tracer study can provide a snapshot of water age at different locations in the distribution system. The locations with highest water age typically should make good candidate high TTHM sites. Remember, though, that tracer studies done in the past may no longer be representative of your system.

Step 4b. Use Residual Disinfectant Data

Low disinfectant residuals relative to the system average may indicate longer residence times, and may correlate with higher TTHM concentrations. Because disinfectant residuals typically decay faster during the summer, a review of data from the summer months may be useful in identifying areas with consistently low residuals that are good candidate high TTHM sites. You should evaluate residual data with caution, however, because disinfectant residual decay can be caused by factors other than water age (e.g., corrosion, bacteriological activity). See Exhibit 7.4 for guidelines on using disinfectant residual data as indicators of water age.

When booster disinfection is applied, the disinfectant residual will increase despite advanced water age. TTHM levels are likely to increase after a booster disinfectant is applied due to the greater concentration of disinfectant available for reaction with DBP precursors. Therefore, if your system practices booster disinfection, you should locate high TTHM standard monitoring sites after booster disinfection is applied.

Step 4c: Use a Map or Schematic and Infrastructure Data

If your system practices booster disinfection, you should locate candidate sites downstream of your booster disinfection stations.

If your system has storage tanks or reservoirs, you should locate candidate high TTHM sites hydraulically downstream of those tanks. Storage facilities in a distribution system increase water age. During tank drain cycles, water age immediately downstream of a storage facility may be significantly (e.g., several days or more) older than “fresh” water upstream of the storage facility. As a result, areas of a distribution system receiving water that has been stored may have higher TTHM concentrations than areas that do not receive any stored water.

You should also locate candidate sites near dead ends, particularly those that are on smaller lines, far from major transmission lines. Sparsely populated residential areas can be good candidate sites for high TTHM. However, be sure to locate the candidate sites before or at the last group of customers on a dead end line. Samples taken at the very end of a dead end line are not representative of the water received by customers.

Step 5: Identify Candidate High HAA5 Standard Monitoring Sites

As with high TTHM standard monitoring sites, it is not the intent of IDSE monitoring to identify sites with maximum daily or hourly HAA5 concentrations. Instead, you should choose high HAA5 standard monitoring sites to represent areas of the distribution system where you expect to find the highest HAA5 levels throughout the year.

Higher temperatures and increased residence time can lead to higher HAA5 concentrations. However, microorganisms can consume HAA5, causing levels to decrease. This is know as ***biodegradation.*** Biodegradation is more likely to occur when disinfectant residual levels are low or non-existent, particularly in warmer months. Therefore, high HAA5 sites may be located closer to the entrance to the distribution system rather than locations with very high water age. See Appendix A for more information on HAA5 formation.

Steps 5a through 5e below discuss how different types of data can be used to select candidate high HAA5 sites. Each tool and data source has its own limitations. EPA recommends that you use all of the tools and data sources available to select **twice** as many candidate high HAA5 sites than required for standard monitoring. Later, you will use additional criteria to select the best standard monitoring sites from these candidate sites (see Step 7). You may also want to map and color-code your candidate sites as you select them to ensure that your distribution system is fully represented.

Remember that high HAA5 sites must be *different* from high TTHM sites for IDSE standard monitoring.

Step 5a: Review Historical HAA5 Data to Identify Trends

One way to determine if HAA5 biodegrades in your system is to examine Stage 1 DBPR monitoring or other HAA5 data. You should evaluate the data over time at different locations in the distribution system to look for trends. Consider evaluating your data to answer the following questions:

- Are the highest HAA5 values typically in the summer months?
- Are the highest HAA5 values at maximum residence time locations?
- Do the highest HAA5 generally occur at the same time of year and locations as high TTHM values?

If you answered **"yes"** to all of these questions, it is unlikely that you are experiencing biodegredation of HAA5 at your existing monitoring sites. If you answered **"no"** to any of these questions, HAA5 compounds may be degrading in your system due to biological activity. In this case you should focus on selecting sites with lower water age compared to sites you selected for high TTHM. It is important that you also evaluate disinfectant residual data and microbiological monitoring data (e.g., HPC data), if available, to determine whether a monitoring location is appropriate.

Step 5b. Use a Hydraulic Model or Tracer Study

Calibrated, system specific hydraulic models can be very useful for identifying locations of maximum residence time. If run in extended period simulation mode, the model should provide estimates of typical residence time for each node in the model. Chapter 6 of this guidance manual provides more details on estimating residence time using hydraulic models. Also refer to Step 1 for cautions on using model results.

You should consider selecting high HAA5 candidate sites near the nodes with the longest residence times, provided that they are prior to the last fire hydrant and before or at the last group of customers. You should examine chlorine residual data and HPC data if available to ensure that these locations are not susceptible to biodegradation (see Steps 5c and 5d). However, if you have determined that biodegradation is occurring in your distribution system in step 5a, you should focus on sites with lower water age.

A tracer study can provide a snapshot of water age at different locations in the distribution system. The locations with highest water age typically should make good candidate sites, unless disinfectant residual levels are too low. Remember, though, that tracer studies done in the past may no longer be representative of your system.

Step 5c. Use Residual Disinfectant Data

Low disinfectant residuals relative to the system average may indicate longer residence times, and may correlate with higher HAA5 concentrations (unless biodegradation is occurring in the distribution system as discussed in step 5a). Sites with very low or non-existent residuals, however, are more likely to have biodegradation of HAA5 and would not be good candidate high HAA5 sites.

You should ***not*** select high HAA5 sites in locations that regularly or in the summer months have free chlorine residuals less than 0.2 mg/L or with chloramine residuals less than 0.5 mg/L.

Because disinfectant residuals typically decay faster during the summer, a review of data from the summer months may be useful in identifying areas with consistent disinfectant residuals that are good candidate high HAA5 sites. You should consider locating candidate high HAA5 sites where disinfectant residuals are less than the system average, but still regularly above 0.2 mg/L for free chlorine systems and above 0.5 mg/L for chloramine systems.

When booster disinfection is applied, the disinfectant residual will increase despite advanced water age. HAA5 levels are likely to increase after a booster disinfectant is applied due to the greater concentration of disinfectant available for reaction with DBP precursors and decreased potential for biodegradation. Therefore, if your system practices booster disinfection, you should locate high HAA5 standard monitoring sites after booster disinfection is applied.

Step 5d. Use Heterotrophic Plate Count Data, if Available

In addition to disinfectant residual data, HPC data can be extremely useful for identifying areas in your distribution system that are biologically active. If locations in the distribution system have high HPC levels compared to other locations (particularly in the summer months), they should be excluded as candidate high HAA5 sites.

Step 5e. Use a Map or Schematic and Infrastructure Data

Geographic locations for high HAA5 sites depend on whether your system experiences biodegredation in the distribution system. See Step 5a for guidance on evaluating historical HAA5 data for trends, and Steps 5c and 5d to evaluate other data to assess the potential for biodegredation.

If you **do not** believe that HAA5 biodegrades in your system, follow the same general guidelines for locating high TTHM sites for locating high HAA5 sites (see *Step 4c*). If you **do** believe that HAA5 biodegrades in your system, you should consider locating HAA5 sites in areas with lower water age in the center regions of your system where you maintain high disinfectant residuals.

Step 6: Plot Sites on a Distribution System Map

A key step in selecting standard monitoring sites from candidate sites is plotting all candidate sites on a map of your distribution system. If you have not already done so, locate all Stage 1 DBPR compliance monitoring locations, near entry point sites, and candidate average residence time, high TTHM, and high HAA5 sites on your water distribution map. Consider color coding the sites by the site type.

As noted in Step 1, your map should also contain the system attributes that will be useful in identifying representative standard monitoring sites, such as:

- Layout of pipes
- Storage facilities
- Pumping stations
- Booster disinfection stations
- Pressure zone boundaries

If possible, your map should also include the location of large water users, areas of significant development, and areas with relatively few customers.

Step 7: Select Standard Monitoring Sites from Candidate Sites

As described in the previous sections, various data sources and tools can be used to identify standard monitoring sites. If you followed the recommended procedures, you should have more candidate sites than are required for standard monitoring. This will allow you to select a final set of standard monitoring locations that represents the entire distribution system, considering the whole picture in addition to the specific characteristics you examined in steps 3 through 6. *How should you prioritize the data and combine data sources and tools to select standard monitoring sites?* This section addresses this question by providing general guidelines for (1) evaluating sites and determining if they meet expectations, and (2) narrowing down the candidate sites to standard monitoring sites. Remember that you must write a justification for each standard monitoring site and a summary of data considered (see Step 8), to be included in your IDSE standard monitoring plan. You may want to consider how you will write your justifications as you examine your candidate sites.

You should always visually confirm that standard monitoring sites, in combination with existing Stage 1 DBPR monitoring sites, provide geographic coverage of the distribution system. You should also visually confirm that standard monitoring sites are in expected areas of high and average residence time (as predicted by a hydraulic model or other data source). You should confirm that you are not missing key areas that may not have been sampled in the past. If you have GIS capabilities, queries can be extremely useful in automating the site selection process. Experienced systems operations personnel can provide valuable input during this process.

The following are general guidelines for choosing standard monitoring sites from the list of candidate sites identified.

Step 7a. Evaluate Sites. Do They Meet Expectations?

The purpose of this step is to confirm that your candidate sites cover key areas and to add candidate sites if appropriate. The following questions may be useful as you evaluate all candidate sites together on the map:

- Are candidate high TTHM sites located in the extremities of the distribution system?

- Are candidate high TTHM sites generally downstream of storage facilities and booster disinfection stations (if booster disinfection is practiced)?

- Are candidate high HAA5 sites in areas where you can regularly maintain disinfectant residual levels greater than 0.2 mg/L for chlorine and 0.5 mg/L for chloramine?

- Are there any other areas where you suspect water age is high that are not represented by a candidate high TTHM (and possibly high HAA5) site?

Step 7b. Select Standard Monitoring Sites

Now that you have plotted the candidate sites on the map, you will need to choose the best locations to represent each type of site. The following issues should be considered when making these choices:

- **Look for geographic representation**. Select sites that are geographically diverse from the other standard monitoring sites and existing Stage 1 compliance monitoring locations. EPA recommends that you locate at least one of the high TTHM standard monitoring sites in a remote area of the distribution system. If your distribution system contains hydraulically isolated portions, you should represent as many of these as possible with at least one standard monitoring site. If you are only required to select one high TTHM site, it is strongly recommended that you locate this site far away from the treatment plant, near the last group of customers (but prior to the last fire hydrant).

- **Look for hydraulic representation**. Select standard monitoring sites in hydraulically different areas. Even if sites are geographically near each other, they may represent different pressure zones. You should also select sites that represent mixing zones if multiple sources with different water quality characteristics are used.

- **Use sites that "multi-task."** Prioritize sites that meet the multiple siting criteria and those identified based on more than one data source. For example, a candidate high TTHM site that has low disinfectant residual, is near the edge of the distribution system and is downstream of a tank would be an excellent standard monitoring site.

- **Consider site access**. Select standard monitoring sites for which access will not be an issue. Sites should remain accessible over the long term.

- **Use existing TTHM and HAA5 monitoring data to prioritize choices**. If you have more than enough sites in a given area of the distribution system and no other data favors one over the other, use existing TTHM or HAA5 monitoring results (if available) to prioritize sites. For example, if disinfectant residual data are the same for three sites over the same periods, then the DBP data can be used to select a high TTHM or HAA5 standard monitoring site. Remember that you *cannot* use Stage 1 DBPR compliance monitoring sites as standard monitoring sites.

Step 8: Write Justifications and a Summary of Data

Your final steps in selecting standard monitoring sites are to write a justification for each site and write the summary of data you used to justify your site selection.

Step 8a. Write Justification for Each Standard Monitoring Site

You **must** write a justification for **each standard monitoring site**. Justifications should document the key site characteristics that led you to select the site for standard monitoring. They should be brief, but as specific as possible. Some characteristics you should consider including in your justifications are as follows:

- Pipe size, or range of pipe sizes in the area
- Relationship to storage facilities
- Estimated water age, if available
- Source of water (if the distribution system is served by more than one source)
- Range of disinfectant residual concentrations (if lower in the summer, provide summer values)
- For HAA5 sites, range of HPC levels, if available

Not all systems will have all data types in this list; include the information that is available to your system in your justification. Hypothetical examples of justifications for each type of standard monitoring site are below. Additional examples of justifications are provided in Appendices H and I of this guidance manual and in the EPA manual, *Initial Distribution System Evaluation Guide for Systems Serving < 10,000 People*.

- *<u>High TTHM site:</u> This site is served by our surface water source and is at the end of one of our pressure zones. It is hydraulically downstream of Tank X, one of our largest storage facilities. The site is a gas station in a residential area with predominantly 4 and 6 inch pipes. Chlorine residuals at this site are below system average, ranging from 1.2 to 1.5 mg/L in the summer.*

- *<u>High HAA5 site:</u> This site is served by our surface water source and is located on an 8-inch pipe in a commercial area. It is in an area of average to high water age that has a history of high chlorine residual concentrations (2 to 2.2 mg/L in the summer). HPC levels for this site have historically been low compared to the rest of the system (< 500).*

- *<u>Average residence time site:</u> This site is in the geographic center of Pressure Zone 2 and has a chlorine residual level close to the system average (1.5 mg/L).*

- *<u>Near entry point:</u> This site is our finished water sampling location for Surface Water Treatment Plant X. We have more entry points than required near entry point sites, so we selected this entry point because it has the highest average daily flow compared to our other sources.*

Step 8b. Write a Summary of Data

You **must** provide a summary of data you relied on to justify standard monitoring location selections. You should describe the water quality data you reviewed, map features you considered, ranges of relevant water quality data, and water sources and seasonal operations if applicable, and tools you used to select your standard monitoring sites. An example summary is provided below. Additional examples of data summaries are provided in Appendices H and I of this guidance manual and in the EPA manual, *Initial Distribution System Evaluation Guide for Systems Serving < 10,000 People*.

> *We used our up-to-date water distribution system map to plot data and select sites. Our map shows locations and sizes of all pipes, storage tanks, booster pumping stations, and sources. We noted the location of large users and new developments.   We analyzed disinfectant residual collected at TCR sites in 2004 and 2005 and plotted average concentrations from the summer months on our map. Summer disinfectant levels ranged from 2.5 mg/L at the plant to 0.3 mg/L in the distribution system. The distribution system average was between 0.9 and 1.1 mg/L. We also indicated average TTHM and HAA5 concentrations for our Stage 1 DBPR sites for 2005 data. TTHM concentrations ranged from 0.035 mg/L through 0.085 mg/L and HAA5 concentrations ranged from 0.015 mg/L through 0.037 mg/L.*

We reviewed our tank level data and determined average water age inside the tank to help identify areas with higher water age. We have some water age information from a tracer study of our distribution system done in 1995. We have estimated the highest water age in the distribution system to be approximately 4.5 days. We also highlighted two problem areas that our operations staff say are places where we get repeat customer complaints and low residuals.

7.1.2 Selecting Your Peak Historical Month and Determining Standard Monitoring Schedule

Determining Peak Historical Month

The Stage 2 DBPR defines the peak historical month as the month with the highest TTHM or HAA5 levels or the warmest water temperature. It is meant to represent "worst case" conditions when DBPs are the highest. You **must** review available compliance, study, or operational data to determine the peak historical month for TTHM or HAA5 levels or warmest water temperature. You can use **Worksheet 7.1** on the next page to determine your peak historical month.

In some cases, you may find data in addition to TTHM, HAA5, and temperature data helpful in selecting your peak historical month. As described in Appendix A, key factors affecting TTHM and HAA5 formation are **temperature**, **water age**, and concentration of **DBP precursors** (i.e., organic compounds that react with disinfectants to produce DBPs). Some systems may regularly see an increase in total organic carbon (TOC) levels in the spring or fall. If your TTHM and HAA5 monitoring does not capture a seasonal increase in TOC, you may want to consider the month with highest TOC when selecting your peak historical month.

Seasonal changes in water age in your distribution system can be another influencing factor in determining the worst-case conditions when DBPs are the highest. For example, some systems may experience a decrease in peak usage in the fall, thereby increasing residence time in the distribution system. The water temperature in the fall may not be as high as it was in the summer months, but it still may be relatively high, such that increased residence time significantly increases TTHM and HAA5 formation. In this scenario, you should consider water age when selecting your peak historical month.

If you based the selection of your peak historical month on data other than TTHM, HAA5, and temperature, you should document the basis for selection in your IDSE standard monitoring plan.

Worksheet 7.1 Selecting the Peak Historical Month

Page 1 of 1

A. Do you have more than one water source (e.g., treatment plant or consecutive system entry point) in your system? ☐ Yes ☐ No

*If **Yes***, you should identify the source associated with the highest TTHM and HAA5 levels in your system based on your Stage 1 DBPR monitoring data. You should use data from this source for selecting your peak historical month. Continue to STEP B

*If **No***, continue to STEP B

B. Do you have monthly or quarterly TTHM and HAA5 data? ☐ Yes ☐ No

*If **Yes***, you should determine in which month your TTHM and HAA5 levels are the highest.

What if the highest TTHM and/or HAA5 levels occur at different times during different years? You should choose the year of data that is most representative of typical system operating and weather conditions.

What if the highest TTHM and HAA5 levels occur in different months? You should consider which contaminant is of more concern. If one contaminant clearly shows a higher overall trend and is closer to the MCL, you should choose the month in which that contaminant is highest.

Choose the month with the highest TTHM and HAA5 levels as your peak historical month. *Stop here.*

*If **No***, continue to STEP C

C. Use temperature data to select your peak historical month

Calculate the average water temperature for each summer month to identify the month of warmest water temperature. If available, use data from several years to determine when the warmest water temperature occurs. If warmest temperature occurs in different months in different years, select the year(s) that are most typical of climatological and water quality data and water use for your region.

Remember, in your standard monitoring plan you should indicate the source used to select your peak historical month and the basis for selecting it (high TTHM, high HAA5, and/or temperature)

Determining Standard Monitoring Schedule

You **must** take one round of standard monitoring samples during the peak historical month. If you serve more than 499 people, you must also conduct sampling at equal intervals before and/or after the peak historical month, based on your required sampling frequency. You can find your required sampling frequency on the ***Standard Monitoring Requirements - Attachment*** sheet in Chapter 2. Be sure to plan your monitoring so that all sampling is complete by the deadline on your requirements summary sheet in Chapter 2.

The intent of the required time interval is to ensure that samples represent the quality of water over an extended period and do not over-emphasize either high or low concentrations of TTHM or HAA5 that may occur seasonally. For example, a system on quarterly monitoring could sample in the **third full week of every third month**. You should keep in mind holidays and sampling schedules for other water quality programs when determining your standard monitoring schedule.

7.1.3 Preparing Your Standard Monitoring Plan

Every system that conducts IDSE standard monitoring **must** prepare and submit an Standard Monitoring Plan. You should submit the plan to the Information Processing and Management Center (IPMC) for review by EPA or your state. See Section 1.4 of this guidance manual for information on how to submit your plan to the IPMC.

EPA has developed a **Standard Monitoring Plan Form (Form 6)**, presented in this section and available electronically as part of the **IDSE Tool.** You are not required to use this form; however, if you choose not to use it, refer to Exhibit 7.1 on page 7-3 for a list of the minimum elements you must include in your standard monitoring plan.

The IDSE Tool creates a custom form for your system and provides links to technical guidance from this manual. The tool is available on EPA's website at http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

Your deadlines for submitting your standard monitoring plan and conducting standard monitoring can be found on your requirements summary sheet in Chapter 2. If EPA or your state does not approve or request modifications to your plan, or notify you that your plan is still under review **within 12 months** after the deadline for plan submission, **you may consider the plan approved**.

The standard monitoring plan form includes the following sections:

I. General Information
II. IDSE Requirements
III. Selecting Standard Monitoring Sites
IV. Justification of Standard Monitoring Sites
V. Peak Historical Month and Standard Monitoring Schedule
VI. Planned Stage 1 DBPR Compliance Monitoring Schedule
VII. Distribution System Schematic
VIII. Attachments

Sections of the form with an asterisk (*) are required by the Stage 2 DBPR. Examples of completed standard monitoring plans using this form are provided in Appendices H and I of this guidance manual and in the EPA manual, *Initial Distribution System Evaluation Guide for Systems Serving < 10,000 People*. The rest of this section provides guidance on the completion of this form.

I. General Information

I.A. <u>PWS Information</u>* - Important definitions for classifying your system are provided in the **definitions section** at the beginning of this guidance manual. If you have any questions on this section, contact EPA or your state.

<u>PWSID</u> - Enter your PWSID identification number here. This number is typically assigned by your state.

<u>PWS Name</u> - Enter the name of your system here.

<u>PWS Address</u> - Enter the primary mailing address for your water system here.

<u>Population Served</u> - Enter the number of people served by your PWS. Remember, this is your RETAIL population served, not including the population served by consecutive systems that purchase water from you.

<u>System Type</u> - Put a check mark in the appropriate box to identify whether your system is a CWS or a NTNCWS. Definitions for CWS and NTNCWS can be found in the **definitions section** at the beginning of this guidance manual.

<u>Source Water Type</u> - Put a check mark in the appropriate box to identify whether your system is a subpart H system or a ground water system. If you use any surface water or GWUDI as a source, mark the subpart H box. Definitions for subpart H system (including GWUDI) and ground water system can be found in the **definitions section** at the beginning of this guidance manual.

<u>Buying/Selling Relationships</u> - Put a check mark in the appropriate box to identify whether your system is a consecutive system, a wholesale system, or neither. If

you are both a consecutive and wholesale system (e.g., you buy and sell water), check both boxes. Definitions for consecutive system and wholesale system can be found in the **definitions section** at the beginning of this guidance manual and in **Appendix D**.

I.B. Date Submitted* - Enter either the date that you are submitting the form electronically, putting it in the mailbox, or dropping it off with an express delivery service. Be sure to submit your standard monitoring plan before the deadline found on your requirements summary sheet.

I.C. PWS Operations - This section asks questions about your system to help inform EPA and state personnel during the plan review process.

Residual Disinfectant Type - Put a check mark in the appropriate box to identify the type of disinfectant you most often use **to maintain a residual in your distribution system** (not necessarily the same disinfectant used for primary disinfection at the treatment plant). If you use chloramine but switch to free chlorine for a short time, you should still check chloramine only. If you use chloramine and chlorine regularly in your system (e.g, 4 months of free chlorine and 8 months of chloramines), check both chlorine and chloramine. If you maintain your residual with a disinfectant other than chlorine or chloramines (e.g., chlorine dioxide), you should place a check next to the box marked "Other" and enter the type of disinfectant you use in the blank next to "Other".

Number of Disinfected Sources - Enter the total number of sources that deliver disinfected water to your distribution system. If you connect to a single wholesale system at a number of locations in your distribution system, consider this one source. Multiple wells that are disinfected at a common treatment plant should also be considered one source. Do not count wells that are not disinfected or are disinfected by UV only.

I.D. Contact Person* - Enter the contact information of the person who is submitting the form. This should be the person who will be available to answer questions from EPA and/or state reviewers.

II. IDSE Requirements*

II.A Number of Sites - Refer to the ***Standard Monitoring Requirements - Attachment*** sheet in Chapter 2. Copy the numbers from the "IDSE Standard Monitoring Requirements" table that correspond to your source type and the population served by your system.

Note that you may need to adjust the number of each site type if you have fewer entry points than required near entry point sites (see Step 1 in Section 7.1.1). This adjustment should be reflected in your site selection and justification in Section IV. Your total should always be the same.

II.B. Schedule - Enter the schedule for your system based on the **letter** sent to you from
EPA or your state. See Chapter 2 for more information on the letter.

II.C. Standard Monitoring Frequency - Refer to the ***Standard Monitoring Requirements Attachment*** sheet in Chapter 2. Locate the monitoring frequency from the "IDSE Standard Monitoring Requirements" table that corresponds to your source type and the population served by your system. Put a check mark in the box corresponding to that monitoring frequency.

III. Selecting Standard Monitoring Sites

III.A. Data Evaluated - Put a check mark in each box corresponding to the data that you used to select each type of standard monitoring site. Water quality data may be compliance data or operational data.

III.B. Summary of Data* - In the space provided (or in an attached writeup), provide a summary of the data you used to justify your site selection. See Step 8b in Section 7.1.1 of this manual for guidance.

IV. Justification of Standard Monitoring Sites* Enter the site ID from the distribution schematic, site type (whether it is near an entry point, average residence time, high TTHM, or high HAA5), and justification. Justification for each standard monitoring site should include the system characteristics that led you to choose it as a standard monitoring site. See Step 8a in Section 7.1.1 of this manual for guidance. If you have fewer near entry points than required near entry point monitoring locations, be sure to replace the extra near entry point sites with high TTHM or high HAA5 sites.

Note that there is only space for 8 monitoring sites on this sheet. If you are a ground water system serving more than 499,999 people or a subpart H system serving more than 49,999 people you are required to monitor at more than 8 sites. Therefore, you will need to attach additional sheets.

V. Peak Historical Month and Proposed Standard Monitoring Schedule

V.A. Peak Historical Month* - Enter the month that you determined to be your peak historical month. See Section 7.1.2 and **Worksheet 7.1** for guidelines on selecting your peak historical month.

V.B. If Multiple Sources, Source Used to Determine Peak Historical Month - If your system has only one source, write "N/A" here. If you have more than one source, write the name of the source you used as the basis for determining peak historical month. For example, if a system has one surface water, one ground water, and one purchased ground water source, it is likely that they relied heavily on data from the surface water source to select their peak historical month. This system would write "surface water source" in the blank provided.

V.C Peak Historical Month Based On* - Put a check mark in the appropriate box to identify the basis for determining your peak historical month. If your peak historical month is supported by more than one parameter (e.g., peak historical month is month of high TTHM and maximum temperature), check each box that applies. If you used data other than TTHM, HAA5, and temperature data to select your peak historical month (e.g., you used TOC data and/or water age data), describe how you used additional data here.

V. D. Proposed Standard Monitoring Schedule* - Enter the ID for each standard monitoring site in the table (verify that these match the IDs you enter in Section IV and on your schematic). Enter your proposed sampling schedule for the number of monitoring periods identified in Section II.C. The entry can be a specific date or week and can be in a number of different formats. For example:

- 7/9/07
- 2nd week in Nov '07
- Week of 7/9/07

Remember that at least one monitoring period must be during the peak historical month identified in Section V.A. Note that there is only space for 8 monitoring sites on this sheet. If you are a ground water system serving more than 499,999 people or a subpart H system serving more than 49,999 people you are required to monitor at more than 8 sites. Therefore, you will need to attach additional sheets.

VI. Planned Stage 1 DBPR Compliance Monitoring Schedule* Enter the projected sampling schedule for the number of Stage 1 DBPR monitoring periods in which you will conduct Stage 1 DBPR monitoring during your IDSE standard monitoring. Verify that site IDs in this table match the IDs on your distribution system schematic. If you are required to monitor at more than 8 Stage 1 DBPR locations you will need to attach additional sheets. You may also want to attach your Stage 1 DBPR monitoring plan.

VII. Distribution System Schematic* Attach a distribution system schematic to your monitoring plan. Your schematic must include the locations of entry points, sources, storage facilities, standard monitoring sites, and Stage 1 compliance monitoring sites.

IDSE standard monitoring plans will not be considered confidential business information (CBI) and are subject to the Freedom of Information Act (FOIA). *Therefore, **your distribution system schematic should not contain information that poses a security risk to your system.*** EPA suggests that you consider one of the following options for submitting distribution system schematics:

- **Option 1: Distribution system schematic with no landmarks or addresses indicated.** Show locations of sources, entry points, storage facilities, standard monitoring locations, and Stage 1 compliance monitoring locations (required). Also include pressure zone boundaries and locations of pump stations. Provide map scale.

- **Option 2: City map without locations of pipes indicated.** Show locations of sources, entry points, storage facilities, standard monitoring locations, and Stage 1 compliance monitoring locations (required). Also include boundaries of the distribution system, pressure zone boundaries and locations of pump stations. Provide map scale.

Schematics should be as clear and easy to read as possible. They should typically be submitted on a scale of between 1:4,000 and 1:8,000; however, larger-scale drawings are acceptable as long as systems components can still be clearly shown. All sizes from 8½ inches x 11 inches to larger, plan-sized sheets are acceptable. If electronic versions are submitted, use one of the following file types:

- Adobe PDF file (*.pdf)
- Microsoft Word (*.doc)
- WordPerfect (*.wpd)
- Image file (*.gif, *.bmp, *.jpg, *.jpeg)

VIII. Attachments Put a check mark in each of the boxes corresponding to any attachments that you have included in your report.

A distribution system schematic is required. Refer to Section VII for details.

Note that there is only space for 8 monitoring sites in Section IV and Section VI. If you are a ground water system serving more than 499,999 people or a subpart H system serving more than 49,999 people, you will need to attach additional sheets for Section IV and Section VI.

If you submit your standard monitoring plan electronically, you also have the option to submit attachments in hard copy. Include a note in your electronic standard monitoring plan explaining that attachments are being submitted in hard copy, and mail the hard copy to the IPMC mailing address in your Requirements Summary Sheet. The IPMC will match the hard copy submission with your electronic submission when it is received.

Enter the total number of pages in your monitoring plan (including attachments) in the blank at the bottom of this section. This will allow EPA or your state to ensure that all pages were received.

Form 6: Standard Monitoring Plan

I. GENERAL INFORMATION

A. PWS Information*

PWSID: ____________________

PWS Name: ____________________

PWS Address: ____________________

City: ______________ State: _____ Zip: ____________

Population Served: ____________________

B. Date Submitted* ___________

System Type:	Source Water Type:	Buying / Selling Relationships:
☐ CWS	☐ Subpart H	☐ Consecutive System
☐ NTNCWS	☐ Ground	☐ Wholesale System
		☐ Neither

C. PWS Operations

Residual Disinfectant Type: ☐ Chlorine ☐ Chloramines ☐ Other:_____________

Number of Disinfected Sources: ___ Surface ___GWUDI ____ Ground ___ Purchased

D. Contact Person*

Name: ____________________

Title: ____________________

Phone #: ____________________ Fax #: ______________

E-mail: ____________________

II. IDSE REQUIREMENTS*

A. Number of Sites	B. Schedule	C. Standard Monitoring Frequency
Total: ___		
Near Entry Point: ___	☐ Schedule 1	☐ During peak historical month (1 monitoring period)
Avg Residence Time: ___	☐ Schedule 2	
High TTHM: ___	☐ Schedule 3	☐ Every 90 days (4 monitoring periods)
High HAA5:	☐ Schedule 4	☐ Every 60 days (6 monitoring periods)

Form 6: Standard Monitoring Plan

III. SELECTING STANDARD MONITORING SITES

A. Data Evaluated Put a "✓" in each box corresponding to the data that you used to select each type of standard monitoring site. Check all that apply.

Data Type	Type of Site			
	Near Entry Pt.	Avg. Residence Time	High TTHM	High HAA5
System Configuration				
Pipe layout, locations of storage facilities				
Locations of sources and consecutive system entry points				
Pressure zones				
Information on population density				
Locations of large customers				
Water Quality and Operational Data				
Disinfectant residual data				
Stage 1 DBP data				
Other DBP data				
Microbiological monitoring data (e.g., HPC)				
Tank level data, pump run times				
Customer billing records				
Advanced Tools				
Water distribution system model				
Tracer study				

B. Summary of Data* Provide a summary of data you relied on to justify standard monitoring site selection. (*attach additional sheets if needed*)

____

____

____

____

____

____

Form 6: Standard Monitoring Plan

IV. JUSTIFICATION OF STANDARD MONITORING SITES*

Standard Monitoring Site ID (from map)[1]	Site Type	Justification
	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☐ High HAA5	
	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☐ High HAA5	
	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☐ High HAA5	
	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☐ High HAA5	
	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☐ High HAA5	
	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☐ High HAA5	
	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☐ High HAA5	
	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☐ High HAA5	

[1] Verify that site IDs match IDs in Section IV and on your distribution system schematic (See Section VII of this form). Attach additional copies if you are required to select more than 8 standard monitoring locations or need more room.

Form 6: Standard Monitoring Plan

V. PEAK HISTORICAL MONTH AND PROPOSED STANDARD MONITORING SCHEDULE

A. Peak Historical Month* _______________

B. If Multiple Sources, Source Used to Determine Peak Historical Month
(write "N/A" if only one source in your system)

____

C. Peak Historical Month Based On* (check all that apply)

☐ High TTHM ☐ Warmest water temperature

☐ High HAA5

If you used other information to select your peak historical month, explain here (*attach additional sheets if needed*)

____

____

____

D. Proposed Standard Monitoring Schedule*

Standard Monitoring Site ID (from map) [1]	Projected Sampling Date (date or week) [2]					
	period 1	period 2	period 3	period 4	period 5	period 6

[1] Verify that site IDs match IDs in Section IV and on your distribution system schematic (See Section VII of this form). Attach additional copies if you are required to select more than 8 standard monitoring locations.

[2] period = monitoring period. Complete for the number of periods from Section II.C. Can list exact date or week (e.g., week of 7/9/07)

Form 6: Standard Monitoring Plan

VI. PLANNED STAGE 1 DBPR COMPLIANCE MONITORING SCHEDULE*

Stage 1 DBPR Monitoring Site ID (from map) [1]	Projected Sampling Date (date or week) [2]			
	Period 1	Period 2	Period 3	Period 4

[1] Verify that site IDs match IDs on your distribution system schematic (See Section VII of this form). Attach additional copies if you are required to monitor at more than 8 Stage 1 DBPR sites.

[2] period = monitoring period. Complete for the number of periods in which you must conduct Stage 1 DBPR monitoring during IDSE monitoring. Can list exact date or week (e.g., week of 7/9/07)

VII. DISTRIBUTION SYSTEM SCHEMATIC*

ATTACH a schematic of your distribution system.

Distribution system schematics are not confidential and should not contain information that poses a ***security risk*** to your system. EPA recommends that you use one of two options:

Option 1: Distribution system schematic with no landmarks or addresses indicated. Show locations of sources, entry points, storage facilities, standard monitoring locations, and Stage 1 compliance monitoring locations (required). Also include pressure zone boundaries and locations of pump stations. Provide map scale.

Option 2: City map without locations of pipes indicated. Show locations of sources, entry points, storage facilities, standard monitoring locations, and Stage 1 compliance monitoring locations (required). Also include boundaries of the distribution system, pressure zone boundaries and locations of pump stations. Provide map scale.

Form 6: Standard Monitoring Plan

VIII. ATTACHMENTS

☐ Distribution System Schematic* (Section VII).

☐ Additional sheets for the summary of data or site justifications (Sections III and IV).

☐ Additional copies of Page 3 for justification of Standard Monitoring Sites (Section IV). **Required if** you are a subpart H system serving **more than 49,999 people** or a ground water system serving **more than 499,999 people**.

☐ Additional sheets for explaining how you used data other than TTHM, HAA5, and temperature data to select your peak historical month (Section V).

☐ Additional copies of Page 4 for proposed monitoring schedule (Section V). **Required if** you are a subpart H system serving **more than 49,999 people** or a ground water system serving **more than 499,999 people**.

☐ Additional sheets for planned Stage 1 DBPR compliance monitoring schedule (Section VI).

Total Number of Pages in Your Plan _____

Note: Fields with an asterisk (*) are required by the Stage 2 DBPR

7.2 Conducting Standard Monitoring

Conducting standard monitoring is an integral part of the IDSE. The results of standard monitoring, along with the results of Stage 1 DBPR compliance monitoring, **must** be used to select the best sites for Stage 2 DBPR compliance monitoring and **must** be documented in your IDSE report.

Remember, you must submit your standard monitoring plan before you begin standard monitoring. If EPA or your state does not approve or request modifications to your plan, or notify you that your plan is still under review **within 12 months** after the deadline for plan submission, **you may consider the plan approved**. You must conduct standard monitoring according to the approved monitoring plan.

This section presents sampling requirements and tips for sample collection for conducting standard monitoring.

REMINDER: you must continue to collect samples and comply with the Stage 1 DBPR during the IDSE. Results from standard monitoring should **not** be used for making Stage 1 compliance determinations.

Your Requirements

You **must** conduct standard monitoring according to the schedule and at each of the monitoring locations listed in your standard monitoring plan. ***If you deviate from the approved plan for any reason*** (e.g., a site was not accessible on the planned week and you needed to sample during the next week), you must include an explanation for the deviation in your IDSE report.

During each sampling event, you must collect a **dual sample set** (i.e., two samples) at each location. One sample must be analyzed for TTHM and the other must be analyzed for HAA5. Two samples are required because the analytical methods used for the two groups of contaminants require different sample preservation methods. You must use EPA-approved methods for analysis of your TTHM and HAA5 samples. More information on EPA-approved methods can be found in Appendix C.

Tips for Sample Collection

As you conduct standard monitoring, you should keep in mind the following tips:

- **Use appropriate sample bottles.** You should use sample bottles that already contain the appropriate dechlorinating agent and preservative for sample collection. You should contact your lab for a recommended sampling and preservation protocol. A typical sampling protocol can be found in Appendix C.

- **Flush your sample tap.** If you collect samples from a tap, you should open the cold water tap and allow the line to flush until the water temperature has stabilized (usually about 3-5 minutes). If you collect a sample at a hydrant or blow-off, the flushing time only needs to be long enough to purge the connecting line to the main. The purpose of this step is to ensure the sample does not represent stagnant water that has been sitting for a long time in the water line between the street and the faucet. The sample should represent the water flowing through the distribution system at the chosen sampling point.

- **Collect cold water samples.** If you collect indoor samples you should collect them from a cold water line.

- **Collect additional water quality data.** You may wish to collect additional water quality data, such as disinfectant residual and temperature data, at the time of DBP sample collection. This information can be helpful as you interpret standard monitoring results (e.g., unusually low residual at a location could mean unusually high residence time).

- **Re-sample if a sample is lost or broken.** If a sample bottle is lost or broken after sample collection, you should re-sample as soon as possible after the loss occurs. Only the lost sample needs to be recollected, not the entire sample set that was collected together. Make sure to note the loss of sample and resample date as a deviation in your IDSE report.

If you need to change an IDSE standard monitoring sampling location for reasons beyond your control, or if you miss a required sampling period entirely, you should contact EPA or your state so they can approve your re-sampling strategy.

7.3 Selecting Stage 2 DBPR Compliance Monitoring Sites and Preparing the IDSE Report

Every system that conducts standard monitoring **must** use results from Stage 1 DBPR compliance monitoring and standard monitoring to select Stage 2 DBPR compliance monitoring sites. You must follow a **specific protocol**, as laid out in the Stage 2 DBPR, to select compliance sites unless you decide to recommend alternative Stage 2 compliance monitoring sites to your state or EPA.

You **must** include your monitoring results and recommended Stage 2 compliance monitoring sites in an IDSE Report. You should submit your IDSE report to the Information Processing and Management Center (IPMC) for review by EPA or your state. See Section 1.4 of this guidance manual for information on how to submit your plan to the IPMC.

This section presents the required protocol for selecting Stage 2 DBPR compliance monitoring sites and provides guidance for preparing an IDSE report.

EPA has developed an **IDSE Report for Standard Monitoring Form (Form 7)**, presented in Section 7.3.3 and available electronically as part of the **IDSE Tool.** You are not required to use this form; however, if you choose not to use it, refer to Exhibit 7.6 for a list of the minimum elements you must include in your IDSE report. Examples of completed reports can be found in Appendices H and I. The IDSE Tool is available on EPA's website at http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

Exhibit 7.6 Required Elements of Your IDSE Report for Standard Monitoring

- Explanation of any deviations from approved standard monitoring plan
- TTHM and HAA5 analytical results from Stage 1 DBPR monitoring and IDSE standard monitoring
- Recommendations and justification of Stage 2 DBPR monitoring sites and sampling dates
- If changed from the approved standard monitoring plan:
  - Distribution system schematic
  - Population served by the system
  - System type (subpart H or ground water)

7.3.1 Selecting Stage 2 DBPR Compliance Monitoring Locations

You should begin the Stage 2 site selection process by calculating the locational running annual average (LRAA) for each standard monitoring site and Stage 1 DBPR compliance monitoring site. Note that because the duration for IDSE standard monitoring is one year, the LRAA for each standard monitoring site is equivalent to the average of all TTHM or HAA5 data collected at the location (either one, four, or six data points depending on your IDSE standard monitoring frequency). The LRAA for each Stage 1 DBPR compliance monitoring site should be the LRAA for the year that you conducted standard monitoring (either one or four data points depending on your Stage 1 compliance monitoring frequency). You should consider using a spreadsheet to store your data and calculate your LRAAs. You can also use **Worksheet 7.2** to help you organize your data

You must use the **site selection protocol in Exhibit 7.7** to select your Stage 2 compliance monitoring locations. The number of required Stage 2 compliance monitoring sites for your system can be found on page 2 of the **Standard Monitoring Requirements - Attachment** sheet in Chapter 2. If you complete all steps in the protocol and need additional compliance monitoring sites for the Stage 2 DBPR, repeat the protocol until the required number of sites has been selected. If you arrive at Step 3 or Step 7 and have no more Stage 1 DBPR sites from which to select, continue to the next step. Example 7.4 shows how a large system uses the protocol to select their Stage 2 compliance monitoring sites.

You may select alternate sites other than those identified using the protocol, but you **must justify** the alternate locations in your IDSE report. Additional factors that may prompt you to choose alternate sites are discussed below.

Additional Factors to Consider During Selection of Stage 2 Compliance Monitoring Sites

In general, TTHM and HAA5 LRAAs are the most important factors in site selection. However, the Stage 2 rule allows for some flexibility in this process. As you work through the site selection protocol, you should consider other factors that may lead you to select a site with a similar or slightly lower LRAA. If you do not use your highest TTHM and HAA5 LRAAs to select your Stage 2 compliance monitoring sites, you **must** provide justification for your selection in your IDSE report. The following conditions are possible reasons why you may select a site with a slightly lower LRAA over another site:

- The site provides more complete geographic coverage of the entire distribution system
- The site allows you to maintain a historical record
- Sampling at that site provides the opportunity to collect other water quality or operational data (e.g., chloramine systems may want to collect nitrate or nitrite data at that site)

EPA recognizes that a slight difference between LRAAs measured at two sites may not be meaningful given the normal variability that may occur at a site over time. As a result, the selection of a Stage 2 compliance monitoring site with a slightly lower LRAA may be acceptable if other factors, such as those listed above, favor the site with the lower LRAA. Examples 7.5 and 7.6 illustrate situations in which hypothetical systems might select Stage 2 DBPR compliance monitoring sites using criteria other than the site selection protocol.

It is possible that EPA or your state may not concur with your justification and may require you to select different Stage 2 compliance monitoring sites.

Worksheet 7.2 Stage 2 DBPR Site Selection Worksheet for Standard Monitoring

Instructions:

1) Enter the number of required Stage 2 DBPR compliance monitoring sites based on your ***Standard Monitoring Requirements - Attachment*** summary sheet from Chapter 2.

2) Enter the Site ID and LRAA for each IDSE standard monitoring and Stage 1 compliance monitoring location. You may want to sort your entries in order by TTHM LRAA or HAA5 LRAA values.

3) As you work through the site selection protocol in Exhibit 7.7, fill in the "Stage 2 Site Type" column each time you select a site to indicate whether the site is a high TTHM, high HAA5, Existing Stage 1 DBPR Compliance Monitoring Site, or selected using criteria other than the protocol.

No. of Stage 2 DBPR Compliance Monitoring Sites Required

_____Highest TTHM _____Highest HAA5 ____Existing Stage 1 _______TOTAL

Site ID	**LRAA**		**Stage 2 DBPR Site Type***
	TTHM (mg/L)	**HAA5 (mg/L)**	
Example	*0.075*	*0.045*	*Highest TTHM*

* Enter Highest TTHM, Highest HAA5, or existing Stage 1 DBPR

Exhibit 7.7 Protocol for Selecting Stage 2 DBPR (Subpart V) Compliance Monitoring Sites

Steps[1] [required by rule]		Stage 2 Compliance Monitoring Sites Selected [2]
1	Select the location with the highest TTHM LRAA	1st highest TTHM site
2	Select the remaining location with the highest HAA5 LRAA	1st highest HAA5 site
3	For subpart H systems: Select the remaining existing Stage 1 DBPR average residence time compliance monitoring location with the highest HAA5 LRAA For ground water systems: Select the remaining existing Stage 1 DBPR maximum residence time compliance monitoring location with the highest HAA5 LRAA *Skip this step if you have no more Stage 1 DBPR sites*	1st Stage 1 DBPR site
4	Select the remaining location with the next highest TTHM LRAA.	2nd highest TTHM site
5	Select the remaining location with the next highest TTHM LRAA	3rd highest TTHM site
6	Select the remaining location with the next highest HAA5 LRAA	2nd highest HAA5 site
7	For subpart H systems: Select the remaining existing Stage 1 DBPR average residence time compliance monitoring location with the highest TTHM LRAA For ground water systems: Select the remaining existing Stage 1 DBPR maximum residence time compliance monitoring location with the highest TTHM LRAA *Skip this step if you have no more Stage 1 DBPR sites*	2nd Stage 1 DBPR site
8	Select the remaining location with the next highest HAA5 LRAA	3rd highest HAA5 site
*If you need more Stage 2 DBPR compliance monitoring locations, Go back to **Step 1** of this protocol and repeat the steps until you have selected the required number of total sites.*		

1. All steps are based on your calculated LRAAs for your standard monitoring sites and Stage 1 DBPR compliance monitoring sites. This means that your existing Stage 1 DBPR sites can be selected in steps *other than* 3 or 7. Stop when you reach your required number of Stage 2 DBPR compliance monitoring sites.
2. You cannot select the same site as a highest TTHM and a highest HAA5 compliance monitoring site.

Example 7.4 Selecting Stage 2 DBPR Compliance Monitoring Sites

A consecutive system serving 15,000 people has conducted standard monitoring for the IDSE. This system purchases disinfected ground water from a number of ground water systems drawing from the same aquifer. Based on state determination, the system has two Stage 1 DBPR compliance monitoring sites. According to the ***Standard Monitoring Requirements Attachment*** sheet in Chapter 2, the system must select the following **four** Stage 2 compliance monitoring sites from IDSE standard monitoring and Stage 1 DBPR sites:

- 2 highest TTHM sites,
- 1 highest HAA5 site, and
- 1 maximum residence time sites from the existing Stage 1 DBPR data.

The table below lists the TTHM and HAA5 LRAAs for the Stage 1 DBPR compliance monitoring sites and standard monitoring sites during the IDSE monitoring period.

Site Number and Description	TTHM LRAA (mg/L)	HAA5 LRAA (mg/L)
Stage 1 DBPR Compliance Monitoring Results:		
1 (Stage 1 max. residence time)	0.059	0.037
2 (Stage 1 max. residence time)	0.036	0.045
IDSE Standard Monitoring Results:		
3 (high TTHM)	0.058	0.031
4 (high TTHM)	0.052	0.034
5 (high HAA5)	0.051	0.042
6 (high HAA5)	0.047	0.038
7 (ave. residence time)	0.038	0.034
8 (near entry point)	0.021	0.015

Example 7.4 Selecting Stage 2 DBPR Compliance Monitoring Sites (cont.)

The system used the required protocol in Exhibit 7.7 to select their compliance monitoring sites.

Go to Step 1: Select the Highest TTHM LRAA Site

Site 1 has the highest TTHM LRAA and is selected as the first high TTHM site.

Go to Step 2: Select the Highest HAA5 LRAA Site

Site 2 has the highest HAA5 LRAA and has not already been selected. Therefore, **Site 2** is chosen as the first high HAA5 site.

Go to Step 3: Select the Stage 1 Maximum Residence Time Site with the Highest HAA5 LRAA

There are no remaining Stage 1 sites to select from. **Skip this step and go to Step 4.**

Go to Step 4: Select the Next Highest TTHM LRAA Site

Site 3 has the next highest TTHM LRAA and is therefore chosen as the next highest TTHM site.

Go to Step 5: Select the Next Highest TTHM LRAA Site

Site 4 has the next highest TTHM LRAA and is therefore chosen as the next highest TTHM site.

Final Inventory of Stage 2 DBPR Compliance Monitoring Sites*

Highest TTHM: Site 1, Site 3, Site 4 (3 sites)

Highest HAA5: Site 2 (1 site)

Existing Stage 1 DBPR Site (as described in Step 3): No sites

TOTAL Sites = 4

**Note that the requirements on the previous page are for 2 highest TTHM sites, 1 highest HAA5 site, and 1 maximum residence time site from existing Stage 1 DBPR data. However, because the two Stage 1 DBPR sample sites were the highest TTHM site and the highest HAA5 site, these sites were selected during the first two steps of the selection protocol. As a result, there were no remaining Stage 1 DBPR sites to choose from during Step 3. Step 3 was skipped and the remaining two Stage 2 compliance sites were chosen using Steps 4 and 5.*

Example 7.5 Maintaining a Historical Record

A ground water system serves 90,000 people and must select four Stage 2 compliance sites from standard monitoring and Stage 1 DBPR data. The system has already selected one highest TTHM site, one highest HAA5 site, and one Stage 1 maximum residence time site. The fourth site to be selected is a high TTHM site which must be selected from the IDSE standard monitoring and Stage 1 DBPR sites not yet selected for Stage 2 compliance monitoring. The table below lists three remaining high-TTHM sites among the IDSE standard monitoring and Stage 1 DBPR sites.

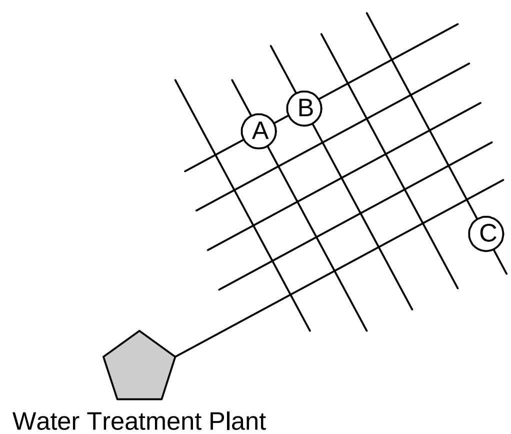
Site Number and Description	LRAA	
	TTHM (mg/L)	HAA5 (mg/L)
4 (Standard monitoring high TTHM)	0.072	0.051
8 (Standard monitoring high TTHM)	0.065	0.056
9 (Stage 1 DBPR max residence time site)	0.070	0.051

Among the three remaining high TTHM IDSE sites, standard monitoring Site 4 has the highest TTHM LRAA. However, the Stage 1 DBPR site has only slightly lower TTHM LRAA than standard monitoring Site 4. The system chooses **the Stage 1 DBPR site over standard monitoring site 4** for the Stage 2 high TTHM site to maintain the historical DBP

Example 7.6 Providing Geographic Coverage When Choosing Stage 2 Sites

In general, two representative high TTHM sites should not be located in the same general area of the distribution system. Consider the following example:

The two highest TTHM LRAAs in the distribution system are from adjacent historical sample sites (sites A and B). The site with the third highest TTHM LRAA is on the far side of the distribution system (site C). In this case, consider selecting sites **A and C** or **B and C** as Stage 2 sites for a broader geographical coverage of the distribution system.



7.3.2 Determining Your Stage 2 DBPR Compliance Monitoring Schedule

The first step in determining your Stage 2 DBPR compliance monitoring schedule is to select your peak historical month. You should use the peak historical month selected in your IDSE standard monitoring plan unless new data suggest another month. Refer to Section 7.1.2 for more information on determining peak historical month.

You **must** conduct Stage 2 DBPR compliance monitoring during the peak historical month. If you are a ground water system that serves more than 9,999 people or you are a subpart H system that serves more than 499 people, you must also conduct Stage 2 compliance sampling at 90 day intervals before and/or after the peak historical month.

The intent of the required time interval is to ensure that samples are representative of the quality of water over an extended period and do not over-emphasize either high or low concentrations of TTHM or HAA5 that might occur seasonally. For example, a system on quarterly monitoring could sample in the **third full week of every third month**. It is not necessary to sample all sites on the same day.

7.3.3 Preparing the IDSE Report for Standard Monitoring

Every system that conducts IDSE standard monitoring **must** prepare and submit an IDSE Report for Standard Monitoring. You should submit the report to the Information Processing and Management Center (IPMC) for review by EPA or your state. See Section 1.4 of this guidance manual for information on how to submit your report to the IPMC.

EPA has developed an **IDSE Report for Standard Monitoring Form (Form 7)**, presented in this section and available electronically as part of the **IDSE Tool.** You are not required to use this form; however, if you choose not to use it, refer to Exhibit 7.6 for a list of the minimum elements you must include in your IDSE report.

The IDSE Tool creates a custom form for your system and provides links to technical guidance from this manual. The tool is available on EPA's website at http://www.epa.gov/safewater/disinfection/stage2.

IDSE Tool

Before you begin Stage 2 DBPR compliance monitoring, you will also be required to prepare a Stage 2 DBPR compliance monitoring plan. In addition, if you are a subpart H system serving >3,300 people, you must submit a copy of your Stage 2 compliance monitoring plan to the state. If you include **compliance calculation procedures** in your IDSE report, the report can meet the requirement of the plan, and you do not have to prepare or submit a separate plan. As a guide for specifying your compliance calculation procedures, refer to the Stage 1 DBPR, 141.133(b), and your Stage 1 compliance monitoring plan. Check with your state, as they may have different requirements under the Stage 2 DBPR. If you are a consecutive or wholesale system, your state may choose to use its special primacy authority to modify your Stage 2 compliance monitoring requirements. In this case, you should check with the state to see if they are going to use this authority. You should develop your IDSE report for the total number of required Stage 2 compliance locations for your system.

The IDSE report for standard monitoring form includes the following sections:

I. General Information
II. Stage 2 DBPR Requirements
III. Monitoring Results
IV. Justification of Stage 2 DBPR Compliance Monitoring Sites
V. Peak Historical Month and Stage 2 DBPR Compliance Monitoring Schedule
VI. Distribution System Schematic
VII. Attachments

Sections of the form with an asterisk (*) are required by the Stage 2 DBPR. Examples of completed IDSE reports for standard monitoring using this form are provided in Appendices H and I of this guidance manual and in the EPA manual, *Initial Distribution System Evaluation Guide for Systems Serving < 10,000 People*. The rest of this section provides guidance on the completion of this form.

I. General Information

I.A. PWS Information* - If nothing has changed since you completed your standard monitoring plan form, copy information from your plan into this section. If your system characteristics have changed, see Section 7.1.3 of this manual for guidance on completing this section.

I.B. Date Submitted* - Enter either the date that you are submitting the form electronically, putting it in the mailbox, or dropping it off with an express delivery service. Be sure to submit your IDSE report before the deadline found on your requirements summary sheet.

I.C. PWS Operations - This section asks questions about your system to help inform EPA and state personnel during the plan review process. If nothing has changed since you completed your standard monitoring plan form, copy information from your plan into this section. If your system characteristics have changed, see Section 7.1.3 of this manual for guidance on completing this section.

I.D. Contact Person* - Enter the contact information of the person who is submitting the report. This should be the person who will be available to answer questions from EPA and/or state reviewers.

II. Stage 2 DBPR Requirements*

II.A Number of Compliance Monitoring Sites - Refer to the ***Standard Monitoring Requirements - Attachment*** sheet in Chapter 2. Copy the numbers from the "Stage 2 Compliance Monitoring Requirements" table that correspond to your source type and the population served by your system.

II.B. Schedule - This should be the same schedule you entered for your standard monitoring plan. See Section 7.1.3 of this manual for guidance.

II.C. Compliance Monitoring Frequency - Refer to the ***Standard Monitoring Requirements - Attachment*** in Chapter 2. Locate the monitoring frequency from the "Stage 2 Compliance Monitoring Requirements" table that corresponds to your source type and the population served by your system. Put a check mark in the box corresponding to that monitoring frequency.

III. Monitoring Results*

III.A. Did you deviate in any way from your approved standard monitoring plan? - Put a check mark in the appropriate box to identify whether your system collected any standard monitoring samples on different dates or at different locations than indicated in your approved standard monitoring plan.

If you sampled on a different date or during a different week than scheduled in the approved monitoring plan, you should write an explanation in the space provided (or in attached sheets). You should include the standard monitoring site ID, the scheduled sampling date or week from your monitoring plan, and the actual sampling date. You must also explain why you sampled on a different day or week than planned. An example explanation is shown below.

> *According to our standard monitoring plan, we were to collect samples at standard monitoring sites 2 and 4 on January 14, 2009. However, a major snowstorm created hazardous road conditions and limited our access to sample locations. Therefore, we conducted our sampling at all sites on January 18, 2009 after the roads were cleared.*

III.B. Where were your TTHM and HAA5 samples analyzed? - Put a check mark in the appropriate box to identify whether your system analyzed TTHM and HAA5 samples in an in-house laboratory or sent the samples to a certified laboratory for analysis.

If you analyzed your TTHM and HAA5 samples in an in-house laboratory, check the appropriate box to identify whether your laboratory is certified. If you sent your TTHM and HAA5 samples to a certified laboratory, enter the name of the laboratory in the blank. If you used more than one laboratory (e.g., if you used different laboratories for standard monitoring samples and Stage 1 DBPR compliance samples), list both laboratories, or check "in-house" and list the name of the laboratory if applicable.

III.C What method(s) was used to analyze your TTHM and HAA5 samples? - Put a check mark in the appropriate box to indicate the analytical method used to measure the TTHM and HAA5 concentrations of your standard monitoring and Stage 1 DBPR compliance samples. If more than one method was used (e.g., if you used different laboratories for standard monitoring samples and Stage 1

DBPR compliance samples), check more than one method. If you do not know what method was used, contact your laboratory.

III.D. IDSE Standard Monitoring Results - TTHM - Enter your TTHM results for each standard monitoring site for each monitoring period in which you collected data. For each sample result, enter the date on which sampling was conducted. If you are a subpart H system serving more than 49,999 people or a ground water system serving more than 499,999 people, you were required to conduct standard monitoring at more than 8 sites. Therefore, you will need to attach additional sheets.

III.E. IDSE Standard Monitoring Results - HAA5 - Enter your HAA5 results for each standard monitoring site for each monitoring period in which you collected data. For each sample result, enter the date on which sampling was conducted. If you are a subpart H system serving more than 49,999 people or a ground water system serving more than 499,999 people, you were required to conduct standard monitoring at more than 8 sites. Therefore, you will need to attach additional sheets.

III.F. Stage 1 DBPR Compliance Monitoring Results - TTHM - Enter your TTHM results for each Stage 1 site for each monitoring period in which you collected data. For each sample result, enter the date on which sampling was conducted. Attach additional sheets if needed.

III.G. Stage 1 DBPR Compliance Monitoring Results - HAA5 - Enter your HAA5 results for each Stage 1 site for each monitoring period in which you collected data. For each sample result, enter the date on which sampling was conducted. Attach additional sheets if needed.

IV. Justification of Stage 2 DBPR Compliance Monitoring Sites*

Enter the site ID from the distribution schematic and the site type (whether it is highest TTHM, highest HAA5, Stage 1 DBPR, or a site selected using criteria other than the site selection protocol). For example:

This site had the 2^{nd} highest TTHM LRAA

An example of how you might justify a site that was ***not*** selected using the protocol is below:

Among the three remaining high TTHM sites, standard monitoring Site 4 has the highest TTHM LRAA. However, Stage 1 DBPR Site 7 has only a slightly lower TTHM LRAA than standard monitoring Site 4. Therefore, we choose Stage 1 DBPR Site 7 over standard monitoring site 4 to maintain the historical DBP record.

V. Peak Historical Month and Proposed Stage 2 DBPR Compliance Monitoring Schedule

V.A. Peak Historical Month* - Enter the month that you determined to be your peak historical month.

V.B Is Your Peak Historical Month the Same as in Your IDSE Standard Monitoring Plan? - Put a check mark in the appropriate box to identify whether your system used the same peak historical month as in your standard monitoring plan. If your standard monitoring results prompted you to change your peak historical month, explain how you selected a new peak historical month.

V.C. Proposed Stage 2 DBPR Compliance Monitoring Schedule* - Enter the ID for each Stage 2 DBPR compliance monitoring site in the table (these should match the ID's you enter in Section IV and on your schematic). Enter your proposed sampling schedule for the number of monitoring periods identified in Section II.C. The entry can be a specific date or week and can be in a number of different formats. For example:

- 7/9/07
- 2nd week in Nov '07
- Week of 7/9/07

Remember that at least one monitoring period must be during the peak historical month identified in Section V.A. Note that there is only space for 8 monitoring sites on this sheet. If you are a subpart H system serving more than 249,999 people you are required to monitor at more than 8 sites. Therefore, you will need to attach additional sheets.

VI. Distribution System Schematic* - A distribution system schematic is required *only if it has changed from your approved IDSE standard monitoring plan.* If it has changed, attach the revised distribution system schematic. See Section 7.1.3 of this manual for guidance.

VII. Attachments - Put a check mark in each of the boxes corresponding to any attachments that you have included in your report.

A distribution system schematic is required *only if it has changed since you submitted your IDSE standard monitoring plan*. Refer to Section VI for details.

If you submit your IDSE report electronically, you also have the option to submit attachments in hard copy. Include a note in your electronic IDSE report explaining that attachments are being submitted in hard copy, and mail the hard copy to the IPMC mailing address in your Requirements Summary Sheet. The IPMC will match the hard copy submission with your electronic submission when it is received.

If you are a subpart H system serving >3,300 people, you must submit a copy of your Stage 2 compliance monitoring plan to the state. If you include **compliance calculation**

procedures in your IDSE report, the report can meet the requirement of the plan, and you do not have to prepare or submit a separate plan. As a guide for specifying your compliance calculation procedures, refer to the Stage 1 DBPR, 141.133(b), and your Stage 1 compliance monitoring plan. Check with your state, as they may have different requirements under the Stage 2 DBPR.

Enter the total number of pages in your IDSE report (including attachments) in the blank at the bottom of this section. This will allow EPA or your state to ensure that all pages were received.

This page intentionally left blank.

Form 7: IDSE Report for Standard Monitoring

I. GENERAL INFORMATION

A. PWS Information*

B. Date Submitted* _______

PWSID: ____________________

PWS Name: ____________________

PWS Address: ____________________

City: ______________ State: _____ Zip: ____________

Population Served: ____________________

System Type:	Source Water Type:	Buying / Selling Relationships:
☐ CWS	☐ Subpart H	☐ Consecutive System
☐ NTNCWS	☐ Ground	☐ Wholesale System
		☐ Neither

C. PWS Operations

Residual Disinfectant Type: ☐ Chlorine ☐ Chloramines ☐ Other:_____________

Number of Disinfected Sources: ___ Surface ___GWUDI ____ Ground ___ Purchased

D. Contact Person*

Name: ____________________

Title: ____________________

Phone #: ____________________ Fax #: ______________

E-mail: ____________________

II. STAGE 2 DBPR REQUIREMENTS*

A. Number of Compliance Monitoring Sites		B. Schedule	C. Compliance Monitoring Frequency
Highest TTHM:	___	☐ Schedule 1	☐ During peak historical month (1 monitoring period)
Highest HAA5:	___	☐ Schedule 2	
Existing Stage 1:	___	☐ Schedule 3	☐ Every 90 days (4 monitoring periods)
Total:	___	☐ Schedule 4	

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS*

A. Did you deviate in any way from your approved standard monitoring plan? ☐ Yes ☐ No

If YES, explain (attach additional pages if necessary):

____

____

____

____

____

____

B. Where were your TTHM and HAA5 samples analyzed?

☐ In-House

Is your in-house laboratory certified? ☐ Yes ☐ No

☐ Certified Laboratory

Name of certified laboratory: ______________________________

C. What method(s) was used to analyze your TTHM and HAA5 samples?

TTHM	HAA5
☐ EPA 502.2	☐ EPA 552.1
☐ EPA 524.3	☐ EPA 552.2
☐ EPA 551.1	☐ EPA 552.3
	☐ SM 6251 B

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

D. IDSE Standard Monitoring Results - TTHM

Site ID[1]	Data Type	TTHM (mg/L)						LRAA
	Sample Date							
	Sample Result							
	Sample Date							
	Sample Result							
	Sample Date							
	Sample Result							
	Sample Date							
	Sample Result							
	Sample Date							
	Sample Result							
	Sample Date							
	Sample Result							
	Sample Date							
	Sample Result							
	Sample Date							
	Sample Result							

[1] Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan.

Attach additional sheets as needed for IDSE standard monitoring results.

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

E. IDSE Standard Monitoring Results - HAA5

Site ID[1]	Data Type	HAA5 (mg/L)						LRAA
	Sample Date							
	Sample Result							
	Sample Date							
	Sample Result							
	Sample Date							
	Sample Result							
	Sample Date							
	Sample Result							
	Sample Date							
	Sample Result							
	Sample Date							
	Sample Result							
	Sample Date							
	Sample Result							
	Sample Date							
	Sample Result							

[1] Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan.

Attach additional sheets as needed for IDSE standard monitoring results.

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

F. Stage 1 DBPR Compliance Monitoring Results - TTHM

Site ID[1]	Data Type	TTHM (mg/L)				LRAA
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					

[1] Verify that site IDs for Stage 1 compliance monitoring sites match the site IDs in your Standard Monitoring Plan.

Attach additional sheets as needed for Stage 1 compliance monitoring results.

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

G. Stage 1 DBPR Compliance Monitoring Results - HAA5

Site ID[1]	Data Type	HAA5 (mg/L)				LRAA
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					

[1] *Verify that site IDs for Stage 1 compliance monitoring sites match the site IDs in your Standard Monitoring Plan.*

Attach additional sheets as needed for Stage 1 compliance monitoring results.

Form 7: IDSE Report for Standard Monitoring

IV. JUSTIFICATION OF STAGE 2 DBPR COMPLIANCE MONITORING SITES*

Stage 2 Compliance Monitoring Site ID	Site Type	Justification
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
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	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	

Attach additional copies of this sheet if you need more room.

Form 7: IDSE Report for Standard Monitoring

V. PEAK HISTORICAL MONTH AND PROPOSED STAGE 2 DBPR COMPLIANCE MONITORING SCHEDULE

A. Peak Historical Month* ______________

B. Is Your Peak Historical Month the Same as in Your IDSE Standard Monitoring Plan?

☐ Yes ☐ No

If no, explain how you selected your new peak historical month *(attach additional sheets if needed*)

____

____

____

____

____

____

C. Proposed Stage 2 DBPR Compliance Monitoring Schedule*

Stage 2 Compliance Monitoring Site ID	Projected Sampling Date (date or week)[1]			
	period 1	period 2	period 3	period 4

[1] period = monitoring period. Complete for the number of monitoring periods from Section II.C.

Attach additional copies of this sheet if you need more room.

Form 7: IDSE Report for Standard Monitoring

VI. DISTRIBUTION SYSTEM SCHEMATIC*

ATTACH a schematic of your distribution system if it has changed since you submitted your Standard Monitoring Plan (Form 6).

VII. ATTACHMENTS

- ☐ Additional sheets for explaining how and why you deviated from your standard monitoring plan (Section III).
- ☐ Additional sheets for Standard Monitoring Results (Section III). **REQUIRED** if you are a subpart H system serving **more than 49,999 people** or a ground water system serving **more than 499,999 people**.
- ☐ Additional sheets for Stage 2 DBPR Compliance Monitoring Sites (Section IV). **REQUIRED** if you are a subpart H system serving **more than 249,999 people**.
- ☐ Additional sheets for explaining how you selected the peak historical month (Section V).
- ☐ Additional sheets for proposed Stage 2 DBPR peak historical month and compliance monitoring schedule (Section V). **REQUIRED** if you are a subpart H system serving **more than 249,999 people**.
- ☐ Distribution system schematic* (Section VI). **REQUIRED if it has changed from your approved IDSE standard monitoring plan**.
- ☐ Compliance calculation procedures (for Stage 2 Compliance Monitoring Plan).

Total Number of Pages in Your Report: ______

Note: Fields with an asterisk (*) are required by the Stage 2 DBPR

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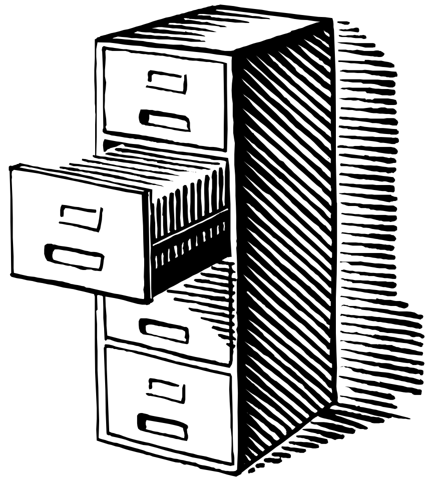
7.4 Recordkeeping



The IDSE standard monitoring report must be kept on file for **10 years** after the date it is submitted. If EPA or your state modifies the recommendations made in your report or approves alternative Stage 2 DBPR compliance monitoring locations, you must also keep a copy of EPA or your state's notification on file for 10 years after the date of the notification. You must make your IDSE report and any notification available for review by your state or the public.

The standard monitoring plan, including any modifications by EPA or your state, must also be kept on file for as long as you are required to retain your IDSE standard monitoring report. You must make the plan and any modifications available for review by your state or the public.

7.5 Next Steps: Preparing the Stage 2 DBPR Compliance Monitoring Plan

As the final step before you can begin compliance monitoring for the Stage 2 DBPR, you must develop and implement a **Stage 2 DBPR monitoring plan** by the deadline provided in your requirements summary sheet. The plan will be similar to your Stage 1 DBPR monitoring plan in that it will identify how you intend to sample for compliance with Stage 2. You must keep your plan on file for state and public review. If you are a subpart H system serving > 3,300 people, you **must** submit your plan to EPA or your state prior to when you are required to start monitoring.

Exhibit 7.8 contains the minimum requirements for what must be included in your Stage 2 DBPR compliance monitoring plan. Because compliance monitoring plans are not addressed as part of the IDSE provisions of the Stage 2 DBPR, ***EPA has not included detailed guidance for developing Stage 2 compliance monitoring plans in this guidance manual***. EPA plans to develop other manuals and training that address the compliance monitoring provisions of the Stage 2 DBPR.

See EPA's website http://www.epa.gov/safewater/disinfection/stage2 for an up-to-date inventory of Stage 2 DBPR guidance manuals and training materials, or call the Safe Drinking Water Hotline at 1-800-426-4791.

Exhibit 7.8 Required Contents of Stage 2 DBPR Compliance Monitoring Plans

All Systems	Additional Requirements for Consecutive and Wholesale Systems [1]
• Monitoring locations • Monitoring dates • Compliance calculation procedures	• If your state has used its special primacy authority to modify your monitoring requirements, you must include monitoring plans for other systems in your combined distribution system

1. See Appendix D of this manual for guidance specifically for consecutive and wholesale systems

Appendix A

Formation of Disinfection Byproducts

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A.1 Introduction

The formation of disinfection byproducts (DBPs) is a function of many factors, including:

- precursor concentration,
- disinfectant dose,
- water pH,
- temperature,
- contact time, and
- bromide ion concentration.

The purpose of this appendix is to provide a brief summary of the factors that affect DBP formation in water treatment processes and distribution systems. More detailed information on this subject can be found in other existing literature, including the following EPA guidance documents:

- *Enhanced Coagulation and Enhanced Precipitative Softening Guidance Manual*, available from EPA (Document #815-R-99-012)

- *Controlling Disinfection By-Products and Microbial Contaminants in Drinking Water,* available from EPA (Document #600-R-01-110)

- *Alternative Disinfectants and Oxidants Guidance Manual*, available from EPA (Document #815-R-99-014)

- *Microbial and Disinfection Byproduct Rules: Final Simultaneous Compliance Guidance Manual*, available from EPA (Document #)

Moreover, it should be noted that the book entitled *Formation and Control of Disinfection By-Products in Drinking Water* (Singer et al., 1999) contains a detailed compilation of the chemistry of DBP formation in Chapter 3 (Krasner, 1999). The references for that chapter represent the seminal works in the literature. Additional references are also presented in the following discussion.

A.2 Formation of DBPs

Organic DBPs (and oxidation byproducts) are formed by the reaction between organic substances, inorganic compounds such as bromide, and oxidizing agents that are added to water during treatment. In most water sources, natural organic matter (NOM) is the major constituent of organic substances and DBP precursors. Total organic carbon (TOC) is typically used as a surrogate measure for precursor levels and is used in the Stage 1 DBPR to determine precursor removal compliance. Dissolved organic carbon (DOC) and UV absorption at 254 nm [UV_{254}] are also often used as surrogate parameters for monitoring precursor levels. The following are the major factors affecting the type and amount of DBPs formed.

- Type of disinfectant, dose, and residual concentration
- Concentration and characteristics of precursors
- Water temperature
- Water chemistry (including pH, bromide ion concentration, organic nitrogen concentration, and presence of other reducing agents such as iron and manganese)
- Contact time and mixing conditions for disinfectant (oxidant), coagulant, source water, and other treatment chemicals

A summary for each of these factors follows.

A.2.1 Impact of Disinfection Method on Organic DBP Formation

Organic DBPs can be subdivided into halogenated and non-halogenated byproducts. Halogenated organic disinfection byproducts are formed when organic and inorganic compounds found in water react with free chlorine, free bromine, or free iodine. The formation reactions may take place in the treatment plant and the distribution system. Free chlorine can be introduced to water directly as a primary or secondary disinfectant, or as a byproduct of the use of chlorine dioxide and chloramines.

Reactions between precursors, bromide and iodide ions, and chlorine lead to the formation of a variety of halogenated DBPs including THMs and HAAs. The presence of bromide can affect both the rate and the yield of DBPs, and if the ratio of bromide to precursors (measured as TOC) increases, the percentage of brominated DBPs also increases (Krasner, 1999 and references therein). Similarly, the presence of iodide may result in the formation of mixed chlorobromoiodomethanes byproducts (Bichsel and Von Gunten, 2000).

The following is an overview of disinfectants including chlorine, chloramines, chlorine dioxide, ultraviolet (UV) irradiation, and ozone and their potential impacts on the formation of THMs and HAAs. Some discussion is also included of potential issues associated with the use of these disinfectants.

Chlorine

Most water systems that disinfect use either liquid or gaseous chlorine as their disinfectant. Halogenated byproducts are formed when free chlorine reacts with natural organic matter. In addition, brominated byproducts are formed when source water containing bromide is chlorinated. Chlorine reacts with natural organic matter in the water to form THMs, HAAs and other disinfection byproducts.

Water systems using chlorine can modify their treatment to reduce TTHM and HAA5 concentrations in the finished water. Treatment modifications include moving the point of chlorination downstream in the water treatment plant, optimizing coagulation to enhance removal of DBP precursors, and using another disinfectant or oxidant to supplement or replace the use of free chlorine. Moving the point of chlorination downstream in the treatment train allows the concentration of disinfection byproduct precursors to be reduced before chlorine is added and may be implemented seasonally. Systems that are required to develop a disinfection profile must calculate a disinfection benchmark for the treatment configuration in place before making any changes to their disinfection practices.

Chloramines

Studies have documented that chloramines produce significantly lower THM and HAA levels than free chlorine, and there is no clear evidence that the reaction of precursors and chloramine leads to the formation of THMs (Singer and Reckhow, 1999; USEPA, 1999). Predictions of an empirical DBP formation model calibrated using ICR data indicated that under chloraminated conditions, THMs and HAAs are formed in full-scale plants and distribution systems at a fraction of the amount that would be expected based on observations of DBP formation under free chlorine conditions. The amount of formation with chloramines varied from 5% to 35% of that calculated for free chlorine, depending on the individual DBP species (Swanson et al., 2001). When chloramination is used, it is possible that DBPs might form if chlorine is added before ammonia. If the mixing process is inefficient, it is also possible that DBPs might form during the mixing of chlorine and ammonia. In this case, free chlorine might react with precursors before the complete formation of chloramines. In addition, monochloramine slowly hydrolyzes to release free chlorine in water. This free chlorine may contribute to the formation of small amounts of additional DBPs in the distribution system.

Additional issues should be considered prior to switching to chloramination. For example, systems using chloramines that have excess ammonia, warm temperatures, long distribution system residence times, and low chloramine residuals may experience nitrification in their distribution systems. Also, systems should be aware that switching from chlorine to chloramines in the distribution system can also change the oxidation reduction potential of the water. The *Microbial and Disinfection Byproduct Rules: Final Simultaneous Compliance Guidance Manual* includes a detailed discussion of factors to consider prior to switching to chloramines.

Chlorine Dioxide

The application of chlorine dioxide does not produce significant amounts of THMs and HAAs unless chlorine is formed as an impurity in the generation process. However, THMs and HAAs will form if excess chlorine is added to water to ensure complete reaction with sodium chlorite during the production of chlorine dioxide.

Chlorine dioxide can also oxidize bromide ions to bromine. The bromine can then react with organic matter to form brominated DBPs. Systems with high bromide concentrations that are near the Stage 2 DBPR limits for THMs or HAA5 should take this into account.

When chlorine dioxide is used as a disinfectant, chlorite is formed. The MCL for chlorite was set at 1.0 mg/L by the Stage 1 D/DBPR. Systems using chlorine dioxide must monitor daily at the entrance to the distribution system for chlorite. They must also collect 3 chlorite samples per month in the distribution system. As much as 70 percent of the chlorine dioxide added to water can break down to form chlorite. This limits the dose of chlorine dioxide that can be used and therefore the amount of inactivation that can be achieved.

Chlorite can react with excess chlorine to reform chlorine dioxide. Some systems may opt to boost with chlorine to maintain a residual in the distribution system. Systems that use chlorine dioxide and then boost with chlorine in the distribution system are required by the Stage 1 D/DBPR to monitor the chlorine dioxide residual in the distribution system. If doses are high enough, systems could exceed either the chlorine dioxide MRDL or the chlorite MCL. Reformed chlorine dioxide can also volatilize at consumer's taps and react with volatile organics to cause odor problems.

Ultraviolet Irradiation

To date, there is no evidence to suggest that ultraviolet irradiation results in the formation of any disinfection byproducts; however, little research has been performed in this area. Most of the research regarding application of UV and DBP formation has focused on chlorinated DBP formation as a result of UV application prior to the addition of chlorine or chloramines (Malley et al., 1995). Studies comparing the effects of UV light followed by chlorination versus chloramination suggest UV does not affect DBP formation in either of these two cases (Malley et al., 1995).

A main drawback with UV is the possibility of microbes passing through at times the lamp is operating off specification. At low UV intensities, some microbes have shown the ability to repair damage done by UV light. Because of this, even drops in lamp intensity not enough to cause a violation of disinfection requirements may allow microbes into the distribution system where they can repair themselves, colonize biofilms, and cause problems with TCR compliance. Therefore any periods of the lamp operating off specification should be minimized.

Because UV disinfection relies on UV light interacting with the organism's genetic material to be effective, any substance that either absorbs or refracts the UV light can interfere with disinfection. Compounds with the potential to do this include dissolved organic carbon (DOC), iron, manganese, calcium, aluminum, and ozone. EPA has developed an *Ultraviolet Disinfection Guidance Manual* that discusses these issues in detail.

Ozone

Ozone does not directly produce chlorinated DBPs. However, if chlorine is added before or after ozonation, mixed bromo-chloro DBPs as well as chlorinated DBPs can form. Ozone can alter the characteristics of precursors and affect the concentration and speciation of halogenated DBPs (THMs and HAAs) when chlorine is subsequently added downstream. In waters with bromide concentrations, ozonation can lead to the formation of bromate and other brominated DBPs. Bromate, like TTHM and HAA5, is a regulated DBP.

Ozonation of natural waters also produces aldehydes, haloketones, ketoacids, carboxylic acids, and other types of biodegradable organic material. The biodegradable fraction of organic material can serve as a nutrient source for microorganisms, and should be removed to prevent microbial regrowth in the distribution system. AOC is a measure of the organic carbon readily available as food for microorganisms. Some systems that have added ozone without biological filtration have experienced increased AOC and microbial growth in the distribution system. Increased biological growth in the distribution system may result in increased corrosion, taste and odor problems, as well as potential health risk.

A.2.2 Disinfectant Dose

As the concentration of chlorine or chloramines increases, the production of DBPs increases. Formation reactions continue as long as precursors and disinfectant are present (Krasner, 1999 and references therein).

In general, the impact of chlorine concentration is greater during primary disinfection than during secondary disinfection. The amount of chlorine added during primary disinfection is usually less than the long-term demand, therefore, the concentration of chlorine is often insufficient to react with all DBP precursors in the water. On the contrary, during secondary disinfection, DBP formation is often limited by the concentration of DBP precursors since excess disinfectant is added to the water to maintain a residual concentration in the distribution system (Singer and Reckhow, 1999).

Distribution system

In distribution systems, DBP formation reactions can become limited by the disinfectant concentration when the free chlorine residual drops to low levels. As a rule of thumb, Singer and Reckhow (1999) suggest this event takes place when the chlorine concentration drops below approximately 0.3 mg/L.

In many systems booster disinfection is applied to raise disinfectant residual concentration, especially in remote areas of the distribution system or near storage tanks where water age may be high and disinfectant residuals can be low. The additional chlorine dose applied to the water at these booster facilities may increase THM and HAA levels. Further, booster chlorination can maintain high HAA concentrations because the increased disinfection residuals can prevent the biodegradation of HAAs. However, booster chlorination can also be useful in decreasing DBP levels by reducing the concentration of secondary disinfectant needed in the finished water leaving the plant.

A.2.3 Time Dependency of DBP Formation

The longer the contact time between disinfectant/oxidant and precursors, the greater the amount of DBPs that can be formed. Generally, DBPs continue to form in drinking water as long as a disinfectant residual and precursors are present. After formation, THMs and HAAs are generally chemically stable as long as a significant disinfectant residual is still present (Singer and Reckhow, 1999). As a consequence, high concentrations of DBPs can accumulate in water with old age.

High THM levels usually occur where the water age is the oldest. Conversely, HAAs cannot be consistently related to water age because HAAs are known to biodegrade over time when the disinfectant residual is low. This might result in relatively low HAAs concentrations in areas of the distribution system where disinfectant residuals are depleted.

A.2.4 Concentration and Characteristics of Precursors

The formation of THMs and HAAs is related to the concentration of precursors at the point of disinfection. In general, greater DBP levels are formed in waters with higher concentrations of precursors. Therefore, removing DBP precursors prior to disinfectant addition is one of the most effective approaches to DBP control.

Studies conducted with different fractions of NOM have indicated the reaction between disinfectant and NOM with high aromatic content tends to form higher DBP levels than NOM with low aromatic content. For this reason, UV_{254}, which is generally linked to the aromatic and unsaturated components of NOM, is considered a good predictor of the tendency of a source water to form THMs and HAAs (Owen et al., 1998; Singer and Reckhow, 1999).

Specific ultraviolet light absorbance (SUVA) is also often used to characterize aromaticity and molecular weight distribution of NOM. This parameter is defined as the ratio between UV_{254} and the dissolved organic carbon (DOC) concentration of water (Letterman et al., 1999). It should be noted that the more highly aromatic precursors in source waters, characterized by high UV_{254}, are more easily removed by coagulation. Thus, it is the UV_{254} measurement immediately upstream of the point(s) of disinfection within a treatment plant that is more directly related to THM and HAA formation potential.

A.2.5 Water Temperature

The rate of formation of THMs and HAAs increases with increasing temperature. Consequently, the highest THM and HAA levels may occur in the warm summer months. However, water demands are often higher during these months, resulting in lower water age within the distribution system which helps to control DBP formation. Furthermore, high temperature conditions in the distribution system promote the accelerated depletion of residual chlorine, which can mitigate DBP formation and promote biodegradation of HAAs unless chlorine dosages are increased to maintain high residuals (Singer and Reckhow, 1999). For these reasons, depending on the specific system, the highest THM and HAA levels may be observed during months which are warm, but not necessarily the warmest. Higher DBP precursor levels in the fall or spring may also cause the highest THM and HAA levels to be observed in cooler months.

Seasonal trends affect THM and HAA concentrations differently. For example, when water is colder, microbial activity is typically lower and DBP formation reactions are slower. Under these conditions, the highest THM and HAA concentrations might appear in the oldest water in the system. In warmer water, the highest HAA concentrations might appear in fresher water, which is likely to contain higher disinfectant residuals that can prevent the biodegradation of HAAs.

A.2.6 Water pH

In the presence of DBP precursors and chlorine, THM formation increases with increasing pH, whereas the formation of HAAs decreases with increasing pH. The increased THM production at high pH is likely promoted by base hydrolysis (favored at high pH). HAAs are not sensitive to base hydrolysis but their precursors are. Consequently, pH can alter their formation pathways, leading to decreased production with increasing pH (Singer and Reckhow, 1999).

Water pH also affects the balance of hypobromite and hypobromous acid formation during the ozonation of waters containing significant concentrations of bromides. At low pH, the equilibrium shifts to the less reactive hypobromous acid. Consequently, the overall formation of bromate decrease as the pH decreases (Singer and Reckhow, 1999). However, the hypobromous acid at low pH can react with NOM to form HAAs and THMs. This may occur if systems using ozone operate at low pH to control bromate formation. In addition, systems may maintain a low pH to achieve the required inactivation.

A.3 References

Bichsel, Y., and Von Gunten U., 2000. *Environmental Science and Technology*, 34 (13): 2784.

Krasner S. W., 1999. Chemistry of disinfection by-product formation. In Formation and Control of Disinfection By-products in Drinking Water. Singer, P.C. (editor). American Water Works Association, Denver, CO.

Letterman, R.D., A. Amirtharajah, and C.R. O'Melia. 1999. Coagulation and flocculation. In *Water quality and treatment.* 5th edition. Letterman R.D. technical editor, American Water Works Association, McGraw-Hill, New York, NY.

Malley, J.P., J.P. Shaw, and J.D. Ropp. 1995. *Evaluation of by-products produced by treatment of groundwaters with ultraviolet irradiation.* AWWA Research Foundation Report No. 90685. Denver CO.

Owen et al., 1998. *Removal of DBP precursors by GAC adsorption*. AWWA Research Foundation Report No. 90744. Denver CO.

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R. Song et al. 1997. Bromate Minimization During Ozonation. Journal American Water Works Association. 89(6):69.

Swanson, W.J., Z. Chowdhury, R. Summers, and G. Solarik. 2001. Predicting DBPs at full-scale: calibration and validation of the Water Treatment Plant Model using ICR data. Conference proceedings, 2001 AWWA Annual Conference, Washington, DC.

USEPA. 1999. *Alternative disinfectants and oxidants guidance manual*. EPA 815-R-99-014.

Appendix B

Stage 2 DBPR and LT2ESWTR Compliance Schedule

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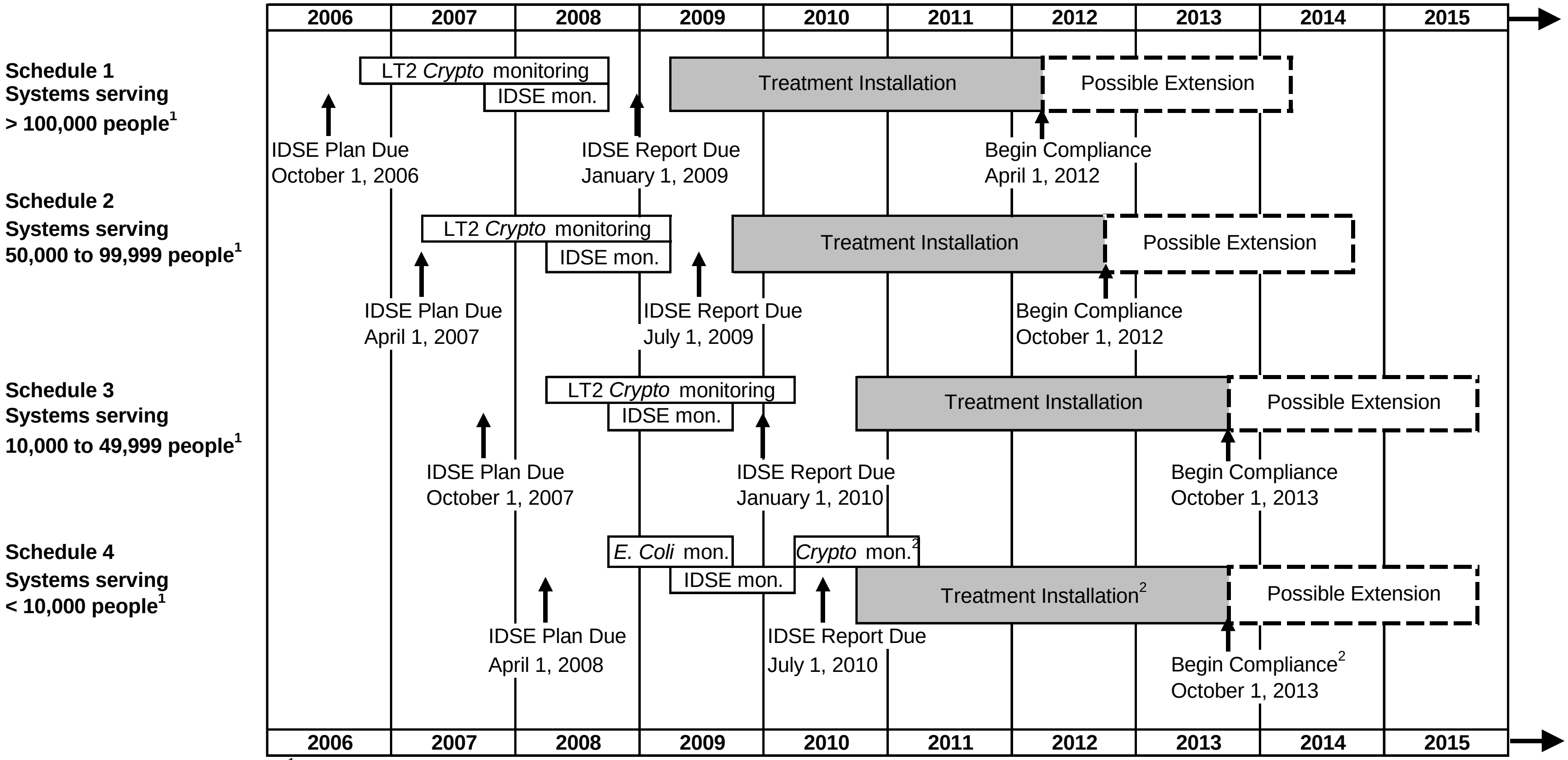
Exhibit B.1 Stage 2 DBPR and LT2ESWTR Compliance Schedule



[1] Includes systems that are part of a combined distribution system in which the largest system serves this population.

[2] Subpart H systems serving fewer than 10,000 that must conduct Crypto monitoring can sample twice a month for 12 months or monthly for 24 months. These systems have an additional 12 months to comply with Stage 2 DBPR MCLs and the LT2ESWTR.

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Appendix C

TTHM and HAA5 Sampling Protocol

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C.1 Introduction

It is important that TTHM and HAA5 samples are properly collected and analyzed to ensure accurate analytical results. For example, THMs are volatile chemicals, meaning they can move from the liquid phase to the gas phase under ambient conditions. Therefore, care must be taken to make sure that no air bubbles are present in the filled sample vial. This appendix summarizes information on proper sample collection, handling, and laboratory analytical techniques.

C.2 Analytical Methods

Exhibit C.1 lists the analytes that are included in TTHM and HAA analyses.

Exhibit C.1 TTHM and HAA Analytes

Analyte Group Code	Analytes in Group (Abbreviation for Analyte)
HAA5	Haloacetic acids: Dibromoacetic acid (DBAA) Dichloroacetic acid (DCAA) Monobromoacetic acid (MBAA) Monochloroacetic acid (MCAA) Trichloroacetic acid (TCAA)
HAA9	HAA5 plus four additional analytes Bromochloroacetic acid (BCAA) Bromodichloroacetic acid (BDCAA) Chlorodibromoacetic acid (CDBAA) Tribromoacetic acid (TBAA)
TTHM	Trihalomethanes: Bromodichloromethane (BDCM) Bromoform (CHBr3) Chloroform (CHCl3) Dibromochloromethane (DBCM)

Exhibit C.2 lists the approved laboratory analytical methods for TTHM and HAA5 along with guidelines for sample collection and storage. These guidelines include type of sample container, preservative and dechlorinating agents, pH, and sample collection.

Exhibit C.2 Sampling Requirements of TTHM and HAA5 Analyses

Analyte Group	Analytical Method[1]	Sample Container Material[2]	Preservative/Dechlorinating Agent (Recommended amount)	Storage Guidelines	Sample Collection Guidelines
TTHM	EPA 502.2	40 mL -120 mL screw cap glass vials with PTFE-faced silicone septum	Options: (1) 3 mg $Na_2S_2O_3$/40 mL sample or (2) 3 mg $Na_2S_2O_3$/40 mL sample and immediate acidification using HCl to pH < 2 or (3) 25 mg ascorbic acid/40 mL sample and immediate acidification using HCl to pH < 2. Option 1 may be used if THMs are the only compounds being determined in the sample. Options 2 & 3 require the sample to be dechlorinated prior to the addition of acid.	Keep at 4°C. 14 days maximum hold time[3].	Fill bottle to just overflowing but do not flush out preservatives. No air bubbles. Do not overfill. Seal sample vials with no head space. If ascorbic acid is used to dechlorinate TTHM samples, then the samples MUST be acidified. Acidification of TTHM samples containing $Na_2S_2O_3$ is required if the samples will also be analyzed for VOCs. In both cases, the pH must be adjusted at the time of sample collection, not later at the laboratory.
	EPA 524.2	40 mL -120 mL screw cap glass vials with Teflon-faced silicone septum			
	EPA 551.1	60 mL screw cap glass vials with PTFE-faced silicone septum	1 g phosphate buffer & NH_4Cl or Na_2SO_3 mixture per 60 mL sample (mixture consists of 1 part Na_2HPO_4, 99 parts KH_2PO_4, and 0.6 parts NH_4Cl or Na_2SO_3. 1g per 60 mL results in a pH of 4.8-5.5 and 0.1 mg NH_4Cl or Na_2SO_3 per mL of sample.)		
HAA5	EPA 552.1	250 mL (approx.) amber glass bottles fitted with Teflon-lined screw caps	0.1 mg NH_4Cl per mL of sample		
	EPA 552.2	50 mL (approx.) amber glass bottles fitted with Teflon-lined screw caps			
	EPA 552.3[4]	50 mL (approx.) amber glass bottles fitted with Teflon-lined screw caps			
	SM 6251 B	40 mL or 60 mL screw cap glass vials with PTFE-faced silicone septum	65 mg NH_4Cl		

1 (40 CFR 141.131 (b))
2 Selection of container should be coordinated with the laboratory.
3 The holding time has been changed to 14 days for all HAA5 samples as a part of the Stage 2 DBPR.
4 EPA Method 552.3 has been added as an approved HAA5 method as part of the Stage 2 DBPR.

C.2.1 Sampling Procedure

It is important to follow sampling procedures provided by your certified laboratory. Sampling procedures may vary slightly among individual laboratories; you should contact your laboratory to learn their procedures. The following is a common procedure for collecting samples for TTHM and HAA5 analyses.

You will need:

1) Sample vials provided by laboratory (most laboratories will provide sample vials with proper preservative and dechlorinating agents)

2) Small bottle of 1:1 hydrochloric acid and eye dropper or pasteur pipette (pH adjustment is necessary for some TTHM methods) (many laboratories will provide ampules with acid for pH adjustment)

3) Water proof labels and permanent (indelible ink) marker

4) Ice/coolant and cooler

Procedure:

1) Label each sample vial. Use waterproof labels and indelible ink. Each label should include:

    - Unique sample ID
    - System name
    - Sample location
    - Sample date and time
    - Analysis required, if not already on label

2) Remove the aerator from the tap, if there is one present.

3) Open the water tap and allow the system to flush until the water temperature has stabilized (usually about 3-5 minutes). The purpose of this step is to ensure the sample does not represent stagnant water that has set for a long time in the water line between the street and the faucet. The sample should be representative of the water flowing through the distribution system at the chosen sampling point.

4) Adjust the flow so that no air bubbles are visually detected in the flowing stream.

5) Slowly fill the sample vial almost to the top without overflowing. Use the bottle cap to add a small amount of additional sample water while simultaneously capping the vial to achieve a headspace-free sample. Be careful not to rinse out any of the preservative/dechlorinating agent during this process. After the bottle is filled, invert three or four times.

6) If collecting TTHM samples that require acidification, let the sample set for about 1 minute, allowing the dechlorinating chemical to take effect. Carefully open the vial and adjust the pH of the TTHM sample to < 2 by adding approximately 4 drops of hydrochloric acid for every 40 mL of sample (amount of acid needed will depend on buffering capacity of sample). Recap the vial, and invert three or four times.

7) Invert the vial and tap it to check for air bubbles. If bubbles are detected, carefully open the vial and add more sample water using the cap to achieve a headspace-free sample.

8) Immediately cool the samples to 4^{o}C by placing them in a cooler with frozen refrigerant packs or ice, or in a refrigerator. Samples should be maintained at this temperature during shipment to the laboratory.

9) Complete the Sample Chain of Custody provided by the laboratory and include it with the sample shipment.

C.2.2 Regarding Loss of Samples

Samples may be "lost" due to a number of reasons:

- Bottle broken during shipment from the water system to the laboratory
- Sample improperly collected (e.g., sample bottle not completely filled)
- Sample improperly shipped (e.g., not kept cold during shipment)
- Sample improperly preserved (e.g., not dechlorinated)
- Bottle is broken or lost at the laboratory
- Quality control doesn't meet method specifications when sample is analyzed

You should conduct resampling for the lost sample as soon as possible after the loss is determined. Only the lost sample needs to be recollected, not the entire sample set that was collected together. Make sure to note the loss of sample and resample date as a deviation in your IDSE report.

C.3 Analytical Method Descriptions

The following are brief summaries of the approved TTHM and HAA5 methods.

C.3.1 EPA Method 502.2

Highly volatile compounds with low water solubility, including TTHMs, are extracted from the water sample by bubbling an inert gas through 5 mL of the sample. The chemical compounds that are extracted from the water sample are then trapped in a tube that contains material to which the chemicals attach, or sorb. Once the extraction process has been completed, the tube containing the extracted chemicals is heated and backflushed with helium, and the mixture of helium and chemicals enters a capillary gas chromatography (GC) column. The column is temperature programmed to separate the chemicals extracted from the water, which are then detected with a photoionization detector (PID) and an electrolytic conductivity detector (ELCD) placed in series. The amount of each chemical is determined using procedural standard calibration. The PID is not required if only TTHMs are being measured.

Chemical compounds are identified by comparing the retention times of unknown GC peaks with retention times for chemical standards analyzed under the same conditions. Confirmation can be made by comparing the relative response from the two detectors. For absolute confirmation of results, a gas chromatography/mass spectrometry (GC/MS) determination can be made using U.S. EPA Method 524.2.

For a complete description of this method see EPA publication: EPA/600/R-95/131 *Methods for the Determination of Organic Compounds in Drinking Water: Supplement III*.

C.3.2 EPA Method 524.2

Volatile organic compounds, including TTHMs, are extracted from the water sample by bubbling an inert gas through the sample. Extracted compounds are trapped in a tube that contains material to which the chemicals attach, or sorb. When the extraction process is complete, the tube is heated and backflushed with helium to de-sorb the trapped chemicals into a capillary gas chromatography (GC) column interfaced with a mass spectrometer (MS). The GC column is temperature programmed to allow for the separation of different chemicals, which are then detected with the MS. Compounds detected by the MS are identified by comparing their measured mass spectra and retention times with reference mass spectra and retention times in a database. Reference mass spectra and retention times for different compounds are obtained by measuring calibration standards under the same conditions that are used for the water samples. The concentration of each compound is measured by comparing the MS response of the compound with the MS response of another compound used as an internal standard. Surrogate chemicals, whose concentrations are known in every sample, are measured using the same internal standard calibration procedure.

For a complete description of this method see EPA publication: EPA/600/R-95/131 *Methods for the Determination of Organic Compounds in Drinking Water: Supplement III*.

C.3.3 EPA Method 551.1

A 50 mL volume of the sample is extracted using either 3 mL of methyl-tert-butyl ether (MTBE) or 5 mL of pentane. A small sub-sample of the extract (2 µL) is then injected into a GC equipped with a fused silica capillary column for separation, and a linearized electron capture detector for analysis. Concentrations of different chemical compounds are determined by comparing their measured amounts to procedural standard calibration curves.

A typical sample can be extracted and analyzed using this method in 50 minutes for chlorination byproducts (e.g., TTHM) and chlorinated solvents, and in two hours for all of the compounds analyzed by this method. Results can be confirmed by using a dissimilar GC column or by the use of GC/MS.

For a complete description of this method see EPA publication: EPA/600/R-95/131 *Methods for the Determination of Organic Compounds in Drinking Water: Supplement III*.

C.3.4 EPA Method 552.1

A 100 mL volume of the sample is adjusted to pH 5.0 and extracted using a pre-conditioned miniature anion exchange column. The chemical compounds to be analyzed are first eluted using small amounts of acidic methanol, and are then esterified directly in this medium after adding a small volume of methyl-tert-butyl ether (MTBE) as a co-solvent. The methyl esters are partitioned into the MTBE phase, and are identified and measured using capillary column gas chromatography with an electron capture detector (GC/ECD).

For a complete description of this method see EPA publication: EPA/600/R-92/129 *Methods for the Determination of Organic Compounds in Drinking Water: Supplement II.*

C.3.5 EPA Method 552.2

The pH of a 40 mL volume of sample is adjusted to less than 0.5, and the sample is extracted using 4 mL of methyl-tert-butyl ether (MTBE). The haloacetic acids that have been partitioned are then converted to their methyl esters by adding acidic methanol and heating them slightly. The acidic extract is then returned to neutral pH using a saturated solution of sodium bicarbonate. The chemical compounds of interest are identified and measured using capillary column gas chromatography with an electron capture detector (GC/ECD). Chemical concentrations are determined using standard calibration procedures.

For a complete description of this method see EPA publication: EPA/600/R-95/131 *Methods for the Determination of Organic Compounds in Drinking Water: Supplement III*.

C.3.6 EPA Method 552.3

The pH of a 40 mL sample is adjusted to 0.5 or less using concentrated sulfuric acid. The sample is then extracted with either methyl tert-butyl ether (MTBE) or tert-amyl methyl ether (TAME) containing an internal standard. The haloacetic acids that have been partitioned are converted to their methyl esters by adding acidic methanol followed by heating for two hours. Sodium sulfate is added to separate the partitioned methylated haloacetic acids from the acidic methanol and the aqueous layer is discarded. The extract is neutralized with a saturated solution of sodium bicarbonate and the solvent layer is removed for analysis. A gas chromatograph equipped with a capillary column and an electron capture detector (GC/ECD) is used for analysis. Chemical concentrations are determined using procedural standard calibration.

For a complete description of this method see *Method 552.3 Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-Liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection Revision 1.0* (EPA 815-B-03-002), available from EPA's website at http://www.epa.gov/safewater/methods/sourcalt.html.

C.3.7 Standard Method 6251 B

The sample is extracted using methyl-tert-butyl ether (MTBE) at an acidic pH. A salting agent is added during the extraction process to increase the extraction's efficiency. Once extracted, compounds are methylated using diazomethane solution to produce methyl ester or other ether derivatives that can be separated in a gas chromatograph. A gas chromatograph equipped with a fused silica capillary column and an electron capture detector (GC/ECD) is used for analysis. Alternative detectors can be used if quality control criteria are met. Calibration standards are extracted, methylated, and analyzed in the same manner as the water samples to compensate for less than 100% recoveries during sample preparation.

For a complete description of this method see *Standard Methods for the Examination of Water and Wastewater: 19th or 20th Edition* published jointly by the APHA, AWWA, and WEF or Standard Methods Online version 6251 B-94 available at http://www.standardmethods.org.

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Appendix D

Consecutive and Wholesale System Issues

D.1 Introduction

If your system is part of a combined distribution system, your compliance schedule for the IDSE is based on the population served by the largest system in your combined distribution system. It is important that all systems in a combined distribution system conduct an IDSE at the same time so that all systems in that combined distribution system know their relative DBP concentrations and can make the necessary treatment and/or operational changes before Stage 2 compliance begins.

The following questions and answers are provided to help you determine if you are in a combined distribution system and what this means with respect to your IDSE schedule.

What is a combined distribution system?

The Stage 2 DBPR rule defines combined distribution system, wholesale system, and consecutive system as follows:

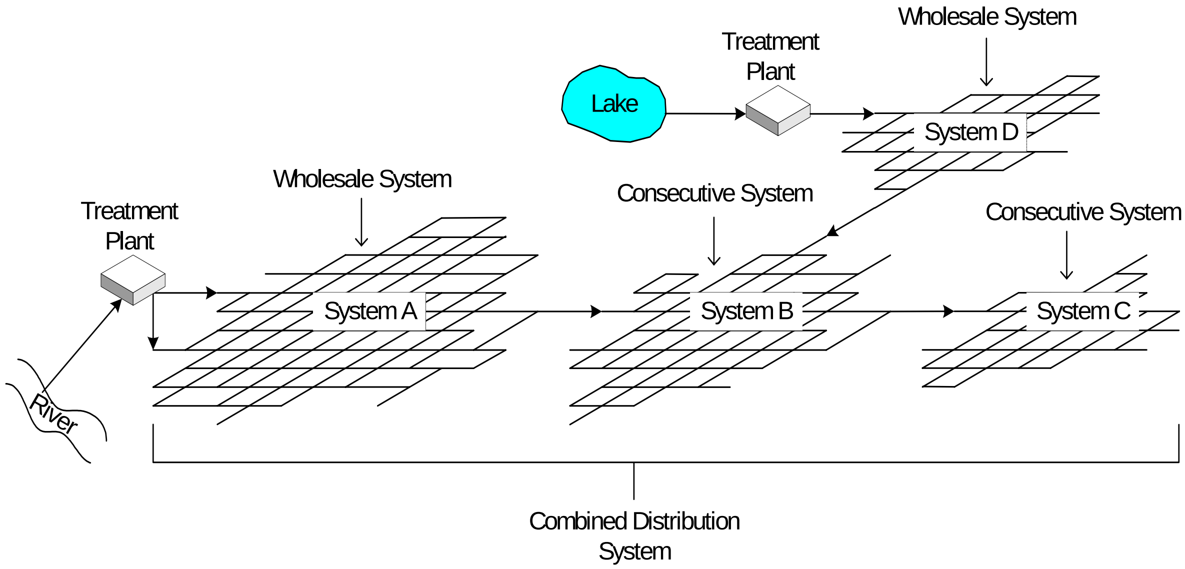
- A *combined distribution system* is the interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive finished water.

- *A wholesale system* is a public water system that treats source water as necessary to produce finished water and then delivers some or all of that finished water to another public water system. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

- *A consecutive system* is a public water system that receives some or all of its finished water from one or more wholesale systems. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

In Example D.1, where system C buys water from system B who buys water from systems A and D, all four systems are considered to be in the same combined distribution system. Even if systems A and D never exchange water, they are still considered to be part of the same combined system.

Example D.1 Example of a Combined Distribution System



If you receive water from a wholesale system only on an emergency basis or receive only a small percentage and small volume of water from a wholesale system, your state may have excluded you from the combined distribution system. If you deliver water to a consecutive system only on an emergency basis or deliver only a small percentage and small volume of water to a consecutive system, your state may also have excluded you from the combined distribution system. You should receive a letter from EPA or your state that tells you the schedule that was determined for your system by your state. See Section 2.2 for more information.

How do I know if I am a subpart H or a ground water system?

If you treat or deliver surface water or ground water under the direct influence of surface water (GWUDI) as any part of your supply, you are considered a subpart H system. If you treat or deliver only ground water, you are considered a ground water system. If you treat or deliver a combination of the two, you are considered a subpart H system. If you do not treat your own water and you do not know whether you receive surface water, GWUDI, or ground water, you should consult with your state to determine what your IDSE and Stage 2 compliance monitoring requirements are.

If I'm in a combined distribution system, which of my IDSE requirements are based on the population of the largest system in my combined distribution system?

If you are part of a combined distribution system, only your compliance schedule is based on the population of the largest system in your combined distribution system. Other requirements are based on your retail population and source water type. The largest system may be a wholesale system or a consecutive system.

If I'm in a combined distribution system, which of my IDSE requirements are based on my individual system's population?

If you are in a combined distribution system, the number of samples that you must collect and the frequency at which you must monitor for both the IDSE and Stage 2 DBPR monitoring are based on your individual system's population.

If I'm in a combined distribution system, when do I submit my 40/30 Certification?

If you are part of combined distribution system and want to submit a 40/30 certification, submit your request based on the schedule of the largest system in your combined distribution system using the information in the table below.

Population Served by the Largest System in the Combined Distribution System	**40/30 Certification Deadline**
Systems serving ≥ 100,000 people	October 1, 2006
Systems serving 50,000-99,999 people	April 1, 2007
Systems serving 10,000-49,999 people	October 1, 2007
Systems serving < 10,000 people	April 1, 2008

How does my standard monitoring or system specific study schedule change if I'm in a combined distribution system?

If you are part of a combined distribution system and plan to conduct standard monitoring or an SSS, your schedule for conducting activities associated with these IDSE options is based on the population of the largest system within your combined distribution system. You can use the table below to help identify the appropriate schedule for your system for submitting your monitoring plan, performing IDSE monitoring, and submitting your report.

Population Served by the Largest System in the Combined Distribution System	You Must Submit Your Standard Monitoring or SSS Plan to the State By [1]	You Should Complete Any Monitoring By	You Must Complete Your IDSE Report By [2]
≥ 100,000 people	October 1, 2006	September 30, 2008	January 1, 2009
50,000-99,999 people	April 1, 2007	March 31, 2009	July 1, 2009
10,000-49,999 people	October 1, 2007	September 30, 2009	January 1, 2010
< 10,000 people	April 1, 2008	March 31, 2010	July 1, 2010

[1] If the state does not approve or modify your plan within 12 months after the date identified in this column, you may consider the plan that you submitted as approved and must implement that plan so that you complete standard monitoring no later than the date identified in the third column.
[2] If the state does not approve or modify your report within three months after the date identified in this column (six months after the date identified in this column if you must comply on the schedule of systems serving 10,000 to 49,999), you may consider the report that you submitted as approved and must implement the recommended Stage 2 compliance monitoring.

What else should I do if I'm in a combined distribution system?

It is very important that you start communicating with the other systems within your combined distribution system to share data and information. You should copy other systems within your combined distribution system on correspondence you submit to the EPA or your state as part of the IDSE process. If you are unsure of what other systems are within your combined distribution system and how to contact these systems, your state drinking water program may be able to provide contact information.

Can my combined distribution system be considered one system for the purposes of the IDSE?

No, each individual system must conduct its own IDSE. The schedule for your IDSE must be based on the population of the largest system in the combined distribution system. The rest of your IDSE requirements are based on your individual system's population. You cannot conduct one IDSE for the entire combined distribution system.

Can my combined distribution system be considered one system for the purposes of Stage 2 compliance monitoring?

If your state chooses to use its authority to treat your combined distribution system as one system for Stage 2 DBPR compliance monitoring, the minimum number of Stage 2 DBPR monitoring sites and monitoring frequency for the combined distribution system will be based on the total population and nature of the interconnection of the combined distribution system. Each consecutive or wholesale system must have at least one Stage 2 compliance monitoring location. Remember this will only happen if the state allows this option. Consequently, you should develop your IDSE report for the total number of required Stage 2 compliance locations for your system unless you hear otherwise from your state.

D.2 Communication Between Wholesale and Consecutive Systems

As discussed in Section D.1, the Stage 2 DBPR requires consecutive and wholesale systems to conduct an IDSE at the same time as the largest system in the combined distribution system. Note that in some cases, this may not be the wholesale provider. This section discusses recommended approaches for communication between consecutive and wholesale systems when completing an IDSE.

Consecutive systems are encouraged to contact their wholesale provider as soon as is reasonably possible after promulgation of the Stage 2 DBPR to determine what plans, if any, the wholesale system has already made regarding the IDSE. Keep in mind that, while it is recommended, it is not the responsibility of the wholesale system to contact the consecutive system regarding the IDSE. Consecutive systems are encouraged to reach out to the wholesale systems to make the initial contact regarding the IDSE. When a consecutive system receives water from another consecutive system, communication should involve all three parties, i.e., both consecutive systems and the wholesale system. At a minimum, you should discuss the following questions during this initial contact:

1. When are our (both the wholesale and consecutive system) IDSE plans due?
2. When are our IDSE reports due?
3. What type of IDSE does the wholesale system intend to complete (Standard Monitoring Program or System Specific Study)? Note: Systems are not required to choose the same IDSE option
4. At what stage in IDSE planning is the wholesale system?
5. During what month(s) does the wholesale system intend to conduct DBP monitoring?
6. Does the wholesale system have water quality data (e.g., temperature, DBP data, source water quality data, operational data, which wholesale sources serve which consecutive systems and when) that might help the consecutive system prepare their IDSE plan?
7. Would the wholesale system be willing to exchange copies of draft IDSE plans with the consecutive system?

Consecutive systems can consider but are not required to select the same peak historical month as the wholesale system. The peak historical month for a consecutive system that has another source(s) may actually be in a different month than the month selected by the wholesale system. If a consecutive system that has no other sources and that has limited data from which to make a decision, they could reasonably assume that its peak historical month is the same as the month selected by the wholesale system.

Consecutive systems that may have limited data can take advantage of water quality data that may be more readily available to wholesale systems, such as water temperature, source water quality, disinfectant residual, TTHM, and HAA5 data. This will provide them some of the data needed to work through the recommended steps presented in Chapter 7 for selecting standard monitoring sites, thus improving the IDSE plan they are able to develop and leading to better selection of Stage 2 compliance monitoring sites.

Consecutive systems should attempt to coordinate their IDSE monitoring with that of the wholesale system. Coordinating IDSE monitoring schedules will allow the two (or more) systems to better utilize data from the IDSE monitoring period to formulate a Stage 2 DBPR compliance strategy, if necessary. Additionally, there may be some benefit in trying to better understand how DBP formation occurs throughout the combined distribution system, especially if DBP levels are relatively high.

Where it is not possible to coordinate IDSE monitoring, consecutive systems are still encouraged to work with their wholesale system to coordinate their proposed Stage 2 DBPR compliance monitoring schedules that must be included in the final IDSE report. Draft and final copies of the IDSE plans for the consecutive system and the wholesale system should be shared between the systems. Where a consecutive system receives water through another consecutive system, all three (or more) systems should share their IDSE plans. This information can be used to verify that water quality and water age throughout the combined distribution system is represented through the monitoring plans. For example, if you have multiple entry points from the same wholesaler, they may have a storage tank prior to one entry point to your system but no storage tank prior to another entry point. In this case, you would want to select the site after the tank that is more likely to have high water age as a monitoring location for your standard monitoring plan.

As IDSE monitoring progresses, consecutive and wholesale systems are encouraged to share monitoring results. When such an approach is utilized, results can be compared for consistency and to help identify potential compliance issues related to the Stage 2 DBPR.

A copy of each system's IDSE report should be shared with the other system(s). It is not necessary for multiple consecutive systems within a combined distribution system to share their reports, unless one of those systems provides water to another consecutive system, but it is recommended that the wholesaler provide a copy of its report to each consecutive system, and each consecutive system provide a copy of its report to the wholesale system. This will help consecutive systems to determine which compliance strategies, if necessary, are feasible for them. It will also help the wholesale system to understand DBP formation in the finished water.

Upon completion of the IDSE, it is recommended that consecutive and wholesale systems work together to discuss their Stage 2 DBPR compliance monitoring schedules for the IDSE report. As with IDSE monitoring, there may be some benefit in coordinating Stage 2 monitoring. Consecutive systems may want to contract with their wholesale system, or contract together with the same laboratory to coordinate Stage 2 compliance monitoring. If consecutive and wholesale systems have the same peak historical month, they may wish to take their samples at approximately the same time during the peak month. Observing DBP formation throughout the combined distribution system using Stage 2 compliance monitoring data can help to identify possible solutions to compliance-related issues.

More information on communication between consecutive and wholesale systems can be found in EPA's *Stage 2 DBPR Consecutive Systems Guidance Manual*.

D.3 Understanding DBP Formation in Combined Distribution Systems

The IDSE will help consecutive and wholesale systems to better understand DBP formation in their systems. Since the Stage 1 DBPR did not explicitly address consecutive systems, the IDSE may provide the first opportunity for some consecutive systems to acquire comprehensive information about DBP levels in their distribution system. As discussed above, consecutive and wholesale systems should consider coordinating their IDSE sampling schedules to facilitate a better understanding of DBP formation across the combined distribution system. Wholesale and consecutive systems should also consider exchanging any existing monitoring data, particularly any DBP data collected by the wholesale system in the consecutive system. This data may be helpful to both systems in understanding DBP formation in the combined distribution system and may help the consecutive system in choosing monitoring locations for the IDSE.

DBP formation typically increases with water age. Wholesale and consecutive systems can make a relative estimate of water age by looking at the extent of their wholesale and consecutive distribution systems, and the distribution of customers. DBP sampling at the entry point as part of the IDSE can help consecutive systems understand whether DBP formation is occurring primarily in the wholesale system or the consecutive system. This can help systems to focus control strategies on the wholesale system, the consecutive system, or a combination of the two. Information on reducing DBP levels in consecutive systems and discussing compliance strategies with wholesale systems can be found in EPA's *Stage 2 DBPR Consecutive Systems Guidance Manual.*

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Appendix E

Example IDSE Existing Monitoring Results System Specific Study Plan and Report for a Surface Water System Serving 40,000 People

This appendix is provided as an example IDSE study plan and report for a Subpart H system serving 40,000 people and opting to complete a System Specific Study (SSS) using existing monitoring results. The system in this example has a surface water intake with a treatment plant and two additional wells that are each disinfected at the well locations. In all, the system has three treatment plants. Because the water blends in the distribution system, the entire system is categorized as a Subpart H system.

Since the system has three treatment plants, it is required to collect four samples per treatment plant each quarter for Stage 1 DBPR compliance. The system therefore satisfies the minimum number of sampling locations required for an Existing Monitoring Results SSS. If the system submits two years of its Stage 1 DBPR compliance data, it also satisfies the requirement for minimum number of TTHM and HAA5 samples. The Stage 1 DBPR sampling locations are representative of the distribution system, so the system is not proposing to do any additional monitoring and is submitting both their IDSE Plan and their IDSE Report by their plan deadline.

Chapter 5 presents detailed guidance on the requirements for performing an existing monitoring results SSS; selection of Stage 2 compliance monitoring locations; and preparing the existing monitoring results IDSE report. The application of the basic guidance on the use of existing monitoring results to select locations meeting the standard monitoring location criteria and the use of the data to select Stage 2 compliance monitoring locations is shown in this example.

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Form 2: Existing Monitoring Results SSS Plan

I. GENERAL INFORMATION

A. PWS Information*

PWSID: US0000000

PWS Name: City of Magnolia

PWS Address: PO Box 1234

City: Magnolia City State: US Zip: 11111

Population Served: 40,000

B. Date Submitted*

Sept. 1, 2007

System Type:	Source Water Type:	Buying / Selling Relationships:
☒ CWS	☒ Subpart H	☐ Consecutive System
☐ NTNCWS	☐ Ground	☐ Wholesale System
		☒ Neither

C. PWS Operations

Residual Disinfectant Type: ☒ Chlorine ☐ Chloramines ☐ Other______________

Number of Disinfected Sources: __1__Surface ____GWUDI __2__Ground ____Purchased

D. Contact Person*

Name: Ms. Mary Flower, P.E.

Title: City Engineer

Phone #: 234-555-1111 Fax #: 234-555-2222

E-mail: MFlower@ci.magnolia.us

II. SSS REQUIREMENTS*

A. Minimum Number of Monitoring Locations __12______

B. Minimum Number of Required Samples

___72_____ TTHM ___72_____ HAA5

C. IDSE Schedule

☐ Schedule 1 ☐ Schedule 2 ☒ Schedule 3 ☐ Schedule 4

Form 2: Existing Monitoring Results SSS Plan

III. PEAK HISTORICAL MONTH

A. Peak Historical Month* July______________

B. If Multiple Sources, Source Used to Determine Peak Historical Month (write "N/A" if only one source in your system)

_______**Surface water source**___________________________________

C. Peak Historical Month Based On (check as many as needed)

☒ High TTHM ☐ High HAA5 ☒ Warmest water temperature

If you used other information to select your peak historical month, explain here (*attach additional sheets if needed*):

____

____

____

IV. PREVIOUSLY COLLECTED MONITORING RESULTS*

A. Where were your TTHM and HAA5 samples analyzed?

☐ In-House

Is your in-house laboratory certified? ☐ Yes ☐ No

☒ Certified Laboratory

Name of certified laboratory: ACME Analytical Services

B. What method(s) was used to analyze your TTHM and HAA5 samples?

TTHM	HAA5
☐ EPA 502.2	☒ EPA 552.1
☐ EPA 524.3	☐ EPA 552.2
☒ EPA 551.1	☐ EPA 552.3
	☐ SM 6251 B

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (Continued)*

C. TTHM Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	TTHM (mg/L)						LRAA
#1 - Stage 1 SW Plant Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.028	0.034	0.035	0.030			0.032
#1 - Stage 1 SW Plant Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.024	0.033	0.037	0.031			0.031
#1 - Stage 1 SW Plant Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.029	0.034	0.036				**0.033**
#2 -Stage 1 SW Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.049	0.056	0.063	0.057			**0.056**
#2 - Stage 1 SW Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.045	0.052	0.060	0.054			0.053
#2 - Stage 1 SW Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.046	0.055	0.063				0.055

[1] *Verify that site IDs match the site IDs on your distribution system schematic.*

Attach additional sheets as needed for previously collected compliance operational and monitoring results.

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (Continued)*

C. TTHM Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	TTHM (mg/L)						LRAA
#3 - Stage 1 SW Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.038	0.047	0.065	0.052			**0.050**
#3 - Stage 1 SW Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.040	0.046	0.068	0.037			0.048
#3 - Stage 1 SW Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.036	0.042	0.070				0.049
#4 -Stage 1 SW Maximum Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.032	0.060	0.074	0.062			0.057
#4 - Stage 1 SW Maximum Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.042	0.069	0.082	0.071			**0.066**
#4 - Stage 1 SW Maximum Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.044	0.059	0.081				0.061

[1] *Verify that site IDs match the site IDs on your distribution system schematic.*

Attach additional sheets as needed for previously collected compliance operational and monitoring results.

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (Continued)*

C. TTHM Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	TTHM (mg/L)						LRAA
#5 - Stage 1 Well 1 Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.038	0.025	0.030	0.032			**0.031**
#5 - Stage 1 Well 1 Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.026	0.031	0.030	0.024			0.028
#5 - Stage 1 Well 1 Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.011	0.027	0.032				0.023
#6 - Stage 1 Well 1 Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.032	0.051	0.058	0.042			**0.046**
#6 - Stage 1 Well 1 Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.024	0.046	0.050	0.049			0.042
#6 - Stage 1 Well 1 Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.030	0.041	0.051				0.041

[1] Verify that site IDs match the site IDs on your distribution system schematic.

Attach additional sheets as needed for previously collected compliance operational and monitoring results.

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (Continued)*

C. TTHM Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	TTHM (mg/L)						LRAA
#7 -Stage 1 Well 1 Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.031	0.037	0.045	0.033			**0.037**
#7 - Stage 1 Well 1 Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.019	0.028	0.038	0.051			0.034
#7 Stage 1 Well 1 Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.022	0.035	0.046				0.034
#8 - Stage 1 Well 1 Maximum Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.038	0.051	0.075	0.073			0.059
#8 - Stage 1 Well 1 Maximum Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.049	0.064	0.075	0.072			**0.065**
#8 - Stage 1 Well 1 Maximum Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.036	0.060	0.080				0.059

[1] *Verify that site IDs match the site IDs on your distribution system schematic.*

Attach additional sheets as needed for previously collected compliance operational and monitoring results.

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (Continued)*

C. TTHM Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	TTHM (mg/L)						LRAA
#9 - Stage 1 Well 2 Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/14/05	4/14/05	7/14/05	10/13/05			
			Sample Result	0.022	0.029	0.026	0.033			**0.028**
#9 - Stage 1 Well 2 Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/12/06	4/13/06	7/13/06	10/12/06			
			Sample Result	0.024	0.022	0.031	0.026			0.026
#9 - Stage 1 Well 2 Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/11/07	4/12/07	7/12/07				
			Sample Result	0.010	0.021	0.023				0.018
#10 - Stage 1 Well 2 Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/14/05	4/14/05	7/14/05	10/13/05			
			Sample Result	0.024	0.035	0.045	0.042			0.037
#10 - Stage 1 Well 2 Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/12/06	4/13/06	7/13/06	10/12/06			
			Sample Result	0.016	0.043	0.060	0.051			0.043
#10 - Stage 1 Well 2 Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/11/07	4/12/07	7/12/07				
			Sample Result	0.011	0.052	0.083				**0.049**

[1] Verify that site IDs match the site IDs on your distribution system schematic.

Attach additional sheets as needed for previously collected compliance operational and monitoring results.

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (Continued)*

C. TTHM Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	TTHM (mg/L)						LRAA
#11 - Stage 1 Well 2 Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/14/05	4/14/05	7/14/05	10/13/05			
			Sample Result	0.027	0.032	0.068	0.059			**0.047**
#11 - Stage 1 Well 2 Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/12/06	4/13/06	7/13/06	10/12/06			
			Sample Result	0.021	0.047	0.060	0.045			0.043
#11 - Stage 1 Well 2 Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/11/07	4/12/07	7/12/07				
			Sample Result	0.018	0.025	0.065				0.036
#12 - Stage 1 Well 2 Maximum Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/14/05	4/14/05	7/14/05	10/13/05			
			Sample Result	0.068	0.073	0.085	0.074			0.075
#12 - Stage 1 Well 2 Maximum Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/12/06	4/13/06	7/13/06	10/12/06			
			Sample Result	0.069	0.077	0.089	0.078			**0.078**
#12 - Stage 1 Well 2 Maximum Residence Time	Jan 07-July 07	Yes	Sample Date	1/11/07	4/12/07	7/12/07				
			Sample Result	0.067	0.075	0.086				0.076

[1] *Verify that site IDs match the site IDs on your distribution system schematic.*

Attach additional sheets as needed for previously collected compliance operational and monitoring results.

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (Continued)*

D. HAA5 Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	HAA5 (mg/L)						LRAA
#1 - Stage 1 SW Plant Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.028	0.034	0.035	0.030			0.032
#1 - Stage 1 SW Plant Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.024	0.033	0.037	0.031			0.031
#1 - Stage 1 SW Plant Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.029	0.034	0.036				**0.033**
#2 -Stage 1 SW Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.049	0.059	0.063	0.057			**0.057**
#2 - Stage 1 SW Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.045	0.052	0.060	0.054			0.053
#2 - Stage 1 SW Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.046	0.055	0.063				0.055

[1] *Verify that site IDs match the site IDs on your distribution system schematic.*

Attach additional sheets as needed for previously collected compliance operational and monitoring results.

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (Continued)*

D. HAA5 Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	HAA5 (mg/L)						LRAA
#3 -Stage 1 SW Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.022	0.035	0.052	0.031			0.035
#3 - Stage 1 SW Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.024	0.041	0.059	0.037			0.040
#3 -Stage 1 SW Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.017	0.045	0.065				**0.042**
#4 -Stage 1 SW Maximum Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.039	0.049	0.058	0.041			**0.047**
#4 - Stage 1 SW Maximum Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.023	0.044	0.052	0.039			0.040
#4 - Stage 1 SW Maximum Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.027	0.051	0.060				0.046

[1] *Verify that site IDs match the site IDs on your distribution system schematic.*

Attach additional sheets as needed for previously collected compliance operational and monitoring results.

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (Continued)*

D. HAA5 Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	HAA5 (mg/L)						LRAA
#5 - Stage 1 Well 1 Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.029	0.036	0.043	0.033			0.035
#5 - Stage 1 Well 1 Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.026	0.034	0.046	0.037			0.036
#5 - Stage 1 Well 1 Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.025	0.035	0.049				**0.036**
#6 - Stage 1 Well 1 Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.040	0.045	0.051	0.044			0.045
#6 - Stage 1 Well 1 Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.037	0.043	0.050	0.044			0.044
#6 - Stage 1 Well 1 Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.042	0.048	0.053				**0.048**

[1] *Verify that site IDs match the site IDs on your distribution system schematic.*

Attach additional sheets as needed for previously collected compliance operational and monitoring results.

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (Continued)*

D. HAA5 Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	HAA5 (mg/L)						LRAA
#7 -Stage 1 Well 1 Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.049	0.055	0.064	0.056			0.056
#7 - Stage 1 Well 1 Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.045	0.052	0.061	0.054			0.053
#7 Stage 1 Well 1 Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.048	0.057	0.065				**0.057**
#8 - Stage 1 Well 1 Maximum Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/13/05	4/13/05	7/13/05	10/12/05			
			Sample Result	0.030	0.057	0.066	0.053			**0.052**
#8 - Stage 1 Well 1 Maximum Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/11/06	4/12/06	7/12/06	10/11/06			
			Sample Result	0.026	0.042	0.053	0.054			0.044
#8 - Stage 1 Well 1 Maximum Residence Time	Jan 07-July 07	Yes	Sample Date	1/10/07	4/11/07	7/11/07				
			Sample Result	0.028	0.045	0.064				0.046

[1] *Verify that site IDs match the site IDs on your distribution system schematic.*

Attach additional sheets as needed for previously collected compliance operational and monitoring results.

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (Continued)*

D. HAA5 Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	HAA5 (mg/L)						LRAA
#9 - Stage 1 Well 2 Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/14/05	4/14/05	7/14/05	10/13/05			
			Sample Result	0.032	0.038	0.046	0.035			0.038
#9 - Stage 1 Well 2 Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/12/06	4/13/06	7/13/06	10/12/06			
			Sample Result	0.030	0.041	0.048	0.039			**0.040**
#9 - Stage 1 Well 2 Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/11/07	4/12/07	7/12/07				
			Sample Result	0.031	0.036	0.045				0.037
#10 - Stage 1 Well 2 Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/14/05	4/14/05	7/14/05	10/13/05			
			Sample Result	0.031	0.037	0.056	0.044			0.042
#10 - Stage 1 Well 2 Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/12/06	4/13/06	7/13/06	10/12/06			
			Sample Result	0.037	0.044	0.053	0.042			0.044
#10 - Stage 1 Well 2 Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/11/07	4/12/07	7/12/07				
			Sample Result	0.038	0.043	0.051				**0.044**

[1] *Verify that site IDs match the site IDs on your distribution system schematic.*

Attach additional sheets as needed for previously collected compliance and operational monitoring results.

Form 2: Existing Monitoring Results SSS Plan

IV. PREVIOUSLY COLLECTED MONITORING RESULTS (Continued)*

D. HAA5 Results

Site ID[1]	12-month period	Data Qualifies (yes/no)	Data Type	HAA5 (mg/L)						LRAA
#11 - Stage 1 Well 2 Average Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/14/05	4/14/05	7/14/05	10/13/05			
			Sample Result	0.038	0.043	0.050	0.044			0.044
#11 - Stage 1 Well 2 Average Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/12/06	4/13/06	7/13/06	10/12/06			
			Sample Result	0.042	0.046	0.053	0.045			**0.047**
#11 - Stage 1 Well 2 Average Residence Time	Jan 07-July 07	Yes	Sample Date	1/11/07	4/12/07	7/12/07				
			Sample Result	0.037	0.042	0.051				0.043
#12 - Stage 1 Well 2 Maximum Residence Time	Jan 05-Jan 06	Yes	Sample Date	1/14/05	4/14/05	7/14/05	10/13/05			
			Sample Result	0.040	0.045	0.048	0.043			0.044
#12 - Stage 1 Well 2 Maximum Residence Time	Jan 06-Jan 07	Yes	Sample Date	1/12/06	4/13/06	7/13/06	10/12/06			
			Sample Result	0.043	0.047	0.052	0.046			0.047
#12 - Stage 1 Well 2 Maximum Residence Time	Jan 07-July 07	Yes	Sample Date	1/11/07	4/12/07	7/12/07				
			Sample Result	0.040	0.048	0.056				**0.048**

[1] *Verify that site IDs match the site IDs on your distribution system schematic.*

Attach additional sheets as needed for previously collected compliance and operational monitoring results.

Form 2: Existing Monitoring Results SSS Plan

V. CERTIFICATION OF DATA*

I hereby certify that:

- The reported monitoring results include all compliance and non-compliance results generated during the time period beginning with the first reported result and ending with the most recent Stage 1 DBPR results.
- The samples are representative of the entire distribution system.
- Treatment and the distribution system have not changed significantly since the samples were collected.

Signature: Mary Flower, P.E.

Date: May 30, 2007

VI. PROPOSED SSS MONITORING SCHEDULE*

Skip if you are submitting your IDSE Report at the same time as your plan

SSS Site ID (from map)[1]	Projected Sampling Date (date or week)[2]					
	period 1	period 2	period 3	period 4	period 5	period 6

[1] Verify that site IDs match IDs on your distribution system schematic (See Section VII of this form). Attach additional copies of this sheet if necessary.

[2] period = monitoring period. Can list exact date or week (e.g., week of 7/9/07)

Form 2: Existing Monitoring Results SSS Plan

VII. DISTRIBUTION SYSTEM SCHEMATIC*

ATTACH a schematic of your distribution system.

Distribution system schematics are not confidential and should not contain information that poses a ***security risk*** to your system. EPA recommends that you use one of two options:

Option 1: Distribution system schematic with no landmarks or addresses indicated. Show locations of sources, entry points, storage facilities, operational monitoring locations, and Stage 1 compliance monitoring locations (required). Also include pressure zone boundaries and locations of pump stations. Provide map scale.

Option 2: City map without locations of pipes indicated. Show locations of sources, entry points, storage facilities, operational monitoring locations, and Stage 1 compliance monitoring locations (required). Also include boundaries of the distribution system, pressure zone boundaries and locations of pump stations. Provide map scale.

VIII. ATTACHMENTS

☐ Additional sheets for explaining how you selected the peak historical month (Section III).

☐ Additional sheets for previously collected monitoring results (Section IV).

☐ Additional sheets for proposed monitoring dates (Section VI).

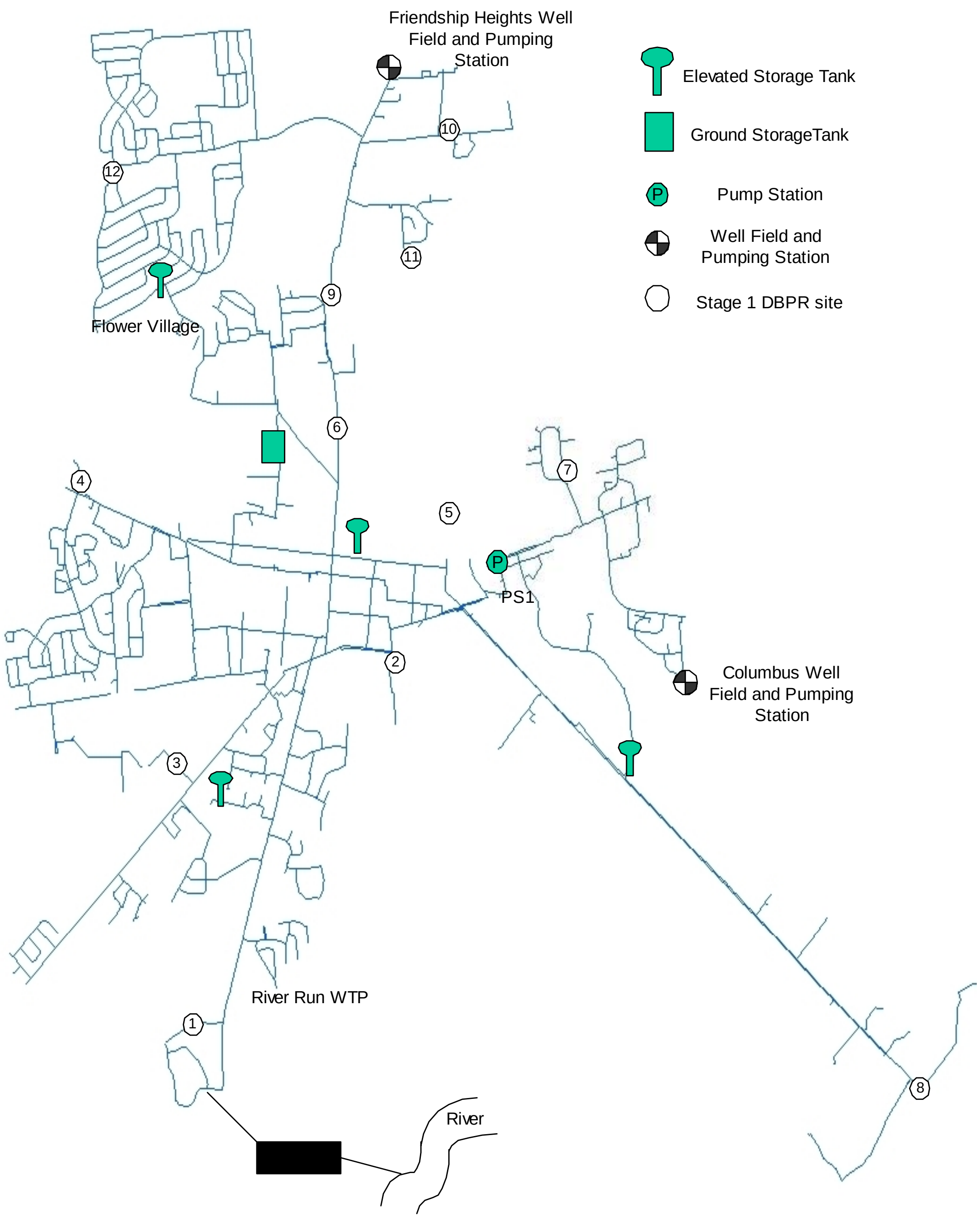
☒ Distribution system schematic* (Section VII).

Total Number of Pages in Your Plan: __17__

Note: Fields with an asterisk (*) are required by the Stage 2 DBPR.

Magnolia City Distribution System Schematic

Attachment #9



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Form 3: IDSE Report for an Existing Monitoring Results SSS

I. GENERAL INFORMATION

(*Skip this section if you are submitting the plan and report at the same time*)

A. PWS Information*

PWSID: ______________________

PWS Name: ______________________

PWS Address: ____

City: ______________________ State: _____ Zip: __________

Population Served: ______________________

B. Date Submitted*

____

System Type:	Source Water Type:	Buying / Selling Relationships:
☐ CWS	☐ Subpart H	☐ Consecutive System
☐ NTNCWS	☐ Ground	☐ Wholesale System
		☐ Neither

C. PWS Operations

Residual Disinfectant Type: ☐ Chlorine ☐ Chloramines ☐ Other_____________

Number of Disinfected Sources: _____Surface____GWUDI_____Ground____Purchased

D. Contact Person*

Name: ____

Title: ____

Phone #: ______________________ Fax #: ______________________

E-mail: ____

II. STAGE 2 DBPR REQUIREMENTS*

A. Number of required Stage 2 DBPR Compliance Monitoring Sites __4__ TOTAL

__2__ Highest TTHM __1__ Stage 1 DBPR __1__ Highest HAA5

Form 3: IDSE Report for an Existing Monitoring Results SSS

II. STAGE 2 DBPR REQUIREMENTS (continued)*

B. IDSE Schedule

☐ Schedule 1

☐ Schedule 2

☒ Schedule 3

☐ Schedule 4

C. Required Stage 2 DBPR Compliance Monitoring Frequency

☐ During peak historical month (1 monitoring period)

☒ Every 90 days (4 monitoring periods)

III. ADDITIONAL SSS AND STAGE 1 COMPLIANCE MONITORING RESULTS*
(Skip this section if you are submitting the plan and report at the same time)

A. Where were your TTHM and HAA5 samples analyzed?

☐ In-House

Is your in-house laboratory certified? ☐ Yes ☐ No

☐ Certified Laboratory

Name of certified laboratory:

B. What method(s) was used to analyze your TTHM and HAA5 samples?

TTHM	HAA5
☐ EPA 502.2	☐ EPA 552.1
☐ EPA 524.3	☐ EPA 552.2
☐ EPA 551.1	☐ EPA 552.3
	☐ SM 6251 B

Form 3: IDSE Report for an Existing Monitoring Results SSS

IV. JUSTIFICATION OF STAGE 2 DBPR COMPLIANCE MONITORING SITES*

Stage 2 Compliance Monitoring Site ID	Site Type	Justification
#12 - Stage 1 Well 2 Max Residence Time	☒ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	1st highest TTHM LRAA. Sampled quarterly at all sites, so compared LRAAs for all sites instead of comparing individual sample results from peak historical month. This is true for the selection of all Stage 2 compliance monitoring sites.
#2 - Stage 1 SW Plant Ave Residence Time Site	☐ Highest TTHM ☒ Highest HAA5 ☐ Stage 1 DBPR	1st highest HAA5; site #7 had the same LRAA result. Site #7 is selected for the Stage 1 site.
#7 - Stage 1 Well 1 Av Residence Time	☐ Highest TTHM ☐ Highest HAA5 ☒ Stage 1 DBPR	Stage 1 site with highest HAA5 LRAA
# 4 - Stage 1 SW plant max residence time	☒ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	2nd highest TTHM LRAA
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	

Attach additional copies of this sheet if you need more room.

Form 3: IDSE Report for an Existing Monitoring Results SSS

V. PEAK HISTORICAL MONTH

A. Peak Historical Month* ______July_________

B. Is Your Peak Historical Month the Same as In Your SSS Plan?

☒ Yes ☐ No

If no, explain how you selected your new peak historical month *(attach additional sheets if needed*):

____

____

____

____

____

____

VI. PROPOSED STAGE 2 DBPR COMPLIANCE MONITORING SCHEDULE*

Stage 2 Compliance Monitoring Site ID	Projected Sampling Date (date or week) [1]			
	period 1	period 2	period 3	period 4
#12	7/15/2013	10/15/2013	1/15/2014	4/15/2014
#2	7/15/2013	10/15/2013	1/15/2014	4/15/2014
#7	7/15/2013	10/15/2013	1/15/2014	4/15/2014
#4	7/15/2013	10/15/2013	1/15/2014	4/15/2014

[1] *period = monitoring period. Complete for the number of monitoring periods from Section II.C.*

Attach additional copies of this sheet if you need more room.

Form 3: IDSE Report for an Existing Monitoring Results SSS

VII. DISTRIBUTION SYSTEM SCHEMATIC*
(Skip this section if you are submitting the plan and report at the same time)

ATTACH a schematic of your distribution system if it has changed since you submitted your Existing Monitoring Results SSS Plan (Form 2).

VIII. ATTACHMENTS

☐ Additional sheets for Additional SSS Monitoring Results (Section III).

☐ Additional sheets for Stage 2 DBPR Monitoring Sites (Section IV). **REQUIRED if you are a subpart H system serving more than 249,999 people**.

☐ Additional sheets for explaining how you selected the peak historical month (Section V).

☐ Additional sheets for proposed compliance monitoring dates (Section VI). **REQUIRED if you are a subpart H system serving more than 249,999 people.**

☐ Explanation of deviations from approved study plan.

☐ Distribution system schematic* (Section VII). **REQUIRED if it has changed from your approved SSS plan**.

☐ Compliance calculation procedures (for Stage 2 Compliance Monitoring Plan).

Total Number of Pages in Your Report: _5___

Note: Fields with an asterisk (*) are required by the Stage 2 DBPR.

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Appendix F

Example IDSE System Specific Study Using a Hydraulic Model for a Surface Water System Serving 57,000 People

This appendix is provided as an example IDSE plan and report for a surface water system serving 57,000 people and opting to complete a System Specific Study (SSS) using a water distribution system model. For this example, the state did not require any modifications to the study plan and the system did not deviate from the approved study plan.

Chapter 6 presents detailed guidance on the requirements for performing a modeling SSS, selecting Stage 2 DBPR compliance monitoring locations using modeling SSS data, and preparing a modeling SSS report. The application of the basic guidance on preliminary location selection and Stage 2 DBPR compliance monitoring location selection is shown in this example, along with several instances of the use of best professional judgement being applied.

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Form 4: Modeling Study Plan

I. GENERAL INFORMATION

A. PWS Information*

B. Date Submitted* 3/8/07

PWSID: US1111111

PWS Name: Big City Water System

PWS Address: 1234 Main Street

City: Big City State: US Zip: 99999

Population Served: 57,000

System Type:	Source Water Type:	Buying / Selling Relationships:
☒ CWS	☒ Subpart H	☐ Consecutive System
☐ NTNCWS	☐ Ground	☐ Wholesale System
		☒ Neither

C. PWS Operations

Residual Disinfectant Type: ☒ Chlorine ☐ Chloramines ☐ Other:______________

Number of Disinfected Sources: 1 Surface ___GWUDI ____ Ground ___ Purchased

D. Contact Person*

Name: Mr. John Smith, P.E.

Title: Water System Manager

Phone #: 123-555-0000 Fax #: 123-555-0001

E-mail: jsmith@ci.bigcity.us

II. IDSE REQUIREMENTS*

A. SSS Monitoring		B. Schedule	C. SSS Monitoring Frequency
Number of Samples per Monitoring Period:	16	☐ Schedule 1	☒ During peak month of TTHM formation (1 monitoring period)
Number of Monitoring Periods:	1	☒ Schedule 2	☐ Additional (describe) _______________
		☐ Schedule 3	__________________________________
Total:	16	☐ Schedule 4	

Form 4: Modeling Study Plan

III. MODEL DESCRIPTION

A. Answer Yes or No to the following questions*
(provide documentation in attached sheets)

1. Is your model an Extended Period Simulation model? Y / N

2. Does your model meet the minimum requirements described below? Attach tables or spreadsheets to demonstrate that your model meets these requirements.

Include 75% of pipe volume	Y / N
Include 50% of pipe length	Y / N
Include all pressure zones	Y / N
Include all pipes 12" and larger	Y / N
Include all 8" and larger pipes that connect pressure zones, influence zones from different sources, storage facilities, major demand areas, pumps, and control valves, or are known or expected to be significant conveyors of water	Y / N
Include all 6" and larger pipes that connect remote areas of a distribution system to the main portion of the system	Y / N
Include all storage facilities with standard operations represented in the model	Y / N
Include all active pump stations with realistic controls	Y / N
Include all active control valves	Y / N

3. Is your model (or will it be) calibrated to simulate actual water levels at all storage facilities and represent the current distribution system configuration during the period of high TTHM formation? Y / N

4. If calibration is complete, does the model simulate 24 hour variation in demand and show a consistently repeating 24 hour pattern of residence time? Y / N

B. Provide a history of your model development and calibration*, including dates (*attach additional sheets if needed*)

See attached sheet.

Form 4: Modeling Study Plan

III. MODEL DESCRIPTION (Continued)

C. How was demand data assigned to the model? (*attach additional sheets if needed*)

1.	What method was used to assign demands throughout the system?	Customer accounts were geocoded and assigned to each node using Thiessen polygons.
2.	How did you estimate diurnal demand variation? How did you determine total system demand?	Diurnal demand patterns were calculated using a mass balance into/out of each pressure zone using the calibration data. Total system demand was calculated based on water production records from the WTP.
3.	How many demand categories did you use?	6 different demand categories were used: residential (based on calculation described above), industrial, school, golf course, swimming pool, and one for a specific industry.
4.	How did you address large water users?	Large water users were asked about their demand patterns. One industry had a usage pattern that was much different than the others so it was assigned an individual pattern.

D. Describe all calibration activities* If your model is not currently calibrated, describe how calibration will be completed within 12 months of plan submission using the questions 1-8 as guidance *(attach additional sheets if needed)*

1.	When was the model last calibrated?	The model was calibrated in 2003 to conditions in July 2002.
2.	What types of data were used in the calibration?	SCADA readings for tank levels, pump flows, and pump discharge pressures were collected on 5 minute intervals. 6 pressure recorders with dataloggers were installed in system for 1 week.
3.	When was the calibration data collected?	July 12 to July 19, 2002
4.	What field tests have been performed to collect calibration data?	No field tests were performed.

Form 4: Modeling Study Plan

III. MODEL DESCRIPTION (Continued)

D. (Continued)

5.	How did you determine friction factors (C-factors)?	C-factors were determined through trial and error simulations to fit the calibration data as closely as possible. Pipe material and pipe diameter were also considered when determining C-factors.
6.	Was the calibration completed for the peak month for TTHM formation? If not, was the model performance verified for the peak month for TTHM formation?	The peak month is August. The model calibration was verified using SCADA data for tank levels in August 2006.
7.	How well do actual tank levels correlate with predicted tank levels during the peak month for TTHM formation? **See Attachments (Section VIII) for additional submission requirements.**	The August 2006 actual tank levels are predicted well (within 2 feet) by the model. See attached graphs.
8.	If you are using a water quality model, what parameters are modeled? How was the model calibrated?	n/a

IV. PEAK MONTH FOR TTHM FORMATION

A. Peak Month For TTHM Formation* August

B. Justification of Peak Month for TTHM Formation

Describe how your system determined which month is the peak month for TTHM formation (*attach additional sheets if needed*):

High temperature and high source water TOC, based on past 5 years of data

Form 4: Modeling Study Plan

V. MODELING INFORMATION *

How was the SSS modeling performed? *(attach additional sheets as needed)*

1.	Was modeling done for the operating conditions during the peak month for TTHM formation?	Yes, modeling was done for August 2006 conditions.
2.	How were operational controls represented in the model?	Logical controls for all pump stations were set using tank level set points for summer operation.
3.	How was water age simulated during the peak month for TTHM formation (time steps, length of simulation, etc.)? If not yet done, indicate how this will be addressed in the IDSE report.	The water age simulation was run for 960 hours to ensure full turnover of all tanks. Tank #2 had the high average water age.
4.	What are the average water age results for your distribution system? **See Attachments (Section VIII) for additional submission requirements.**	The average water age (for the final 24 hours of the 960 hour simulation) is given in the attached table. Nodes with zero demand have a water age approximately equal to 960 hours and were not considered in the analysis for site selection. Table is attached.

VI. PLANNED STAGE 1 DBPR COMPLIANCE MONITORING SCHEDULE*

Stage 1 DBPR Monitoring Site ID (from map) [1]	Projected Sampling Date (date or week) [2]			
	Period 1	Period 2	Period 3	Period 4
Stage 1 #1	3/12/2008	6/7/2008	8/22/2008	10/1/2008
Stage 1 #2	3/12/2008	6/7/2008	8/22/2008	10/1/2008
Stage 1 #3	3/12/2008	6/7/2008	8/22/2008	10/1/2008
Stage 1 #4	3/12/2008	6/7/2008	8/22/2008	10/1/2008

[1] Verify that site IDs match IDs on your distribution system schematic (See Section VII of this form). Attach additional copies if you are required to monitor at more than 8 Stage 1 DBPR sites.

[2] period = monitoring period. Complete for the number of periods in which you must conduct Stage 1 DBPR monitoring during IDSE monitoring. Can list exact date or week (e.g., week of 7/9/07)

Form 4: Modeling Study Plan

VII. DISTRIBUTION SYSTEM SCHEMATIC*

ATTACH a schematic of your distribution system.

Distribution system schematics are not confidential and should not contain information that poses a ***security risk*** to your system. EPA recommends that you submit the following:

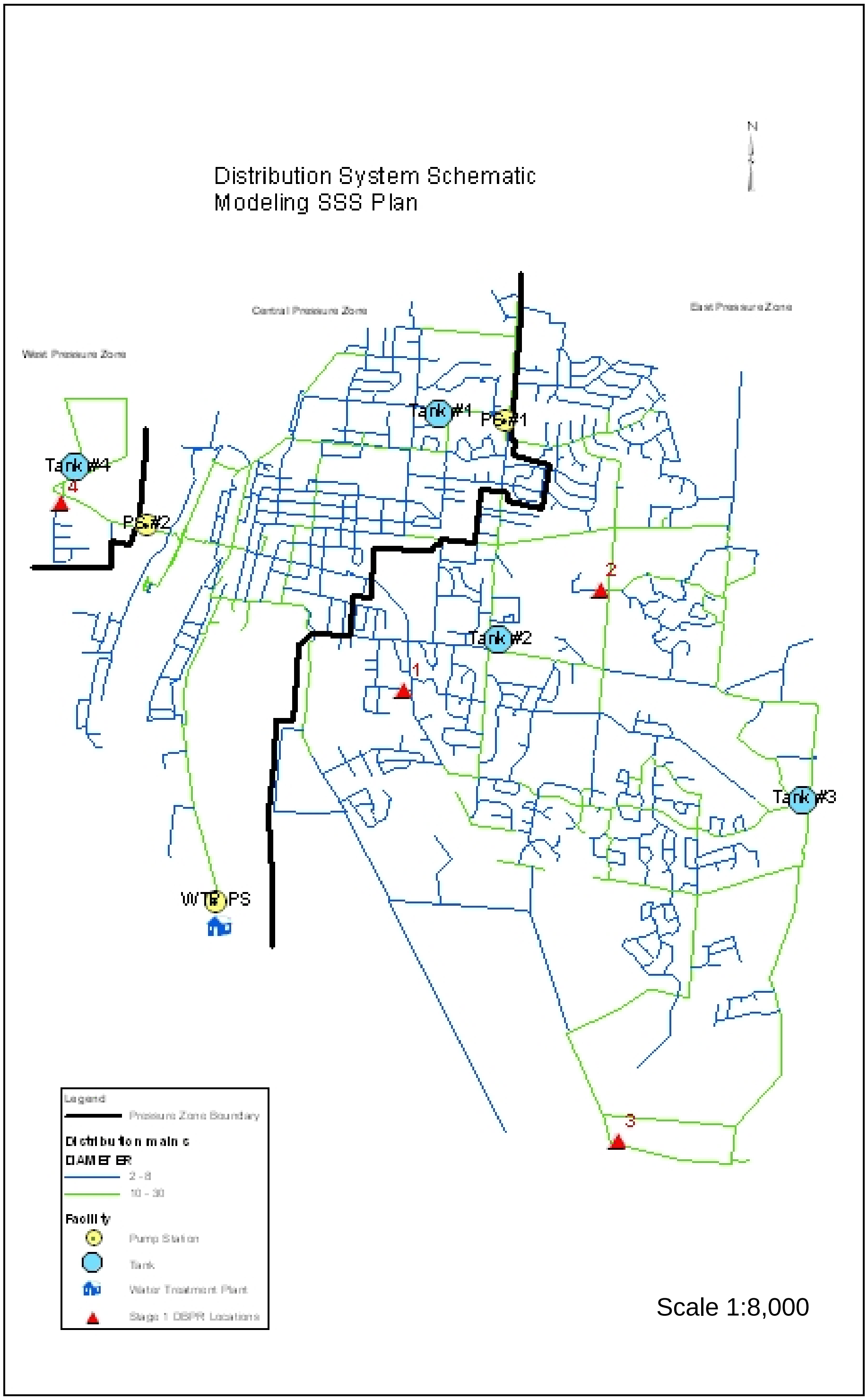
> **Distribution system schematic with no landmarks or addresses indicated.** Show locations of sources, entry points, storage facilities, locations of completed monitoring, and Stage 1 compliance monitoring locations (required). Also include pressure zone boundaries and locations of pump stations. Provide map scale.

VIII. ATTACHMENTS

- ☒ Distribution System Schematic* (Section VII).
- ☒ Tabular or spreadsheet documentation that your model meets minimum requirements* (Section III.A).
- ☒ Additional sheets for explaining your model (Section III.B).
- ☒ Graph of predicted tank levels vs. measured tank levels for the storage facility with the high residence time in each pressure zone* (Section III.D). **Required if calibration is complete**.
- ☒ Time series graph of water age at the longest residence time storage facility in the distribution system showing the predictions for the entire EPS simulation period* (Section V). **Required if calibration is complete**
- ☐ Additional sheets for explaining how you selected the peak historic month for TTHM formation (Section V).
- ☒ Model output showing preliminary 24 hour water age predictions for all nodes throughout the distribution system* (Required for all submissions. If your model is calibrated, this should be your final water age predictions)(Section V).
- ☐ Additional sheets describing the planned Stage 1 DBPR Compliance Monitoring Schedule (Section VI).

Total Number of Pages in Your Plan: 19

Note: All items marked with an asterisk (*) are required by the rule.


Distribution System Schematic
Modeling SSS Plan
N
Central Pressure Zone
East Pressure Zone
West Pressure Zone
Tank #1
PS#1
Tank #4
4
PS#2
2
Tank #2
1
Tank #3
WTP PS
3
Legend
Pressure Zone Boundary
Distribution mains
DIAMETER
2 - 8
10 - 30
Facility
Pump Station
Tank
Water Treatment Plant
Stage 1 DBPR Locations
Scale 1:8,000

MINIMUM MODEL REQUIREMENTS

No GIS system for the water mains exists. Using information from the paper water atlas sheets for the City and the model input data, the following characteristics were estimated. There are no active control valves in the distribution system.

	Length (ft)				Volume (cf)			
Pipe Diameter (in)	Total	Not In Model	In Model	% in Model	Total	Not In Model	In Model	% in Model
4	15,142	10,400	4,472	31.3	1,321	908	414	31.3
6	234,996	4,000	230,996	98.3	46,141	785	45,356	98.3
8	156,720	0	156,720	100.0	54,706	0	54,706	100.0
10	15,505	0	15,505	100.0	8,457	0	8,457	100.0
12	136,404	0	136,404	100.0	107,131	0	107,131	100.0
16	26,815	0	26,815	100.0	37,441	0	37,441	100.0
20	12,832	0	12,832	100.0	27,995	0	27,995	100.0
24	1,761	0	1,761	100.0	5,532	0	5,532	100.0
Total	600,175	14,400	585,775	97.6	288,725	1,693	287,032	99.4

HISTORY OF MODEL DEVELOPMENT AND CALIBRATION

Model was developed in 2003 and calibrated to conditions in July 2002 (maximum demand day). No new major facilities have been constructed in the system since 2003. The model was used to determine new pipe sizes for future construction, to adjust operation of the pumps, to examine water age, and to identify fire flow improvements. New mains that were constructed since 2003 have been added to the model.

ADDITIONAL MODEL INFORMATION

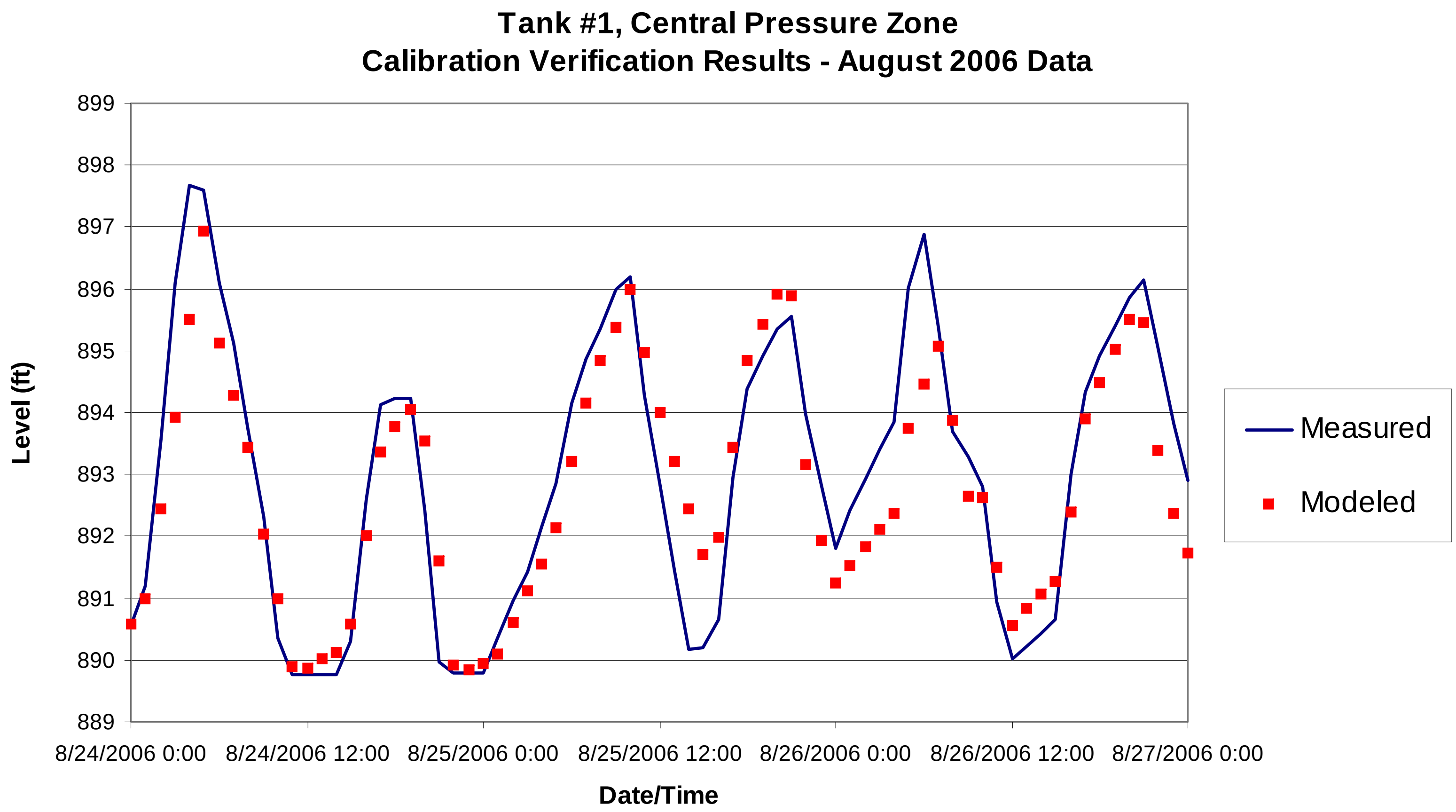
Pump Station Controls

Pump Station	Controlling Tank	Pump Number	Pump ON Level (ft)	Pump OFF Level (ft)
WTP High Service	Tank #1	1 (Lead)	27.0	28.5
		2 (Lag 1)	26.0	28.5
		3 (Lag 2)	24.0	28.0
		4 (Lag 3)	20.0	26.5
PS #1	Tank #3	1 (Lead)	25.0	29.0
		2 (Lag 1)	24.0	28.0
		3 (Lag 2)	23.5	27.0
PS #2	Tank #4	1 (Lag 1)	28.0	33.0
		2 (Lead)	30.0	35.0
		3 (Lag 2/Fire)	20.0	30.0

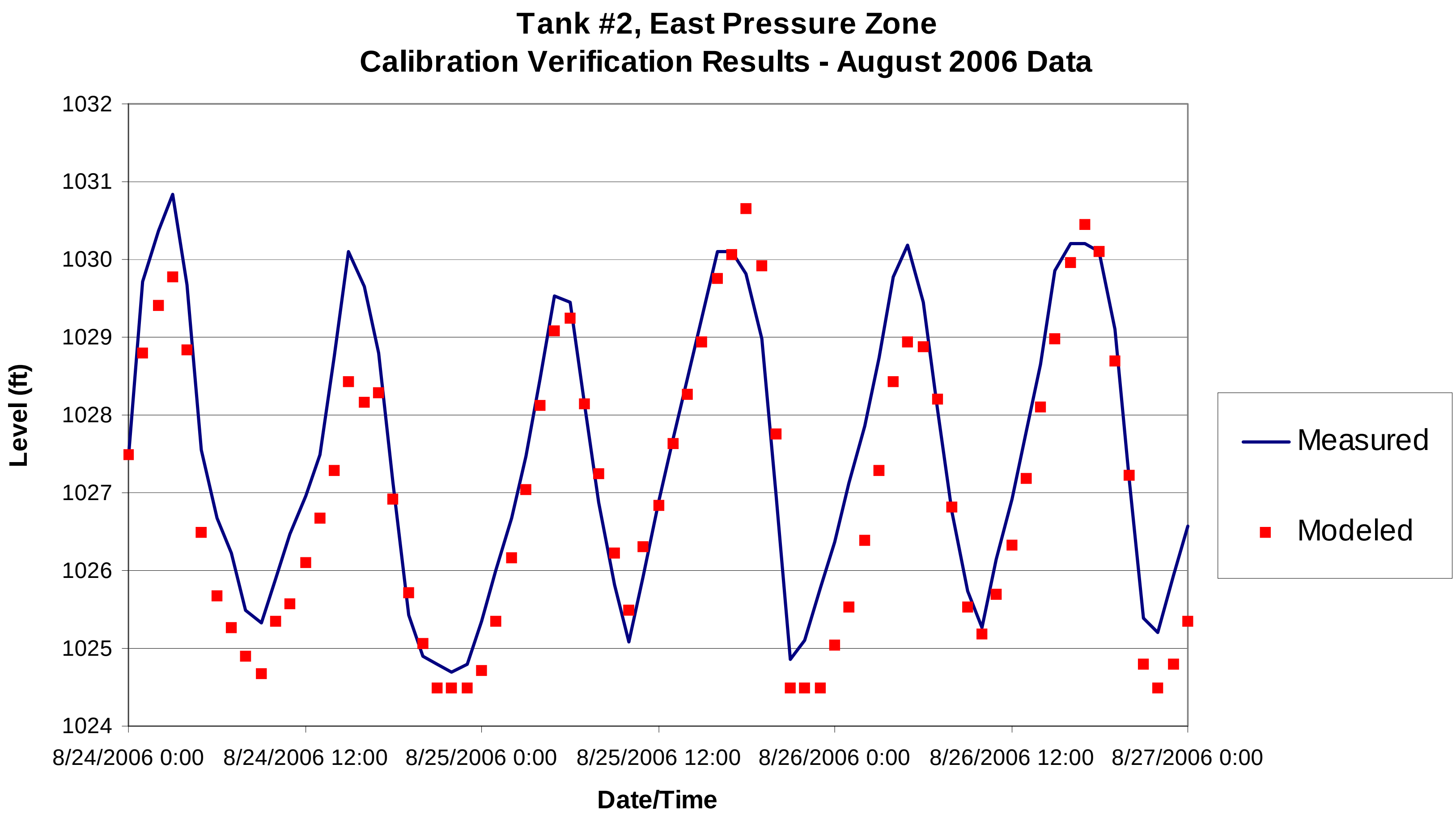
Tank Information

Tank	Pressure Zone	Average Water Age (hrs)
1	Central	120.08
2	East	134.19
3	East	77.33
4	West	60.89

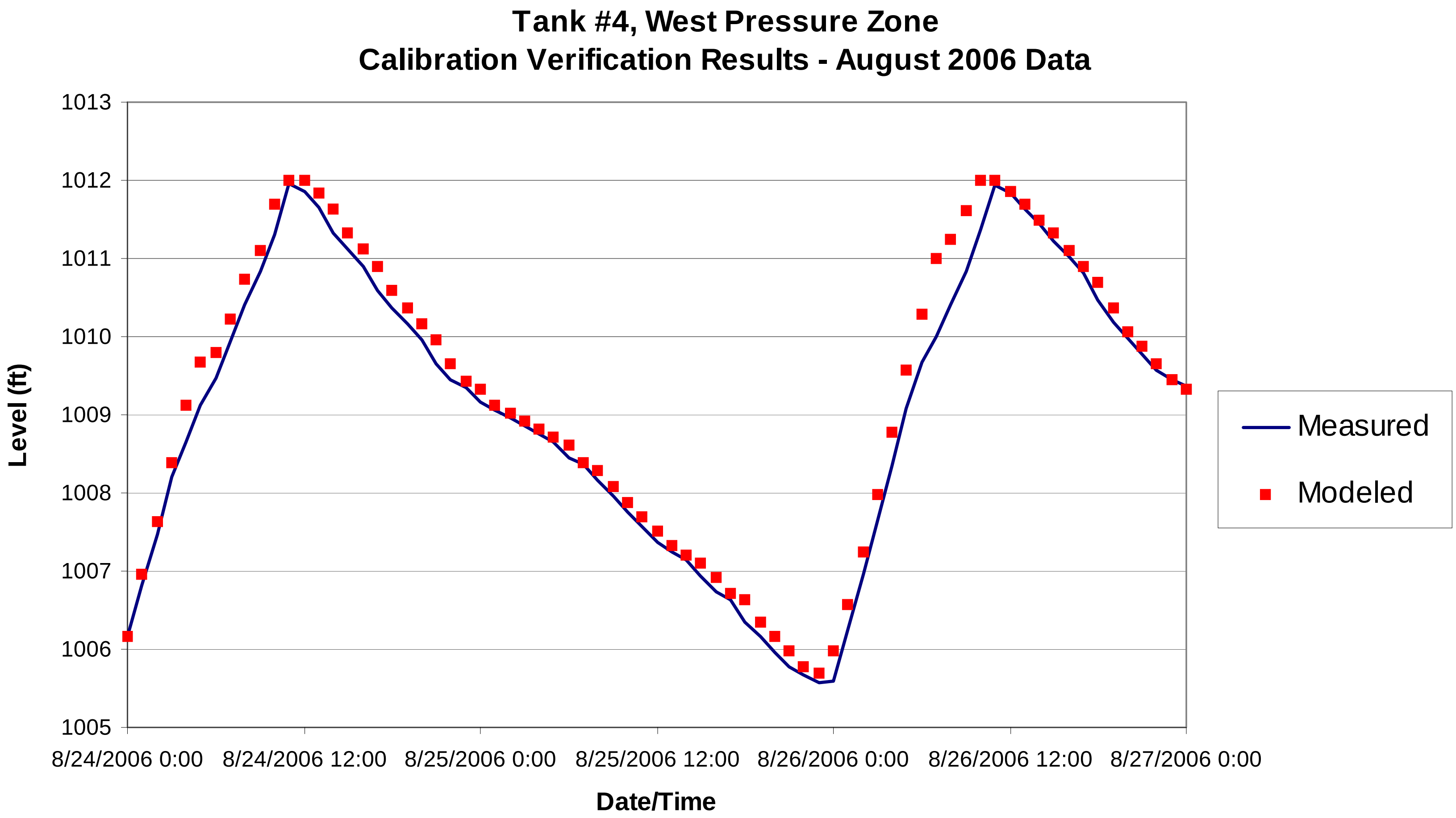
CALIBRATION RESULTS



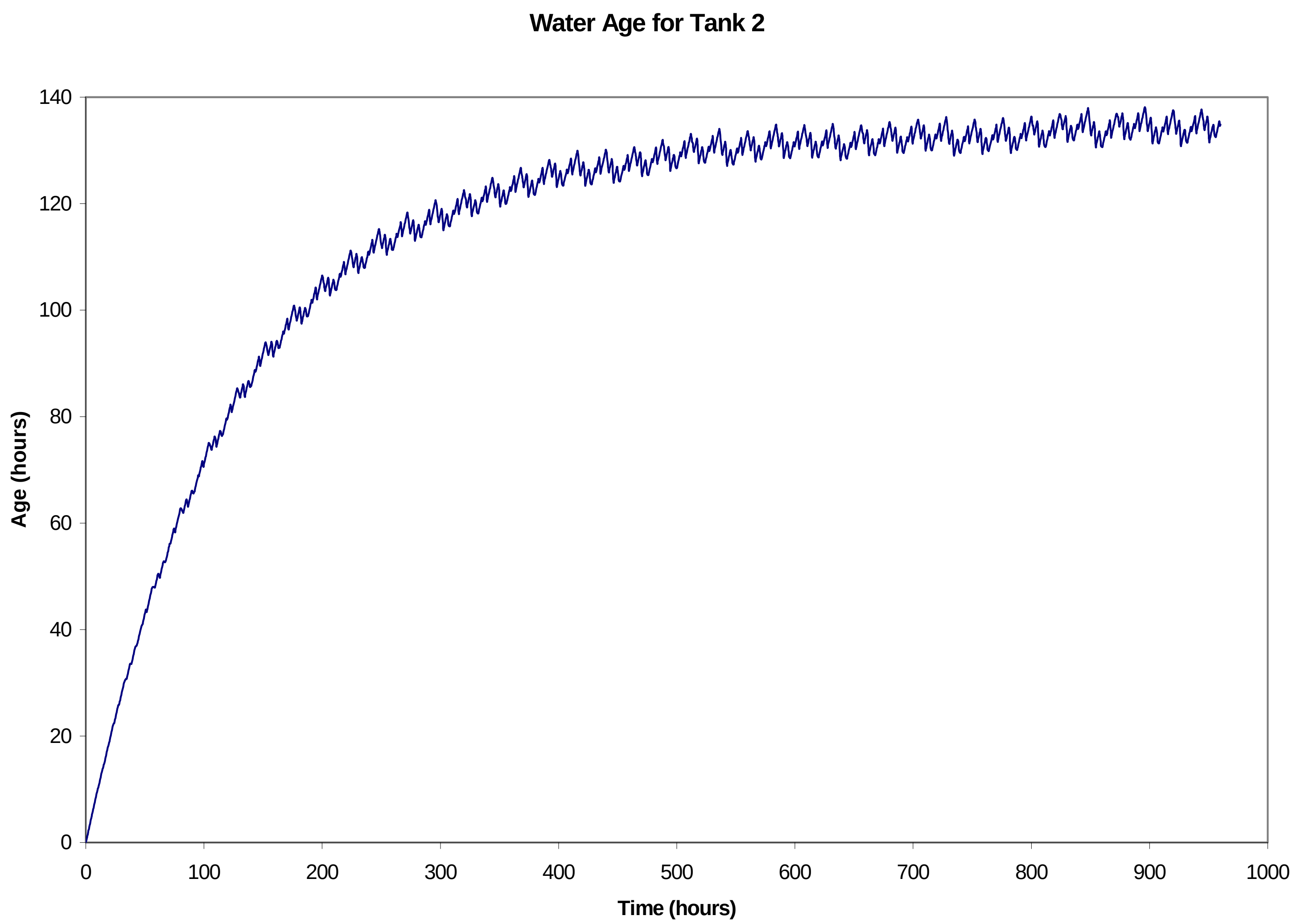
CALIBRATION RESULTS (CONTINUED)



CALIBRATION RESULTS (CONTINUED)



MODELING ANALYSIS RESULTS



MODELING ANALYSIS RESULTS

Average Water Age for All Nodes (Hour 936 to Hour 960 of Simulation)

ID	Average (hrs)	ID	Average (hrs)	ID	Average (hrs)	ID	Average (hrs)
10	263.32	96	0.76	182	1.47	268	6.57
12	3.05	98	0.83	184	18.37	270	13.57
14	21.28	100	0.95	186	16.35	272	79.19
16	4.68	102	947.88	188	9.42	274	172.01
18	581.18	104	947.88	190	48.29	276	280.49
20	5	106	333.21	192	34.8	278	35.64
22	947.93	108	264.09	194	58.32	280	947.93
24	947.81	110	270.36	196	52.38	282	27.33
26	246.72	112	33.79	198	44.4	284	947.93
28	16.64	114	947.93	200	46.24	286	27.3
30	947.76	116	947.93	202	44.64	288	947.93
32	947.76	118	419.19	204	40.19	292	26.54
34	32.95	120	331.35	206	46.77	294	947.93
36	18.67	122	288.94	208	947.93	296	25.95
38	0.04	124	65.68	210	47.64	298	54.63
40	0.38	126	174.07	212	48.59	300	76.66
42	183.79	128	40.42	214	45.22	302	23.47
44	2.96	130	0.05	216	41.58	304	28.74
46	0.09	132	847.23	218	49.83	306	22.85
48	0.16	134	947.93	220	43.94	308	8.04
50	0.25	136	290.74	222	8.77	310	21.75
52	0.33	138	1.12	224	947.93	312	27.97
54	0.16	140	20.57	226	947.93	314	23.31
56	0.31	142	1.36	228	34.13	316	22.94
58	0.15	144	497.02	230	39.62	318	4.14
60	894.92	146	21.59	232	42.32	320	6.65
62	2.84	148	0.12	234	35.18	322	4.5
64	886.42	150	751.59	236	36.64	324	947.93
66	0.15	152	947.93	238	11.73	326	3.71
68	0.24	154	947.93	240	947.93	328	1.98
70	0	156	355.98	242	11.4	330	3.43
72	894.96	158	18.04	244	947.93	332	3.19
74	934.2	160	0.08	246	9.9	334	947.93
76	889.41	162	491.68	248	46	336	947.93
78	0.81	164	947.93	250	947.93	338	2.9
80	0.68	166	947.93	252	17.1	340	2.5
82	0.63	168	230.29	254	15.64	342	3.12
84	947.93	170	24.57	256	25.88	344	947.93
86	579.20	172	549.5	258	947.93	346	3.64
88	0.4	174	587.53	260	4.89	348	34.98
90	93.09	176	947.93	262	5.02	350	947.93
92	14.19	178	947.93	264	947.93	352	99.19
94	19.75	180	1.45	266	947.93	354	947.93

MODELING ANALYSIS RESULTS (CONTINUED)

Average Water Age for All Nodes (Hour 936 to Hour 960 of Simulation)

ID	Average (hrs)	ID	Average (hrs)	ID	Average (hrs)	ID	Average (hrs)
356	17.38	446	5.61	1028	8.26	1071	0.24
358	947.93	448	2.07	1029	6.64	1072	14.53
360	947.93	450	8.73	1030	6.57	1073	3.55
362	947.93	452	12.94	1031	9.37	1074	9.89
364	83.58	454	2.38	1032	9.09	1075	947.93
366	947.93	470	0.49	1033	8.06	1076	4.37
368	947.93	472	0.49	1034	9.44	1077	1.99
370	7.49	474	0.41	1035	7.56	1078	3.36
372	12.99	476	0.55	1036	5.78	1079	5.48
374	29.83	480	947.93	1037	7.12	1080	10.56
376	6.76	482	130.78	1038	10.42	1081	3.82
378	919.41	484	0.11	1039	9.59	1082	3.6
380	223.06	486	588.10	1040	10.82	1083	947.93
384	20.56	488	947.93	1041	8.56	1084	3.54
388	12.38	490	18.14	1042	7.71	1085	947.93
390	13.03	1000	62.06	1043	10.54	1086	15.45
392	1.53	1001	0.16	1044	12.2	1087	28.45
394	45.29	1002	7.11	1045	11.08	1088	3.18
396	45.07	1003	95.1	1046	6.31	1089	2.68
398	2.91	1004	108.24	1047	0.78	1090	13.68
400	16.09	1005	947.93	1048	8.91	1091	4
402	7.69	1006	93.84	1049	5.99	1092	40.09
404	8.21	1007	947.93	1050	5.54	1093	12.76
406	11.3	1008	7.58	1051	5.67	1094	0.32
408	15.69	1009	947.93	1052	4.38	1095	15.78
410	11.36	1010	947.93	1053	4.94	1096	0.86
412	33.78	1011	8.11	1054	4.86	1097	23.18
414	34.6	1012	13.93	1055	11.25	1098	5.46
416	35.59	1013	5.64	1056	947.93	1099	2.26
418	38.42	1014	12	1057	4.74	1100	947.93
420	36.09	1015	0	1058	10.28	1101	9.96
422	77.88	1016	6.17	1059	9.12	1102	9.65
424	70.07	1017	155.01	1060	5.08	1103	2.62
426	66.5	1018	7.2	1061	6.25	1104	2.84
428	59.04	1019	20.33	1062	4.38	1105	2.87
430	34.85	1020	23.77	1063	7.17	1106	3.17
432	39.89	1021	16.59	1064	3.98	1107	2.49
434	37.1	1022	5.61	1065	5.3	1108	947.93
436	29.81	1023	6.3	1066	4.24	1109	2.58
438	11.31	1024	0.63	1067	6.25	1110	947.93
440	4.39	1025	7.06	1068	62.36	1111	13.53
442	8.26	1026	11.19	1069	9.19	1112	0.55
444	6.1	1027	6.53	1070	5.27	1113	19.15

MODELING ANALYSIS RESULTS (CONTINUED)

Average Water Age for All Nodes (Hour 936 to Hour 960 of Simulation)

ID	Average (hrs)	ID	Average (hrs)	ID	Average (hrs)	ID	Average (hrs)
1114	7.76	1157	11.18	1200	16.11	1243	947.93
1115	3.33	1158	11.08	1201	22.86	1244	44.19
1116	947.93	1159	12.28	1202	24.73	1245	28.38
1117	3.39	1160	12.71	1203	7.42	1246	20.8
1118	2.96	1161	9.74	1204	17.71	1247	13.59
1119	3.54	1162	6.69	1205	4.75	1248	17.77
1120	3.11	1163	16.61	1206	21.63	1249	15.55
1121	12.42	1164	7.23	1207	8.88	1250	15.21
1122	11.1	1165	21.24	1208	947.93	1251	93.45
1123	947.93	1166	55.84	1209	30.85	1252	334.45
1124	91.17	1167	4.14	1210	20.75	1253	47.35
1125	3.9	1168	4.01	1211	24.67	1254	44.01
1126	4.03	1169	26.65	1212	19.74	1255	73.19
1127	947.93	1170	11.46	1213	19.27	1256	180.69
1128	5.77	1171	13.53	1214	16.71	1257	14.57
1129	33.29	1172	10.92	1215	21.05	1258	13.66
1130	4.15	1173	15.57	1216	947.93	1259	128.65
1131	3.66	1174	30.07	1217	18.78	1260	5.87
1132	4.33	1175	9	1218	17.59	1261	5.25
1133	4.38	1176	12.33	1219	37.14	1262	3.38
1134	9.14	1177	0.55	1220	10.53	1263	55.17
1135	0.55	1178	947.93	1221	15.7	1264	947.93
1136	35.4	1179	30.74	1222	25.96	1265	57.91
1137	4.25	1180	13.37	1223	28.42	1266	16.04
1138	4.85	1181	34.46	1224	28.09	1267	15.39
1139	4.42	1182	21.7	1225	16.94	1268	9.4
1140	62.47	1183	13.97	1226	15.21	1269	5.49
1141	4.6	1184	29.7	1227	21.73	1270	10.51
1142	947.93	1185	23.94	1228	43.29	1271	13.76
1143	947.93	1186	9.61	1229	11.98	1272	9.59
1144	4.28	1187	8.47	1230	17.13	1273	28.08
1145	4.93	1188	23.68	1231	9.13	1274	173.08
1146	6.34	1189	21.97	1232	17.52	1275	15.82
1147	6.08	1190	21.6	1233	16.95	1276	183.99
1148	16.55	1191	21.85	1234	17.2	1277	154.62
1149	8.71	1192	22	1235	16.81	1278	172.86
1150	4.67	1193	18	1236	20.4	1279	35.13
1151	7.07	1194	22.54	1237	947.93	1280	155.92
1152	7.82	1195	20.72	1238	947.93	1281	29.41
1153	7.42	1196	947.93	1239	14.17	1282	8.24
1154	19.91	1197	33.84	1240	14.04	1283	25.69
1155	9.08	1198	37.03	1241	62.71	1284	947.93
1156	0.4	1199	23.58	1242	13.92	1285	947.93

MODELING ANALYSIS RESULTS (CONTINUED)

Average Water Age for All Nodes (Hour 936 to Hour 960 of Simulation)

ID	Average (hrs)	ID	Average (hrs)	ID	Average (hrs)	ID	Average (hrs)
1286	15.41	1329	947.93	1372	36.44	1415	30.44
1287	13.2	1330	27.25	1373	947.93	1416	15.56
1288	947.93	1331	12.31	1374	38.16	1417	36.91
1289	13.18	1332	64.6	1375	47.25	1418	947.93
1290	947.93	1333	10.2	1376	32.22	1419	20.34
1291	44.01	1334	35.3	1377	38.87	1420	1.71
1292	30.5	1335	107.16	1378	31.36	1421	947.93
1293	10.47	1336	30.62	1379	15.1	1422	21.62
1294	39.4	1337	947.93	1380	31.67	1423	22.44
1295	64.59	1338	46.6	1381	32.44	1424	27.88
1296	90.1	1339	26.67	1382	28.03	1425	27.93
1297	66.63	1340	6.72	1383	28.28	1426	22.1
1298	22.13	1341	25.72	1384	31.44	1427	33.81
1299	69.96	1342	26.8	1385	28.46	1428	1.71
1300	67.85	1343	9.95	1386	21.36	1429	5.35
1301	80.4	1344	26.07	1387	28.67	1430	18.02
1302	61.48	1345	25.99	1388	54.41	1431	5.3
1303	4.7	1346	25.39	1389	27.44	1432	8.3
1304	67.69	1347	23.62	1390	13.34	1433	9.92
1305	64.22	1348	947.93	1391	13.05	1434	18.12
1306	73.64	1349	947.93	1392	12.04	1435	57.1
1307	68.43	1350	25.09	1393	947.93	1436	15.31
1308	28.44	1351	22.99	1394	14.01	1437	18.75
1309	28.17	1352	23.95	1395	15.85	1438	58.41
1310	28.4	1353	9.39	1396	31.76	1439	81.12
1311	30.9	1354	22.1	1397	14.79	1440	65.54
1312	61.1	1355	947.93	1398	56.36	1441	26.22
1313	11.5	1356	106.7	1399	16.5	1442	24.87
1314	14.01	1357	45.02	1400	34.68	1443	26.12
1315	28.05	1358	947.93	1401	947.93	1444	27.32
1316	27.83	1359	51.76	1402	20.62	1445	947.93
1317	43.49	1360	54.77	1403	30.51	1446	2.98
1318	35.48	1361	48.44	1404	30.37	1447	26.42
1319	26.95	1362	30.27	1405	947.93	1448	22.2
1320	27.3	1363	947.93	1406	947.93	1449	10.38
1321	20.57	1364	27.34	1407	29.74	1450	4.93
1322	9.35	1365	32.52	1408	30.68	1451	20.56
1323	60.46	1366	67.84	1409	28.82	1452	20.09
1324	36.99	1367	38.08	1410	39.05	1453	2.8
1325	13.44	1368	32.98	1411	1.69	1454	3.84
1326	67.16	1369	947.93	1412	28.82	1455	6.55
1327	48.75	1370	34.52	1413	4.52	1456	21.22
1328	947.93	1371	30.84	1414	28.66	1457	2.15

MODELING ANALYSIS RESULTS (CONTINUED)

Average Water Age for All Nodes (Hour 936 to Hour 960 of Simulation)

ID	Average (hrs)	ID	Average (hrs)	ID	Average (hrs)	ID	Average (hrs)
1458	12.74	1501	27.28	1544	2.94	1587	17.62
1459	1.94	1502	21.53	1545	947.93	1588	54.87
1460	1.83	1503	15.63	1546	1.49	1589	45.46
1461	1.63	1504	16.98	1547	1.62	1590	11.65
1462	1.91	1505	24.66	1548	947.93	1591	947.93
1463	33.73	1506	947.93	1549	9.1	1592	62.9
1464	29.76	1507	11.1	1550	7.02	1593	44.65
1465	947.93	1508	12.54	1551	5.53	1594	32.05
1466	4.96	1509	26.33	1552	8.93	1595	43.9
1467	4.86	1510	947.93	1553	5.51	1596	3.47
1468	5.17	1511	23.21	1554	947.93	1597	947.93
1469	5.39	1512	947.93	1555	29.7	1598	4.1
1470	28.36	1513	18.48	1556	7.21	1599	229.18
1471	7.62	1514	17.66	1557	8.33	1600	4.68
1472	947.93	1515	17.77	1558	16.13	1601	121.33
1473	6.88	1516	8.21	1559	21.2	1602	28.19
1474	9.07	1517	8.07	1560	4.41	1603	124.75
1475	14.69	1518	6.18	1561	35.53	1604	24.75
1476	7.97	1519	4.67	1562	18.2	1605	17.01
1477	14.39	1520	4.39	1563	53.95	1606	16.78
1478	17.08	1521	4.33	1564	21.74	1607	9.42
1479	16.1	1522	5.45	1565	18.58	1608	74.9
1480	11.46	1523	4.6	1566	17.41	1609	6.61
1481	947.93	1524	4.82	1567	17.39	1610	9.45
1482	12.63	1525	947.93	1568	20.31	1611	9.54
1483	35.05	1526	947.93	1569	24.61	1612	10.05
1484	8.09	1527	6.23	1570	18.49	1613	12.7
1485	6.71	1528	31.31	1571	33.57	1614	10.52
1486	34.93	1529	75.19	1572	21.88	1615	9.56
1487	5.47	1530	1.51	1573	22.31	1616	6.49
1488	13.62	1531	3.88	1574	27.95	1617	51.88
1489	26.17	1532	19.37	1575	15.85	1618	11.17
1490	947.93	1533	324.34	1576	947.93	1619	11
1491	26.13	1534	39.59	1577	18.55	1620	12.65
1492	26.9	1535	10.21	1578	18.16	1621	23.87
1493	26.12	1536	947.93	1579	17.63	1622	30.62
1494	21.46	1537	28.04	1580	21	1623	26.81
1495	29.26	1538	26.12	1581	52.83	1624	6.86
1496	109.84	1539	947.93	1582	947.93	1625	6.32
1497	31.54	1540	947.93	1583	19.81	1626	7.54
1498	90.57	1541	32.43	1584	26.65	1627	63.75
1499	24.39	1542	318.95	1585	26.24	1628	11.24
1500	16.31	1543	947.93	1586	947.93	1629	947.93

MODELING ANALYSIS RESULTS (CONTINUED)

Average Water Age for All Nodes (Hour 936 to Hour 960 of Simulation)

ID	Average (hrs)	ID	Average (hrs)	ID	Average (hrs)
1630	14.57	1673	4.33	1716	2.6
1631	11.29	1674	4.37	1717	2.43
1632	11.45	1675	4.2	1718	2.5
1633	12.1	1676	5.36	1719	113.62
1634	11.92	1677	6.02	1720	1.79
1635	12.35	1678	5.67	1721	20.44
1636	233.36	1679	29.71	1722	1.47
1637	947.93	1680	5.57	1723	1.15
1638	13.44	1681	5.95	1724	5.27
1639	30.77	1682	6.27	1725	947.93
1640	30.78	1683	6.75	1726	1.07
1641	3.38	1684	6.19	1727	2.37
1642	35.68	1685	6.48	1728	42.65
1643	14.93	1686	14.02	1729	112.12
1644	50.93	1687	14.57	1730	947.93
1645	32.32	1688	18.25	1731	33.5
1646	33.81	1689	15.42	1732	42.95
1647	25.23	1690	5.34	1733	116.37
1648	26.59	1691	6.78	1734	123.36
1649	25.16	1692	4.34	1735	9.67
1650	29.32	1693	6.02	1736	117.02
1651	21.69	1694	8.44	1737	5.31
1652	41.66	1695	23.73	1738	8.1
1653	9.53	1696	5.29	1739	947.93
1654	5.65	1697	5.87	1740	125.05
1655	19.64	1698	4.97	1741	166.46
1656	14.9	1699	4.23	1742	100.57
1657	5.55	1700	5.17	1743	112.85
1658	5.71	1701	4.52	1744	176.36
1659	5.14	1702	3.83	1745	169.74
1660	4.96	1703	5.99	1746	947.93
1661	947.93	1704	3.09	1747	947.93
1662	8.48	1705	3.6		
1663	5.4	1706	3.33		
1664	4.46	1707	5.83		
1665	6.13	1708	3.46		
1666	6.32	1709	3.19		
1667	5.25	1710	3.93		
1668	7.75	1711	18.99		
1669	103.99	1712	5.16		
1670	4.93	1713	947.93		
1671	4.64	1714	2.68		
1672	6.97	1715	2.37		

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Form 5: IDSE Report for a Modeling SSS

I. GENERAL INFORMATION

(Skip this section if you are submitting the plan and report at the same time)

A. PWS Information*

PWSID: US1111111

PWS Name: Big City Water System

PWS Address: 1234 Main Street

City: Big City   State: US   Zip: 99999

Population Served: 57,000

System Type:	Source Water Type:	Buying / Selling Relationships:
☒ CWS	☒ Subpart H	☐ Consecutive System
☐ NTNCWS	☐ Ground	☐ Wholesale System
		☒ Neither

B. Date Submitted*

2/17/09

C. PWS Operations

Residual Disinfectant Type: ☒ Chlorine ☐ Chloramines ☐ Other:___________

Number of Disinfected Sources: ___1__ Surface ___GWUDI ____ Ground ___ Purchased

D. Contact Person*

Name: Mr. John Smith, P.E.

Title: Water System Manager

Phone Number: 123-555-0000   Fax: 123-555-0001

E-mail: jsmith@ci.bigcity.us

II. SSS AND STAGE 2 DBPR REQUIREMENTS*

A. Number of Required Stage 2 DBPR Compliance Monitoring Sites __8__ TOTAL

__3__ Highest TTHM   __2__ Stage 1 DBPR

__3__ Highest HAA5

B. IDSE Schedule

☐ Schedule 1

☒ Schedule 2

☐ Schedule 3

☐ Schedule 4

C. Required Stage 2 DBPR Monitoring Frequency

☐ Once during peak historical month

☒ Every 90 days (4 monitoring periods)

D. Number of Required SSS Samples

__16__ TOTAL

Form 5: IDSE Report for a Modeling SSS

III. MODELING INFORMATION
(Skip this section if you submitted a modeling study plan with an approved model calibration and your information has not changed, or if you are submitting your plan and report at the same time)

A. How was demand data assigned to the model? (*attach additional sheets if needed*)

1.	What method was used to assign demands throughout the system?	
2.	How did you estimate diurnal demand variation? How did you determine total system demand?	
3.	How many demand categories did you use?	
4.	How did you address large water users?	

B. Describe all calibration activities undertaken* (*attach additional sheets if needed*)

1.	When was the model last calibrated?	
2.	What types of data were used in the calibration?	
3.	When was the calibration data collected?	
4.	What field tests have been performed to collect calibration data?	

Form 5: IDSE Report for a Modeling SSS

III. MODELING INFORMATION (Continued)

5.	How did you determine friction factors (C-factors)?	
6.	Was the calibration completed for the peak month for TTHM formation? If not, was the model performance verified for the peak month for TTHM formation?	
7.	How well do actual tank levels correlate with predicted tank levels during the peak month for TTHM formation? **Submit a graph of predicted tank levels vs. measured tank levels for the storage facility with the highest water age in each pressure zone*.**	
8.	If you are using a water quality model, what parameters are modeled? How was the model calibrated?	

Form 5: IDSE Report for a Modeling SSS

III. MODELING INFORMATION (Continued)

C. **How was the SSS modeling performed?* (*attach additional sheets as needed*)**

1.	Was modeling done for the operating conditions during the peak month for TTHM formation*?	
2.	How were operational controls represented in the model?	
3.	How was water age simulated during the peak month for TTHM formation (time steps, length of simulation, etc.)?	
4.	What are the average water age results for your distribution system? **Submit final model output showing 24-hour average residence time throughout the distribution system*.** **Submit graph of water age at the longest residence time storage facility in the distribution system showing the predictions for the entire EPS simulation period*.**	

Form 5: IDSE Report for a Modeling SSS

IV. SSS MONITORING LOCATION SELECTION

How were the SSS monitoring locations selected? ***(attach additional sheets as needed)***

1.	What model results were used as the basis for selection?	The average water age results from the last 24 hours of the 960 hour simulation were analyzed. Nodes were ranked by age and a histogram of water age ranges was created.
2.	What criteria were used in selecting average residence time, high TTHM, and high HAA5 sites?	The high TTHM and high HAA5 sites were selected with water ages in the range of 300 - 500 hours. These were the high results from the modeling (excluding zero demand nodes). The average water age was determined to be 20 hours based on the most frequently occurring age in the histogram.
3.	What additional data was used in the analysis, and how was it used?	TCR data for chlorine residual was examined for each potential sampling site. High water age locations with measurable residual were selected for high HAA5 sites. High water age locations with low residual chlorine were selected for high TTHM sites.
4.	How did you look at practical considerations like accessibility of sampling locations?	Once model nodes were identified, the proposed location was found on the paper water atlas sheets and an accessible sampling point was determined in the vicinity of the original node. Accessible locations served by the same water main as the model node were targeted. If the targeted water main was not accessible, an alternate location on a water main of the same diameter was found in the vicinity.
5.	How did you verify that your selected sampling locations corresponded to the selected node in your model?	Using the paper water atlas sheets and comparing the locations to the information in the hydraulic model, locations were verified.

Form 5: IDSE Report for a Modeling SSS

V. SSS AND STAGE 1 DBPR MONITORING RESULTS*

A. TTHM Results

Site ID & Category	Data Type	TTHM (mg/L)				LRAA
Stage 1 Site 1	Sample Date	3/12/08	6/7/08	8/22/08	10/1/08	
	Sample Result	0.041	0.048	0.062	0.050	0.050
Stage 1 Site 2	Sample Date	3/12/08	6/7/08	8/22/08	10/1/08	
	Sample Result	0.045	0.046	0.058	0.053	0.051
Stage 1 Site 3	Sample Date	3/12/08	6/7/08	8/22/08	10/1/08	
	Sample Result	0.051	0.055	0.075	0.059	0.060
Stage 1 Site 4	Sample Date	3/12/08	6/7/08	8/22/08	10/1/08	
	Sample Result	0.048	0.052	0.068	0.053	0.055
SSS-1 Entry	Sample Date			8/5/08		
	Sample Result			0.028		0.028
SSS-2 Average	Sample Date			8/5/08		
	Sample Result			0.048		0.048
SSS-3 Average	Sample Date			8/5/08		
	Sample Result			0.058		0.058
SSS-4 Average	Sample Date			8/5/08		
	Sample Result			0.067		0.067
SSS-5 Average	Sample Date			8/5/08		
	Sample Result			0.033		0.033
SSS-6 High TTHM	Sample Date			8/5/08		
	Sample Result			0.056		0.056
SSS-7 High TTHM	Sample Date			8/5/08		
	Sample Result			0.059		0.059
SSS-8 High TTHM	Sample Date			8/5/08		
	Sample Result			0.055		0.055

Attach additional sheets as needed for SSS and Stage 1 DBPR results.

Form 5: IDSE Report for a Modeling SSS

V. SSS AND STAGE 1 DBPR MONITORING RESULTS* (Continued)

B. HAA5 Results

Site ID & Category	Data Type	HAA5 (mg/L)				LRAA
Stage 1 Site 1	Sample Date	3/12/08	6/7/08	8/22/08	10/1/08	
	Sample Result	0.034	0.046	0.006	0.042	0.032
Stage 1 Site 2	Sample Date	3/12/08	6/7/08	8/22/08	10/1/08	
	Sample Result	0.030	0.045	0.044	0.042	0.040
Stage 1 Site 3	Sample Date	3/12/08	6/7/08	8/22/08	10/1/08	
	Sample Result	0.032	0.038	0.037	0.040	0.037
Stage 1 Site 4	Sample Date	3/12/08	6/7/08	8/22/08	10/1/08	
	Sample Result	0.040	0.004	0.012	0.044	0.025
SSS-1 Entry	Sample Date			8/5/08		
	Sample Result			0.018		0.018
SSS-2 Average	Sample Date			8/5/08		
	Sample Result			0.020		0.020
SSS-3 Average	Sample Date			8/5/08		
	Sample Result			0.019		0.019
SSS-4 Average	Sample Date			8/5/08		
	Sample Result			0.026		0.026
SSS-5 Average	Sample Date			8/5/08		
	Sample Result			0.033		0.033
SSS-6 High TTHM	Sample Date			8/5/08		
	Sample Result			0.048		0.048
SSS-7 High TTHM	Sample Date			8/5/08		
	Sample Result			0.057		0.055
SSS-8 High TTHM	Sample Date			8/5/08		
	Sample Result			0.046		0.046

Attach additional sheets as needed for SSS and Stage 1 DBPR results.

V. SSS AND STAGE 1 DBPR MONITORING RESULTS* (Continued)

C. Where were your TTHM and HAA5 samples analyzed?

☒ In-House

Is your in-house laboratory certified? ☒ Yes ☐ No

☐ Certified Laboratory

Name of certified laboratory: ____________________

D. What method(s) was used to analyze your TTHM and HAA5 samples?

TTHM

☒ EPA 502.2

☐ EPA 524.3

☐ EPA 551.1

HAA5

☒ EPA 552.1 ☐ EPA 552.2

☐ EPA 552.3 ☐ SM 6251 B

VI. SELECTION OF STAGE 2 DBPR COMPLIANCE MONITORING LOCATIONS

Describe the comparison of sampling and modeling results (*attach additional sheets as needed*):

1.	How well did the sampling results correspond to the modeling results?	For most SSS monitoring sites, the results were in accordance with the modeling results. Discrepancies were found at 2 sites: SSS-4 and SSS-11. SSS-4 was an average residence time site with TTHM results that were more typical of a high TTHM site. SSS-11 was a high TTHM site with TTHM results that were more typical of an average site.
2.	For samples that did not match well with model results, what follow-up investigations were performed?	At sites SSS-4 and SSS-11, data for chlorine residual was reviewed from TCR sampling. The time of sample collection was compared to the water age graph. The model results for water age at SSS-11 are highly variable and therefore that site was eliminated from further consideration. The discrepancy at SSS-4 could have been related to variation over time, although the model results are less conclusive at that site. SSS-4 was also eliminated from further consideration.
3.	Were additional samples collected? (Include data on table in section IV)	No
4.	**Submit a graph of water age versus time for each selected sampling location*.**	Graphs are attached.

Form 5: IDSE Report for a Modeling SSS

VII. JUSTIFICATION OF STAGE 2 DBPR COMPLIANCE MONITORING SITES*

Compliance Monitoring Site ID	Site Type	Justification
Stage 2 Site 1	☒ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	SSS-12 High average water age, high TTHM results during monitoring, located in East Pressure Zone
Stage 2 Site 2	☐ Highest TTHM ☒ Highest HAA5 ☐ Stage 1 DBPR	SSS-14 High average water age, high HAA5 results during monitoring, measurable residual in historical TCR data, located in East Pressure Zone
Stage 2 Site 3	☐ Highest TTHM ☐ Highest HAA5 ☒ Stage 1 DBPR	Stage 1 Site 2 Average residence time Stage 1 DBPR site with high HAA5 LRAA, relatively high water age, located in East Pressure Zone
Stage 2 Site 4	☒ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	SSS-9 High average water age, high TTHM results during monitoring, located in East Pressure Zone
Stage 2 Site 5	☒ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	SSS-15 High average water age, high TTHM results during monitoring, located in East Pressure Zone
Stage 2 Site 6	☐ Highest TTHM ☒ Highest HAA5 ☐ Stage 1 DBPR	SSS-10 High average water age, high HAA5 results during monitoring, measurable residual in historical TCR data, located in Central Pressure Zone
Stage 2 Site 7	☐ Highest TTHM ☐ Highest HAA5 ☒ Stage 1 DBPR	Stage 1 Site 4 High average water age, high TTHM historical data, located in West Pressure Zone
Stage 2 Site 8	☐ Highest TTHM ☒ Highest HAA5 ☐ Stage 1 DBPR	SSS-13 High average water age, high HAA5 results during monitoring, measurable residual in historical TCR data, located in East Pressure Zone

Attach additional copies of this sheet if you need more room.

Form 5: IDSE Report for a Modeling SSS

VIII. PEAK HISTORICAL MONTH

A. **Peak Historical Month*** ___August___

B. **Is Your Peak Historical Month the Same as your Peak Month for TTHM Formation in your Model Study Plan?**

☒ Yes ☐ No

If no, explain how you selected your new peak month for TTHM formation (*attach additional sheets if needed*):

____

____

____

____

____

____

IX. PROPOSED STAGE 2 COMPLIANCE MONITORING SCHEDULE*

Stage 2 Compliance Monitoring Site ID	Projected Sampling Date (date or week)[1]			
	period 1	period 2	period 3	period 4
Stage 2 Site 1	11/2012, wk 1	2/2013, wk 1	5/2013, wk 1	8/2013, wk 1
Stage 2 Site 2	11/2012, wk 1	2/2013, wk 1	5/2013, wk 1	8/2013, wk 1
Stage 2 Site 3	11/2012, wk 1	2/2013, wk 1	5/2013, wk 1	8/2013, wk 1
Stage 2 Site 4	11/2012, wk 1	2/2013, wk 1	5/2013, wk 1	8/2013, wk 1
Stage 2 Site 5	11/2012, wk 1	2/2013, wk 1	5/2013, wk 1	8/2013, wk 1
Stage 2 Site 6	11/2012, wk 1	2/2013, wk 1	5/2013, wk 1	8/2013, wk 1
Stage 2 Site 7	11/2012, wk 1	2/2013, wk 1	5/2013, wk 1	8/2013, wk 1
Stage 2 Site 8	11/2012, wk 1	2/2013, wk 1	5/2013, wk 1	8/2013, wk 1

[1] period = monitoring period. Complete for the number of monitoring periods from Section II.C.

Attach additional copies of this sheet if you need more room.

Form 5: IDSE Report for a Modeling SSS

X. DISTRIBUTION SYSTEM SCHEMATIC*
(Skip this section if you submitted a modeling study plan and your distribution system schematic ***was complete*** *and has not changed from your approved modeling study plan, or if you are submitting the plan and report at the same time*)

ATTACH a schematic of your distribution system. If your schematic has changed or if you did not show your SSS monitoring locations on the distribution system schematic you submitted with your model study plan (Form 4), you must submit a revised distribution system schematic.

XI. ATTACHMENTS

- ☐ Tabular or spreadsheet documentation that your model meets minimum calibration requirements if updated since approved modeling study plan* (Section III).
- ☐ Additional sheets for explaining model information/results, including required graphs if not submitted as part of an approved modeling study plan* (Section III).
- ☒ Additional sheets for sampling results, if needed (Section V).
- ☒ Additional sheets for selection of Stage 2 DBPR compliance monitoring sites (Section VI).
- ☒ Graph of water age versus time for all Stage 2 DBPR sites selected* (Section VI).
- ☐ Additional sheets for justification of Stage 2 DBPR Monitoring Sites, if needed (Section VII). **REQUIRED if you are a subpart H system serving more than 249,999 people**.
- ☐ Additional sheets for explaining how you selected the peak historical month (Section VIII).
- ☐ Additional sheets for proposed compliance monitoring schedule (Section IX). **REQUIRED if you are a subpart H system serving more than 249,999 people**.
- ☐ Explanation of deviations from approved study plan.
- ☒ Distribution system schematic* (Section X). **REQUIRED if it has changed from your approved model study plan or if monitoring locations were not shown**.
- ☐ Compliance calculation procedures (for Stage 2 Compliance Monitoring Plan).

Total Number of Pages in Your Report: 25

Note: All items marked with an asterisk (*) are required by the rule.

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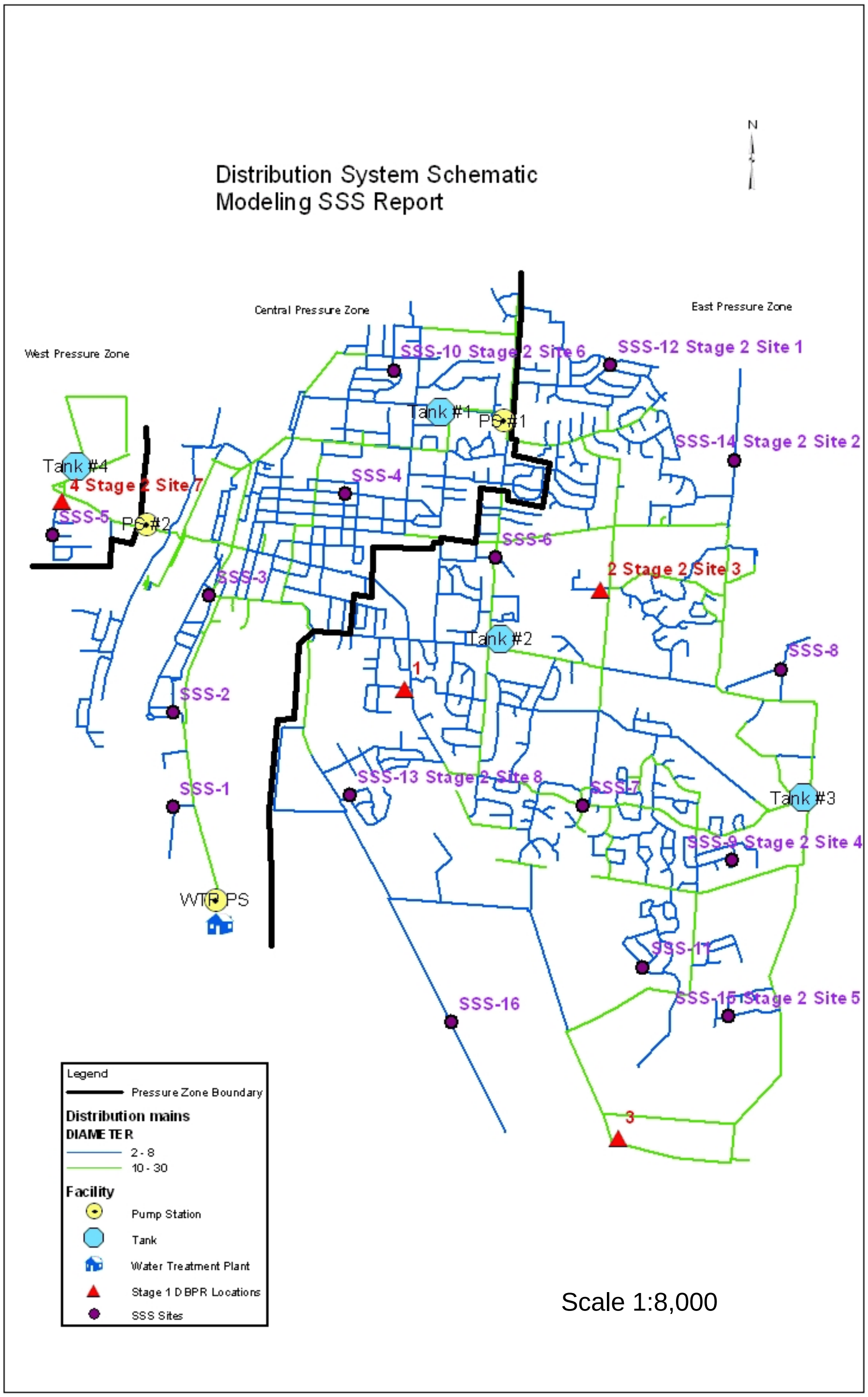
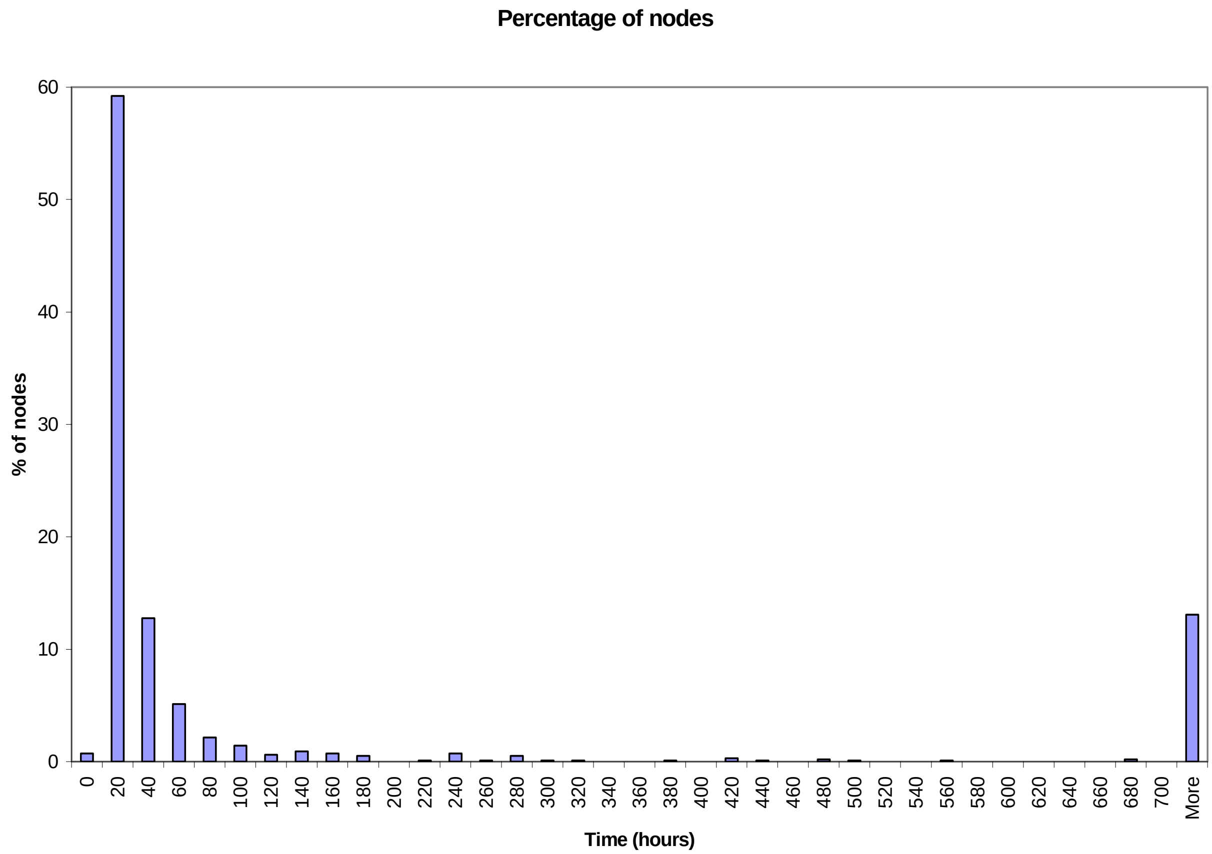

Distribution System Schematic
Modeling SSS Report
N
Central Pressure Zone
East Pressure Zone
West Pressure Zone
SSS-10 Stage 2 Site 6
SSS-12 Stage 2 Site 1
Tank #1
PS #1
SSS-14 Stage 2 Site 2
Tank #4
4 Stage 2 Site 7
SSS-4
SSS-5
PS #2
SSS-6
2 Stage 2 Site 3
SSS-3
Tank #2
SSS-8
1
SSS-2
SSS-13 Stage 2 Site 8
SSS-7
Tank #3
SSS-1
SSS-9 Stage 2 Site 4
WTP PS
SSS-11
SSS-15 Stage 2 Site 5
SSS-16
3
Legend
Pressure Zone Boundary
Distribution mains
DIAMETER
2 - 8
10 - 30
Facility
Pump Station
Tank
Water Treatment Plant
Stage 1 DBPR Locations
SSS Sites
Scale 1:8,000

SSS MONITORING LOCATION SELECTION

Histogram of Water Age Results
Average Age = midpoint of most frequently occurring range
= midpoint of 20 - 40 hour range = 30 hours



SSS MONITORING LOCATION SELECTION (CONTINUED)

Average Water Age Results for SSS monitoring locations (Hour 936 to Hour 960 of Simulation)

Node	Average Water Age (hrs)	Preliminary Category	ID
1411	1.69	Entry	SSS-1
1362	30.27	Average	SSS-2
1336	30.62	Average	SSS-3
1639	30.77	Average	SSS-4
1640	30.78	Average	SSS-5
276	280.49	High TTHM	SSS-6
1533	324.34	High TTHM	SSS-7
144	497.02	High TTHM	SSS-8
18	581.18	High TTHM	SSS-9
174	587.53	High TTHM	SSS-10
486	588.10	High TTHM	SSS-11
122	288.94	High HAA5	SSS-12
120	331.35	High HAA5	SSS-13
106	333.21	High HAA5	SSS-14
162	491.68	High HAA5	SSS-15
86	579.20	High HAA5	SSS-16

SSS MONITORING LOCATION SELECTION (CONTINUED)

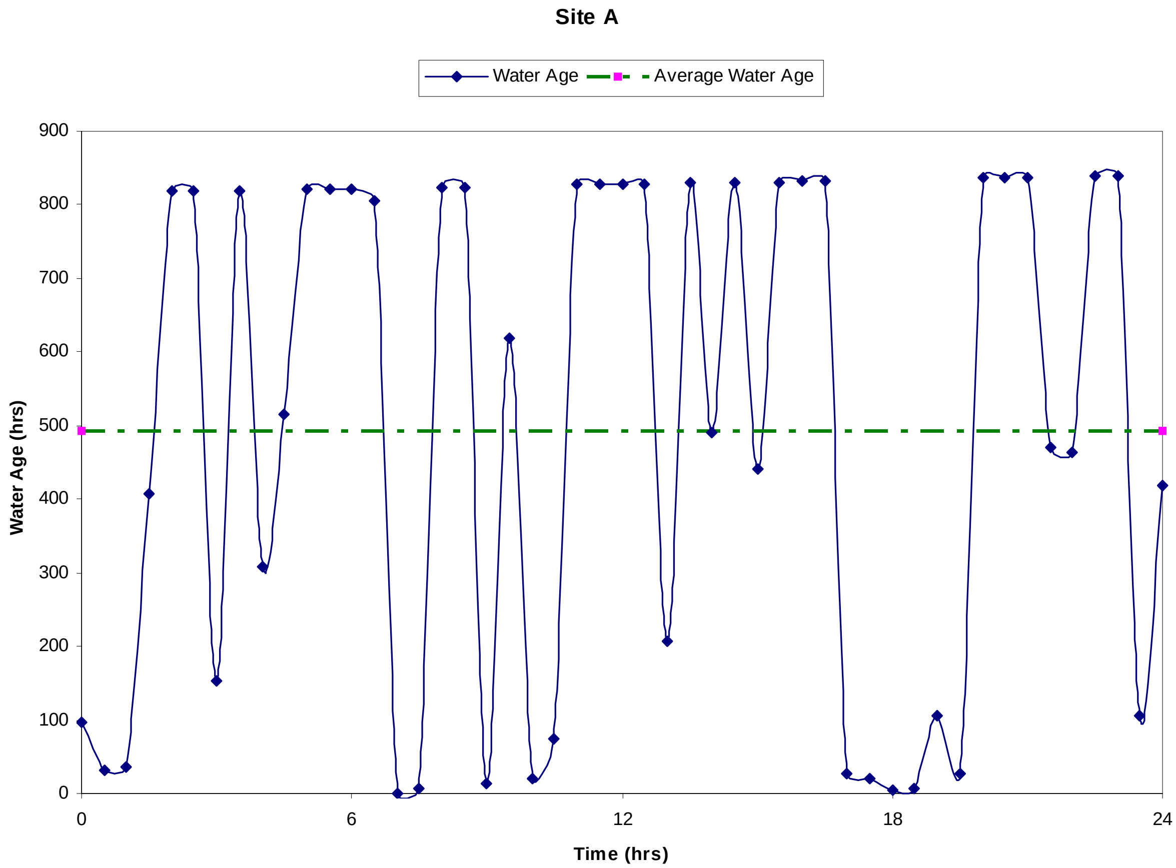
Selection of Stage 2 DBPR Compliance Monitoring Sites

SSS Sites	TTHM LRAA Results	TTHM Rank*	HAA5 LRAA Results	HAA5 Rank*	Preliminary Category	Water Age	Zone	Stage 2 DBPR Selected Sites	Stage 2 DBPR Site Type
SSS-1	0.028	20	0.018	20	Entry	1.69	Central		
SSS-2	0.048	17	0.020	18	Average	30.27	Central		
SSS-3	0.058	10	0.019	19	Average	30.62	Central		
SSS-4	0.067	4	0.026	16	Average	30.77	Central	Rejected	
SSS-5	0.033	19	0.033	12	Average	30.78	West		
SSS-6	0.056	11	0.048	7	High TTHM	280.49	East		
SSS-7	0.059	9	0.055	3	High TTHM	324.34	East		
SSS-8	0.055	12	0.046	8	High TTHM	497.02	East		
SSS-9	0.068	3	0.029	15	High TTHM	581.18	East	Site 4	TTHM
SSS-10	0.064	6	0.057	4	High TTHM	587.53	Central	Site 6	HAA5
SSS-11	0.043	18	0.030	14	High TTHM	588.10	East	Rejected	
SSS-12	0.073	1	0.050	6	High HAA5	288.94	East	Site 1	TTHM
SSS-13	0.061	7	0.052	5	High HAA5	331.35	East	Site 8	HAA5
SSS-14	0.069	2	0.060	1	High HAA5	333.21	East	Site 2	HAA5
SSS-15	0.064	5	0.058	2	High HAA5	491.68	East	Site 5	TTHM
SSS-16	0.048	16	0.046	9	High HAA5	579.20	East		
Stage 1, Site 1	0.050	15	0.032	13	Stage 1	203.22	East		
Stage 1, Site 2	0.051	14	0.040	10	Stage 1	31.05	East	Site 3	Stage 1
Stage 1, Site 3	0.060	8	0.037	11	Stage 1	423.44	East		
Stage 1, Site 4	0.055	13	0.025	17	Stage 1	496.81	West	Site 7	Stage 1 - Not highest but representative high site and located in West zone

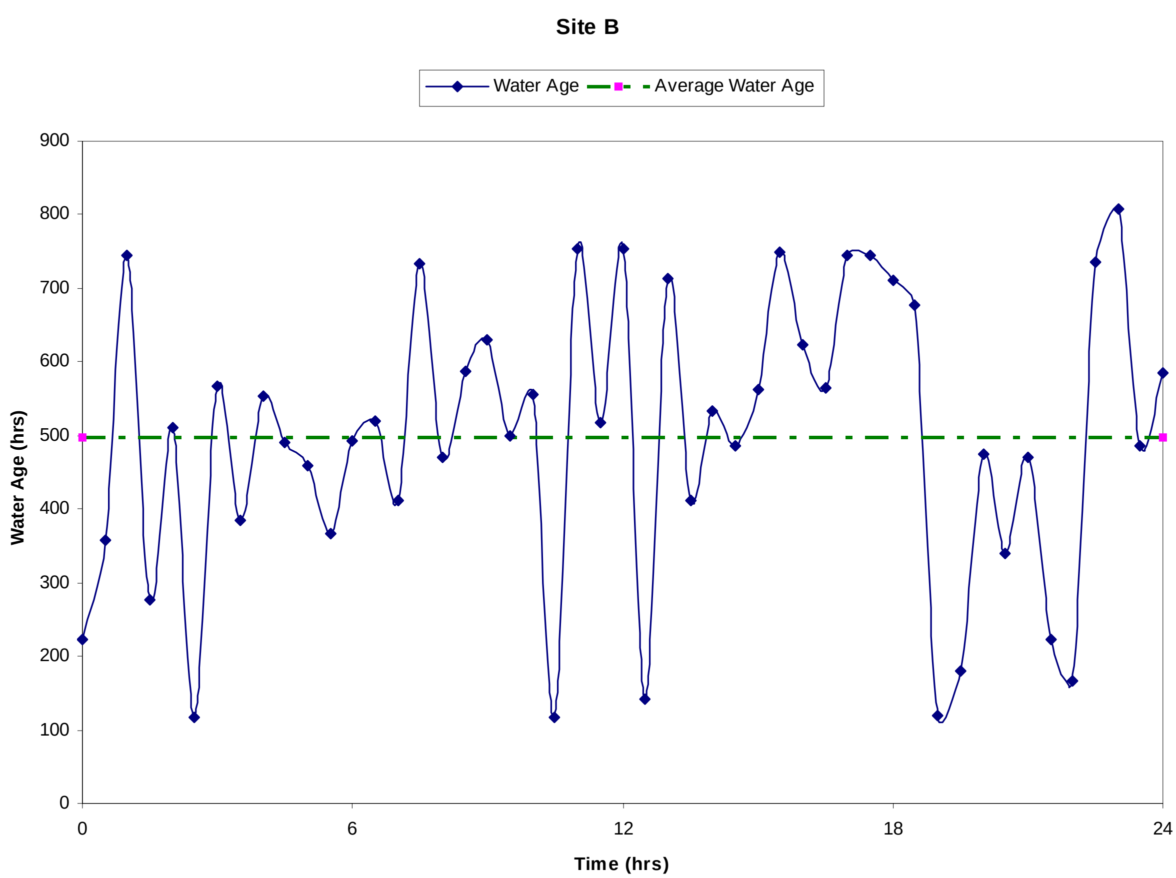
*Ranked from highest(1) to lowest (20)

SSS MONITORING LOCATION SELECTION (CONTINUED)

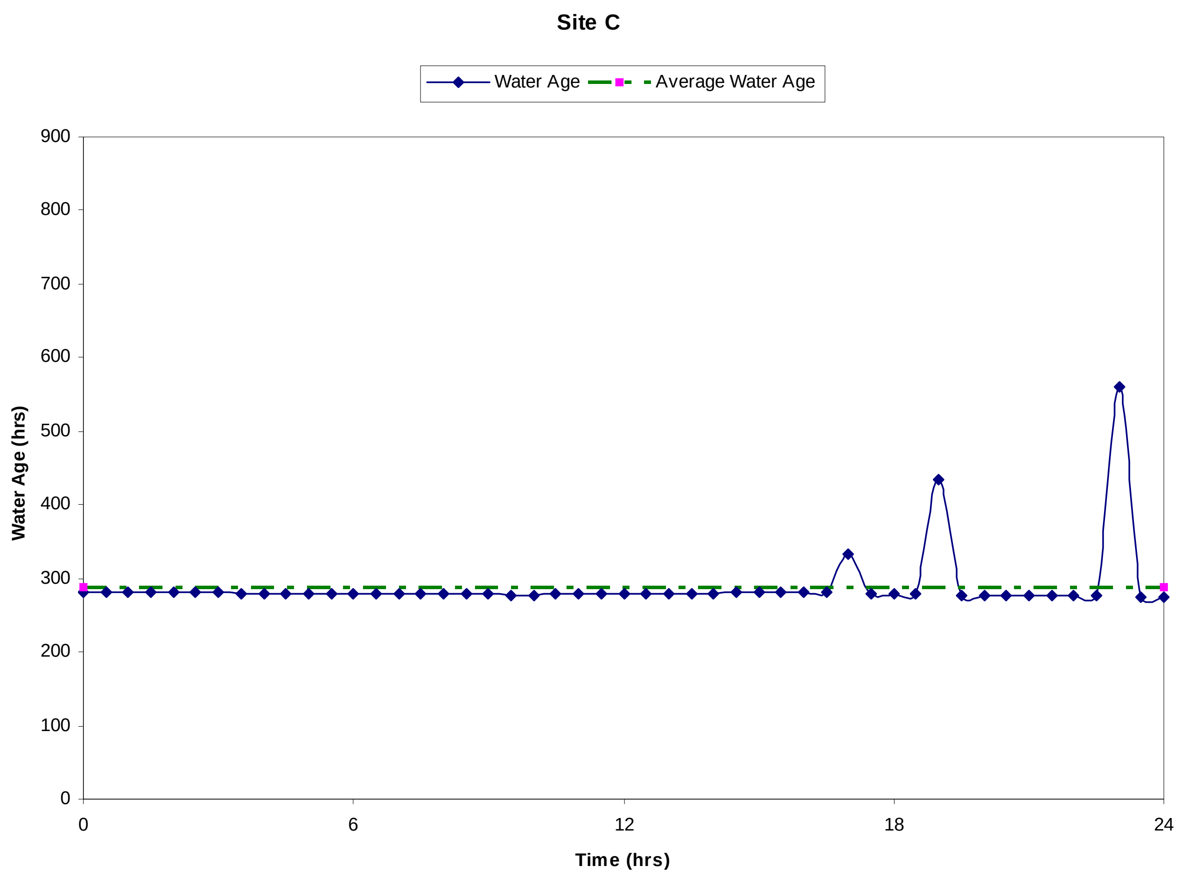
WATER AGE RESULTS GRAPHS



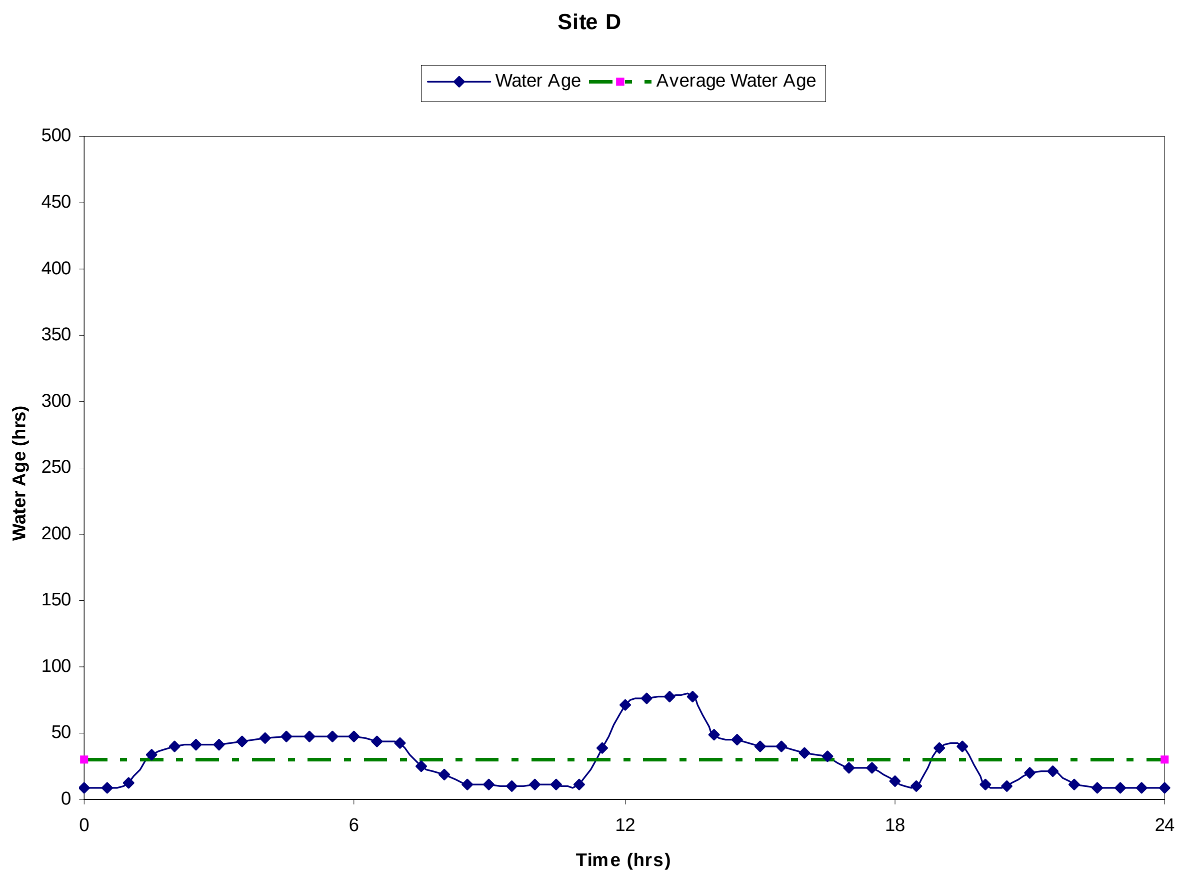
STAGE 2 DBPR MONITORING LOCATIONS
WATER AGE RESULTS



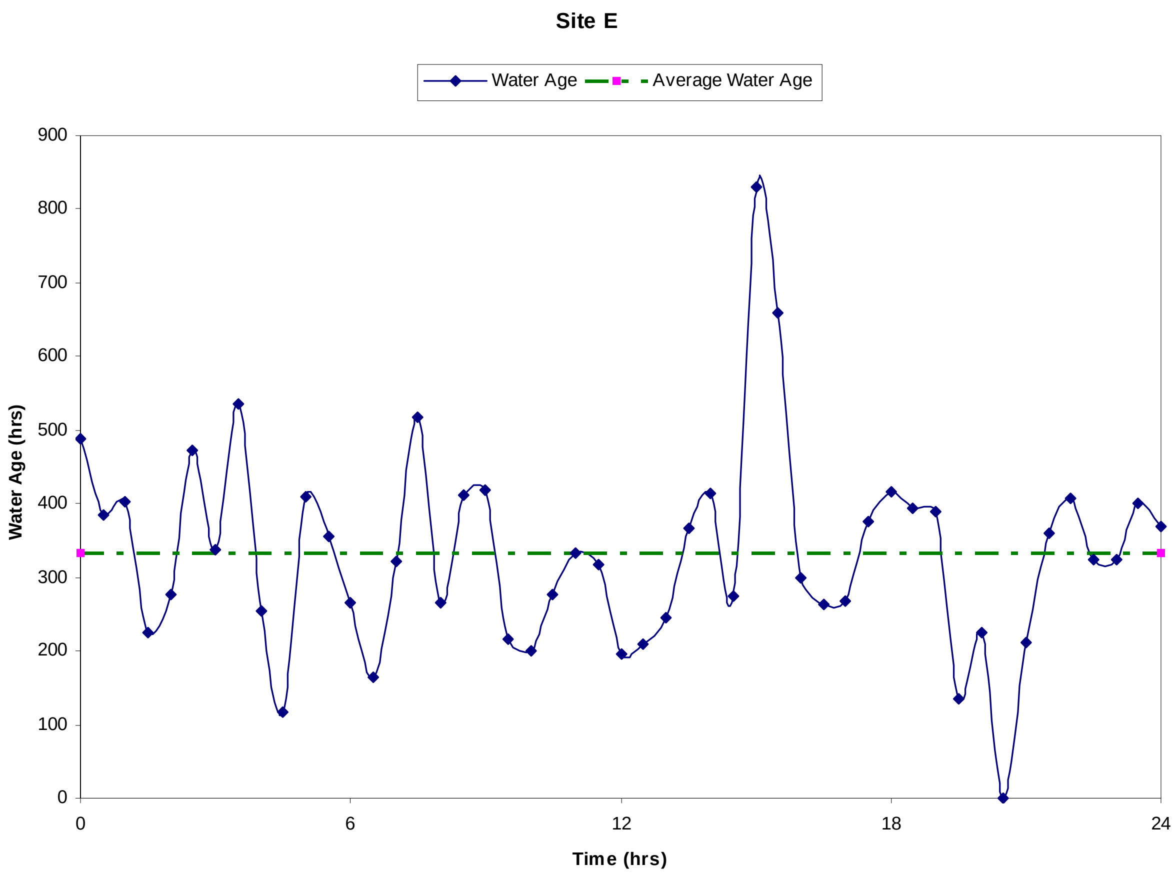
STAGE 2 DBPR MONITORING LOCATIONS
WATER AGE RESULTS (CONTINUED)



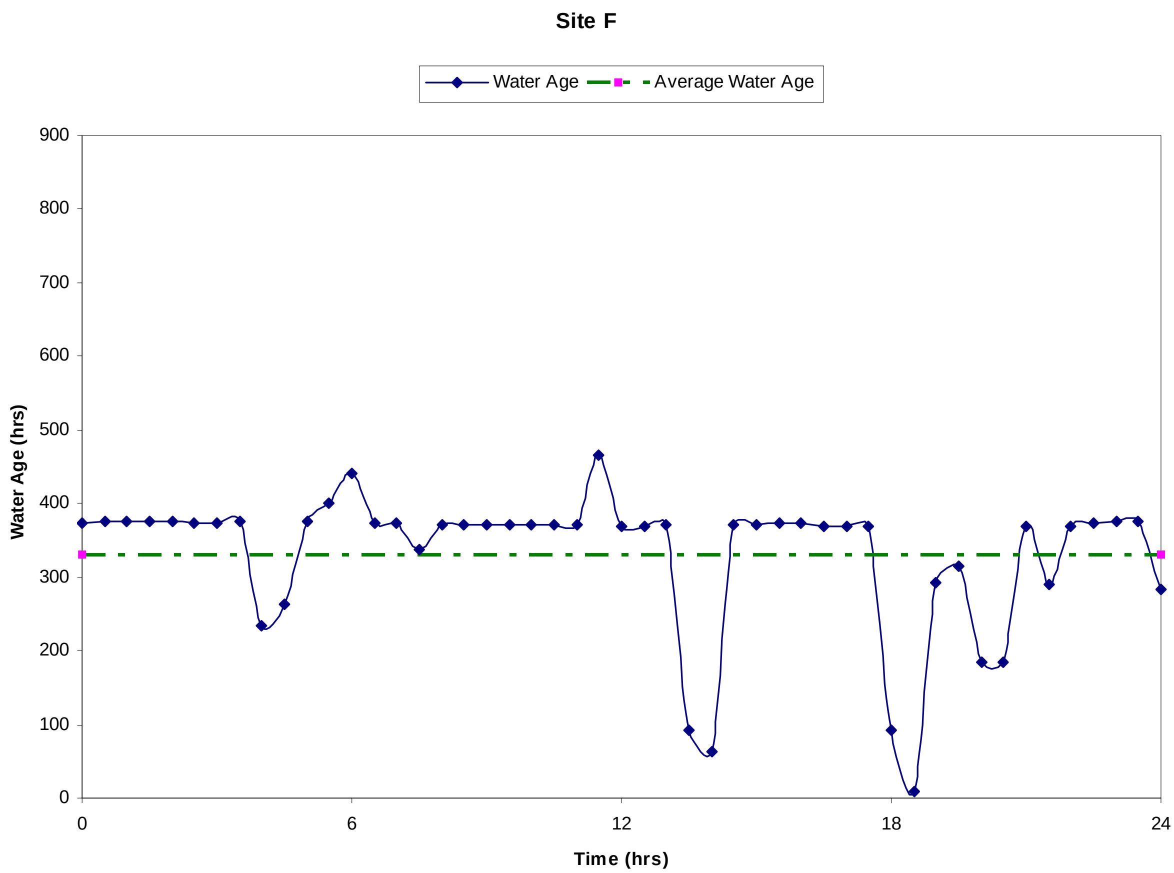
STAGE 2 DBPR MONITORING LOCATIONS
WATER AGE RESULTS (CONTINUED)



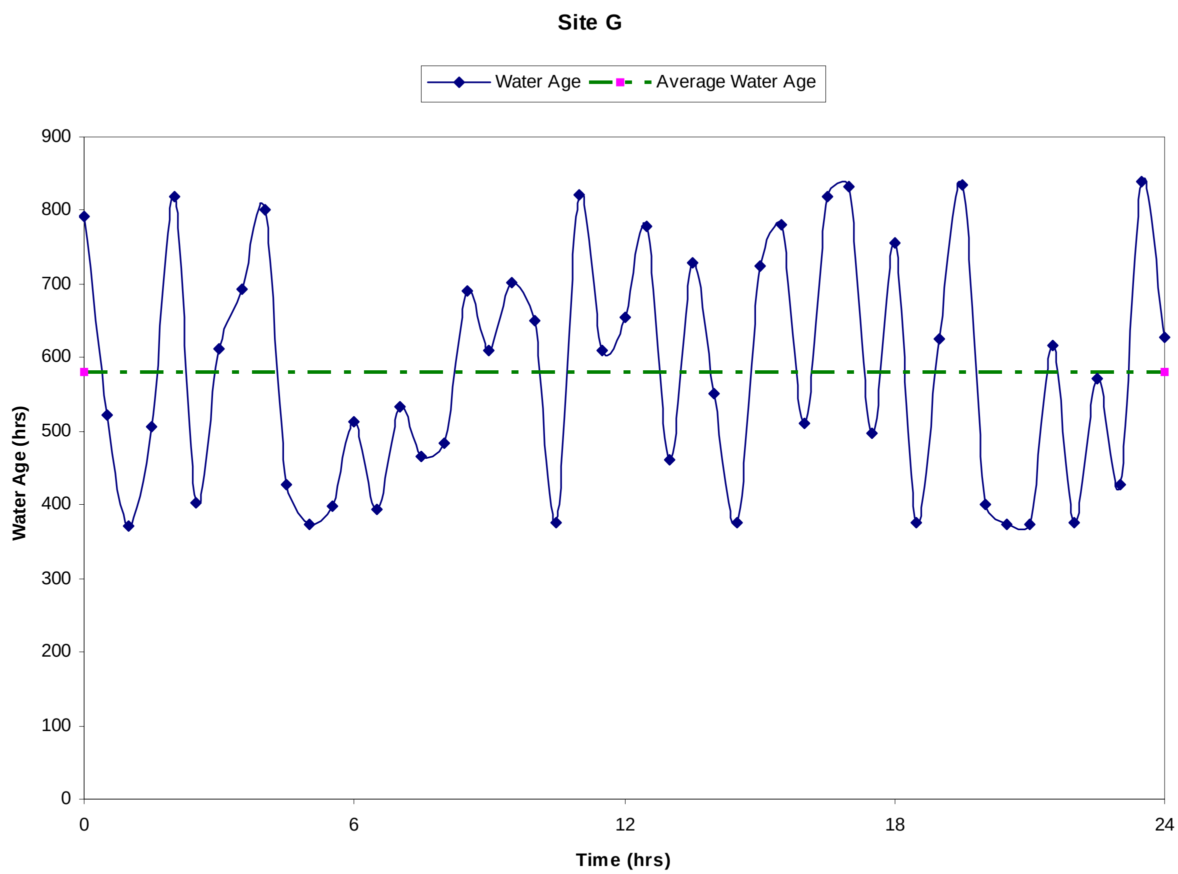
STAGE 2 DBPR MONITORING LOCATIONS
WATER AGE RESULTS (CONTINUED)



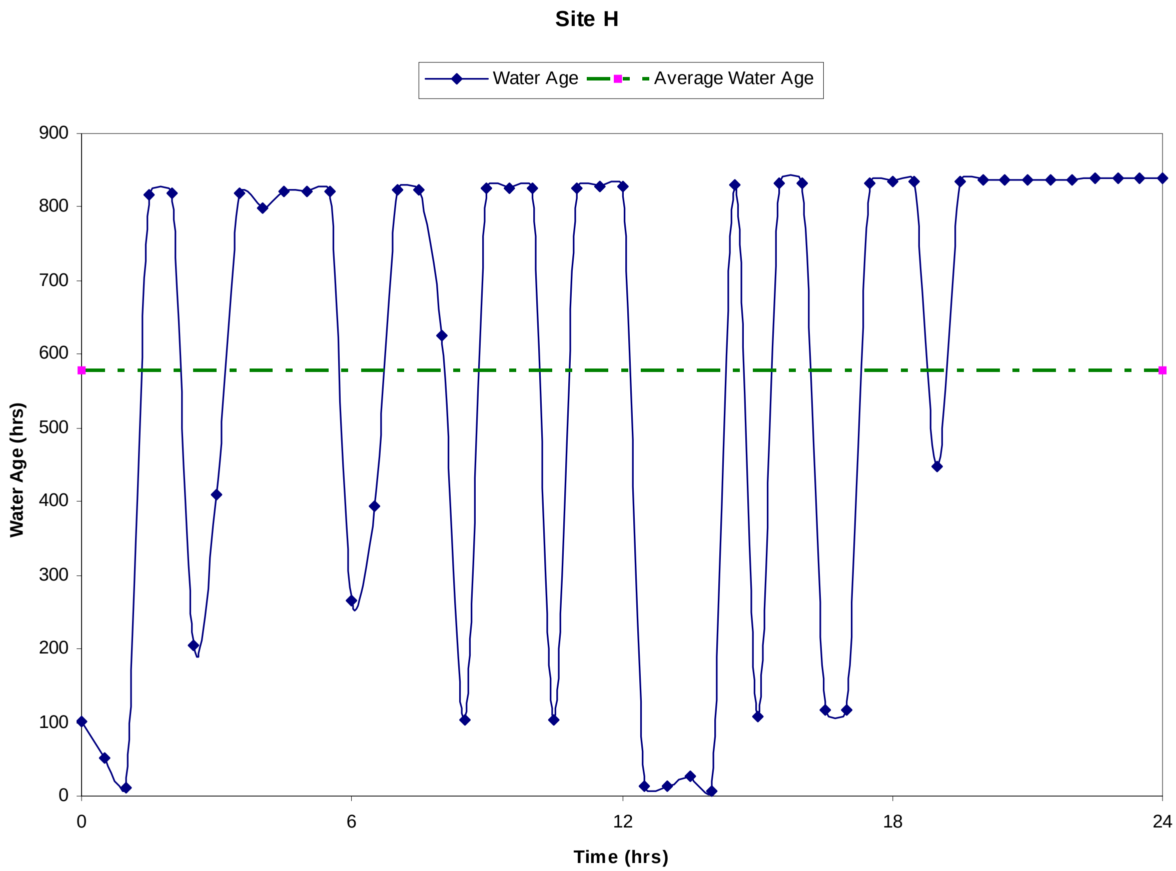
STAGE 2 DBPR MONITORING LOCATIONS
WATER AGE RESULTS (CONTINUED)



STAGE 2 DBPR MONITORING LOCATIONS
WATER AGE RESULTS (CONTINUED)



STAGE 2 DBPR MONITORING LOCATIONS
WATER AGE RESULTS (CONTINUED)



Form 5: IDSE Report for a Modeling SSS

V. SSS AND STAGE 1 DBPR COMPLIANCE MONITORING RESULTS

A. TTHM Results*

Site ID	Data Type	TTHM (mg/L)				LRAA
SSS-9 High TTHM	Sample Date			8/6/08		
	Sample Result			0.068		0.068
SSS-10 High TTHM	Sample Date			8/6/08		
	Sample Result			0.064		0.064
SSS-11 High TTHM	Sample Date			8/6/08		
	Sample Result			0.043		0.043
SSS-12 High HAA5	Sample Date			8/6/08		
	Sample Result			0.073		0.073
SSS-13 High HAA5	Sample Date			8/6/08		
	Sample Result			0.061		0.061
SSS-14 High HAA5	Sample Date			8/6/08		
	Sample Result			0.069		0.069
SSS-15 High HAA5	Sample Date			8/6/08		
	Sample Result			0.064		0.064
SSS-16 High HAA5	Sample Date			8/6/08		
	Sample Result			0.048		0.048
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					

Attach additional sheets as needed for SSS and Stage 1 DBPR results.

Form 5: IDSE Report for a Modeling SSS

V. SSS AND STAGE 1 DBPR COMPLIANCE MONITORING RESULTS

A. HAA5 Results*

Site ID	Data Type	HAA5 (mg/L)				LRAA
SSS-9 High TTHM	Sample Date			8/6/08		
	Sample Result			0.029		0.029
SSS-10 High TTHM	Sample Date			8/6/08		
	Sample Result			0.057		0.057
SSS-11 High TTHM	Sample Date			8/6/08		
	Sample Result			0.030		0.030
SSS-12 High HAA5	Sample Date			8/6/08		
	Sample Result			0.050		0.050
SSS-13 High HAA5	Sample Date			8/6/08		
	Sample Result			0.052		0.052
SSS-14 High HAA5	Sample Date			8/6/08		
	Sample Result			0.060		0.060
SSS-15 High HAA5	Sample Date			8/6/08		
	Sample Result			0.058		0.058
SSS-16 High HAA5	Sample Date			8/6/08		
	Sample Result			0.046		0.046
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					

Attach additional sheets as needed for SSS and Stage 1 DBPR results.

Appendix G

Complex Modeling Analysis Example for a System with Multiple Sources

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Complex Modeling Analysis Example for a System with Multiple Sources

Chapter 6 discussed modeling in general terms and the example included in Section 6.2.2 is applicable to systems with a single water source or multiple sources with similar water quality in terms of initial DBP concentrations and DBP formation potentials. However, some systems may have multiple sources with very different water quality characteristics. For example, a system may be served by both a groundwater source with low DBP precursor concentrations and a surface water source with high DBP precursor concentrations. For these special cases, a simple water age simulation will not capture the true variation in DBP concentrations because it does not distinguish between the different quality source waters. A high water age for the low DBP source may not result in a high DBP concentration. For example, in this case study the low DBP precursor source has a TTHM formation potential of 0.022 mg/L and the high DBP precursor source has a TTHM formation potential of 0.122 mg/L. Very old water from the low DBP precursor source may have a TTHM concentration on the order of 0.020 mg/L while relatively fresh water from the high DBP precursor source could have a TTHM concentration greater than 0.100 mg/L. Similar situations arise in consecutive systems where the water age entering the distribution system is different at different entry points.

Most modeling software that is currently available cannot apply a source-specific formation rate coefficient. The formation rate coefficient is currently specified as a single, globally-applied parameter. Special provisions should be made when using models to analyze systems with multiple sources of varying water quality. A source-adjusted water age can be calculated or an estimate of maximum possible DBP concentration can be developed. These are illustrated in the following example.

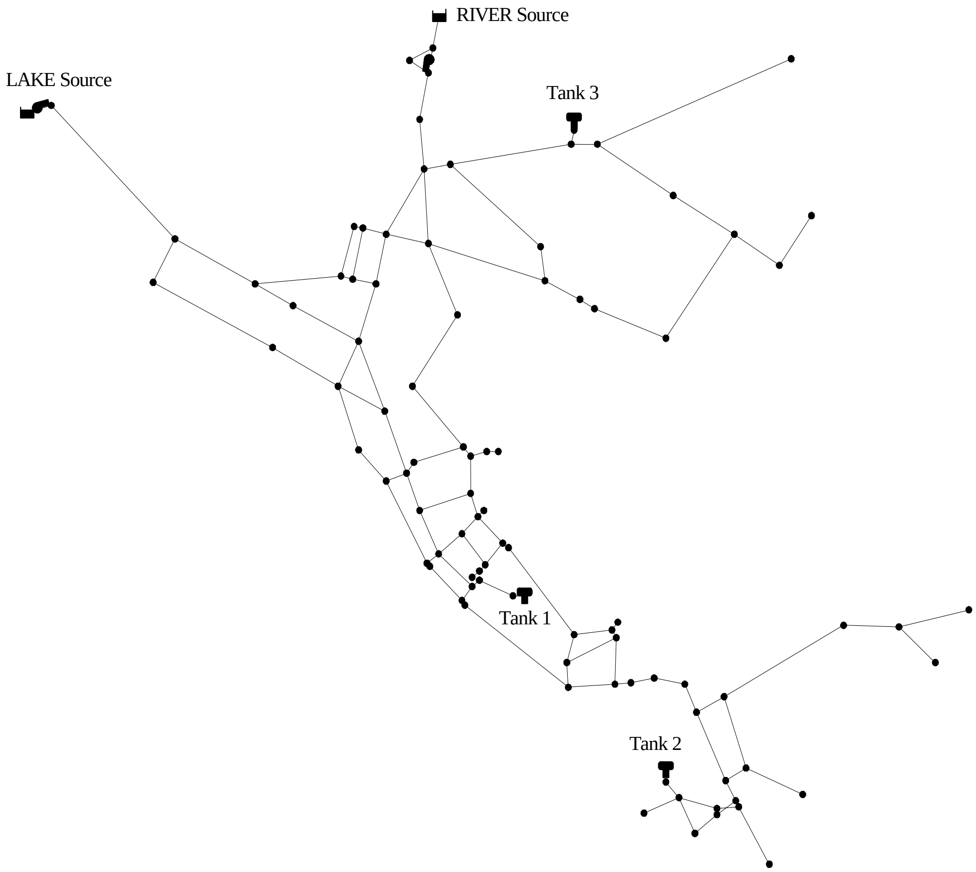
Systems in this category should submit additional documentation that describes their modeling procedures and analysis for selection of SSS monitoring sites.

Source-Adjusted Water Age Analysis

The system schematic is shown in Exhibit G.1. If the two sources in this example have very different DBP formation rates and ultimate formation potentials, then a simple water age analysis as performed in Section 6.2.2 will not necessarily identify the locations with highest DBP levels. For example, if the water in Tank 3 comes mostly from the RIVER source and this source has a much lower DBP formation potential than the LAKE source, then this tank may no longer contain water with the highest DBP concentration, even though it has the oldest water in the system.

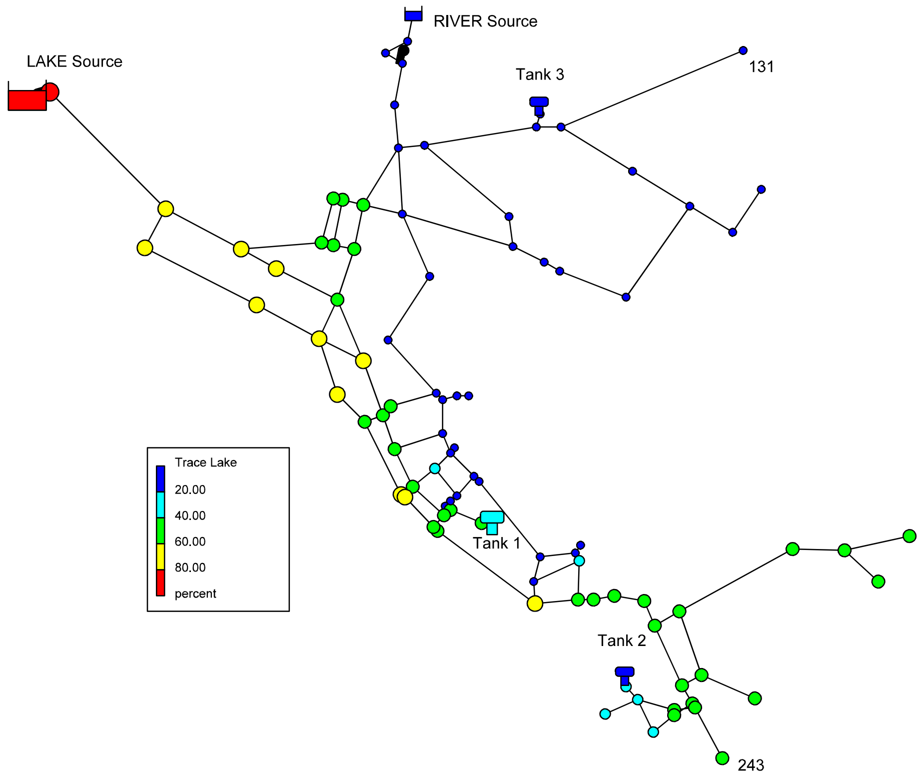
Ideally, one would like to account for both the individual DBP formation potential and kinetics for each source water as well as the blending of these waters together in an integrated fashion when simulating the system. Unfortunately, the current generation of network water quality models is not capable of directly performing this kind of analysis. However, one can perform a series of simulations and calculations to approximately account for significant differences in DBP production between different source waters.

Exhibit G.1 Schematic of the Case Study Distribution System



Calculating a source-adjusted water age for this case study requires a source trace analysis and data on the ultimate DBP formation potential (maximum concentration) for each source. The first step is to calculate the percentage of water from each source for all nodes in the system. These values can be obtained by changing the type of water quality analysis from AGE to TRACE, selecting the LAKE source as the source to be traced, and re-running the simulation. Exhibit G.2 displays the average percentage of water from the LAKE source reaching each node. The percentage from the RIVER source at any node would simply be 100 minus the LAKE percentage. Note how the nodes on the left side of the network receive mainly LAKE water while the nodes in the upper right, which had the oldest water in the example in Section 6.2.2, receive the least amount of LAKE water.

Exhibit G.2 Average Percentage of Water From the LAKE Source



The adjusted water age for each node of the system can be calculated as a weighted average by using the following equation:

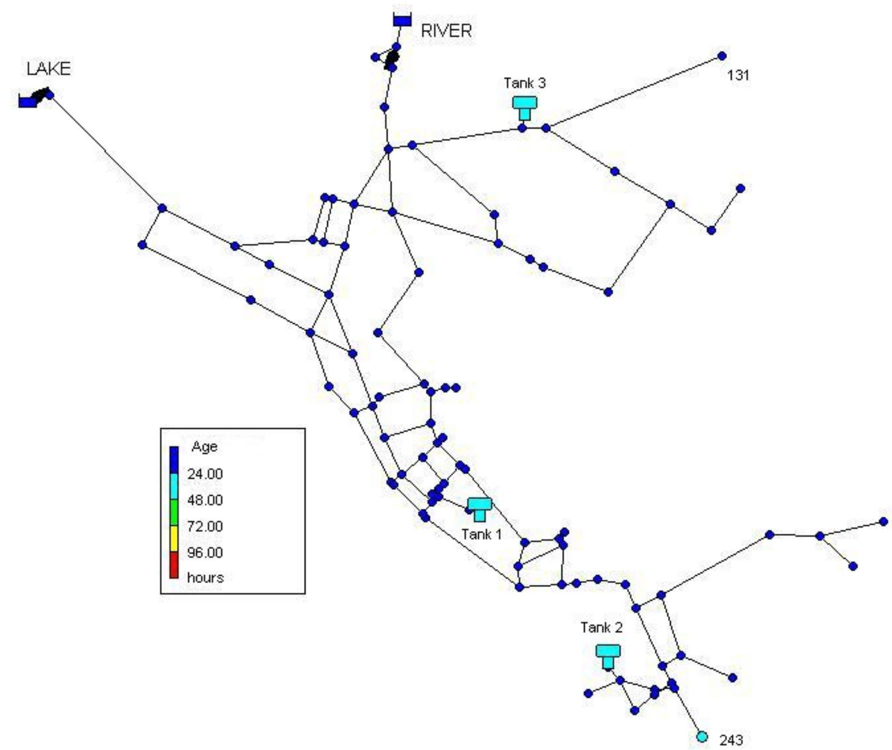
Adjusted Age = Age * (P_{LAKE} + P_{RIVER} / R) / 100

where Age = the original age estimate,
P_{LAKE} = percentage of LAKE water,
P_{RIVER} = percentage of RIVER water, and
R = ratio of LAKE DBP formation potential to RIVER DBP formation potential.

A similar version of this equation can be used with more than two sources by including all sources in the weighted average.

In this case, a review of historical data showed that R was equal to 5.5, i.e. the LAKE source has the potential to form 5.5 times greater DBP concentrations than the RIVER source. Exporting both the age results and the source tracing results from the model into a spreadsheet and applying the formula shown above gives the resulting source-adjusted water age throughout the network, as shown in Exhibit G.3. Comparing these results with the unadjusted ages in Section 6.2.2 shows a similar pattern in terms of which nodes have the highest ages but a much lower adjusted water age overall. This demonstrates that the RIVER water remains in the system the longest but has much lower potential to form DBPs than the LAKE water. The results of the adjusted water age analysis demonstrate the importance of considering different sources. For example, node 131, which was predicted to have the second highest water age in the simple water age analysis, has an adjusted water age of only 22.5 hours.

Exhibit G.3 Source-Adjusted Water Age Throughout the Study Area



Rather than using water age as the basis for selecting sampling sites, another option would be to model DBP formation and thereby directly identify locations with high levels of DBPs. The required input data for each DBP of interest (i.e., each chemical species) and for each water source must be available:

1. the DBP concentration leaving the treatment plant
2. a first-order rate constant based on laboratory tests
3. an ultimate formation potential (maximum concentration) of the DBP

Exhibit G.4 lists the values of these parameters for TTHM for the case study. Note the large difference in the formation potential and formation rate coefficient between the two sources.

Exhibit G.4 Total THM Growth Parameters for the Case Study Example

	RIVER Source	LAKE Source
Total THM at Distribution System Entry Point (mg/L)	0.012	0.108
Total THM Formation Potential, F (mg/L)	0.022	0.122
First-Order Growth Constant, k (1/days)	2.3	15.1

These parameters are normally used in the following THM growth expression that is applied system-wide:

$$C = Co + (F - Co)(1 - \exp(-kt))$$

where C = TTHM concentration (mg/L),
Co = initial TTHM concentration leaving the source (mg/L),
F = ultimate TTHM formation (mg/L),
k = growth constant (1/days), and
t = time in days
exp = natural log, e.

Because there are two distinctly different THM sources in this example, the above equation cannot be applied directly. Instead, as was done for the adjusted water age analysis, a separate THM growth simulation should be made for each individual source with the results of each combined outside of the model according to the percent of water from each source. Or, to simulate a worst case scenario, a DBP simulation could be made using the appropriate source concentrations for each source but using the highest values for F and k for the global formation equation. The results from this worst-case simulation are given in Exhibit G.5. The results for the DBP modeling are quite different from the results for the water age analysis at certain nodes, as shown in Exhibit G.6.

The results for this case study depend greatly on the system configuration and the operational conditions. This is a simple representation of a distribution system and does not reflect the level of complexity that is present in real systems. However, this example does illustrate the difficulty in predicting water age or DBP concentrations for systems with multiple sources with varying water quality characteristics.

Exhibit G.5 Maximum Possible TTHM Simulation Results

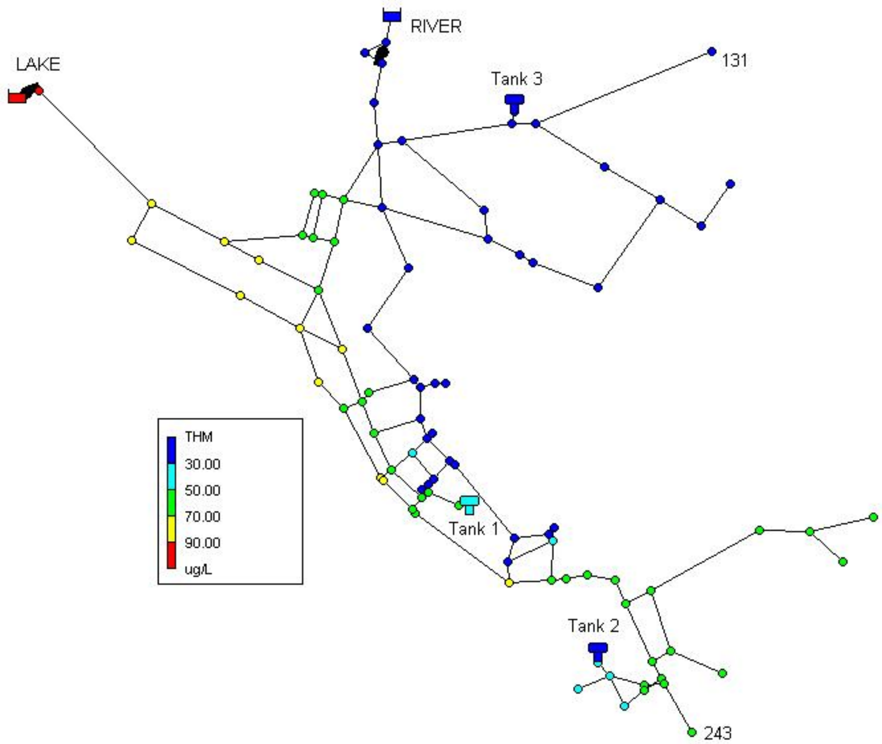


Exhibit G.6 Summary of Results from Different Analyses

Node ID	Average Water Age hours	Source Adjusted Water Age hours	Max. THM formation ug/l
10	0.03	0.03	108.00
15	72.89	12.67	12.79
20	114.22	19	11.91
35	14.9	4.53	27.86
40	31.35	17.63	57.59
50	46.22	20.49	43.86
60	0.08	0.01	12.00
601	0.8	0.13	12.00
61	0.21	0.04	12.00
101	8.33	5.85	73.77
103	6.28	5.21	88.52
105	9.06	6.15	71.02
107	9.91	7.7	82.53
109	9.86	7.29	78.01
111	8.69	6.11	73.90
113	9.68	6.49	70.14
115	9.47	6.03	66.19
117	9.16	5.88	66.86
119	11.56	2.41	16.86
120	10.69	5.91	56.55
121	10.93	1.83	12.08
123	3.39	0.57	12.00
125	67.79	11.3	11.99
127	108.72	18.09	11.92
129	113.89	18.95	11.91
131	135.44	22.53	11.90
139	108.63	18.07	11.92
141	97.77	16.46	12.16
143	76.02	13.18	12.76
145	32.38	5.92	13.87
147	24.66	4.67	14.65
149	30.58	5.88	14.96
151	39.84	7.4	14.19
153	70.11	11.7	12.02
157	10.68	2.23	16.84
159	10.54	2.19	16.73
161	10.75	2.31	17.60
163	10.75	2.31	17.59
164	20.74	4.28	16.57
166	42.97	8.85	16.51
167	11.3	2.53	18.64
169	11.16	2.5	18.66
171	11.39	2.56	18.67
173	11.38	2.55	18.64
177	22.1	13.43	62.77
179	25.41	16.16	66.04

181	**14.87**	**4.52**	**27.83**
183	**19.29**	**12.76**	**68.97**
184	**15.85**	**10.53**	**69.40**
185	**15.68**	**10.45**	**69.55**
187	**10.59**	**7.12**	**70.29**
189	**11.59**	**7.37**	**66.08**
191	**10.09**	**6.67**	**68.98**
193	**9.58**	**6.03**	**65.33**
195	**10.06**	**6.26**	**64.62**
197	**12.26**	**8.72**	**74.89**
199	**11.34**	**2.54**	**18.56**
201	**11.32**	**2.58**	**19.02**
203	**11.38**	**2.58**	**18.98**
204	**10.3**	**6.95**	**70.65**
205	**15.51**	**10.46**	**70.47**
206	**15.29**	**9.2**	**62.13**
207	**15.17**	**9.14**	**62.24**
208	**15.62**	**9.39**	**62.07**
209	**14.98**	**9.27**	**64.12**
211	**14.7**	**9.47**	**66.99**
213	**15.32**	**9.56**	**64.75**
215	**22.64**	**13.76**	**62.86**
217	**24.55**	**14.76**	**62.10**
219	**33.48**	**19.68**	**60.53**
225	**34.01**	**20.14**	**61.03**
229	**19.75**	**12.01**	**62.84**
231	**31.31**	**18.81**	**62.02**
237	**19.98**	**12.13**	**62.75**
239	**25.77**	**14.89**	**59.38**
241	**28.85**	**16.34**	**58.05**
243	**78.49**	**44.19**	**57.66**
247	**30.62**	**17.24**	**57.66**
249	**28.14**	**16.17**	**59.02**
251	**41.28**	**20.12**	**48.96**
253	**46.92**	**22.56**	**48.17**
255	**43.68**	**21.09**	**48.41**
257	**9.85**	**5.99**	**62.94**
259	**9.6**	**6.06**	**65.60**
261	**9.09**	**5.87**	**67.24**
263	**9.14**	**5.94**	**67.76**
265	**10.82**	**2.42**	**18.58**
267	**10.36**	**6.44**	**64.48**
269	**11.13**	**4.19**	**36.21**
271	**11.14**	**2.7**	**20.71**
273	**10.74**	**3.42**	**29.46**
275	**10.39**	**3.55**	**32.22**
River Source	**0**	**0**	**12.00**
Lake Source	**0**	**0**	**108.00**
Tank 1	**75.35**	**25.63**	**31.97**
Tank 2	**122.41**	**35.84**	**26.50**
Tank 3	**189.26**	**31.48**	**11.85**

Appendix H

Example IDSE Standard Monitoring Plan and Report for a Surface Water System Serving 160,000 People

This appendix provides an example IDSE standard monitoring plan and report for a surface water system serving 160,000 people. For this example, the state did not require any modifications to the standard monitoring plan.

Chapter 7 discusses the standard monitoring plan, conducting standard monitoring, selection of Stage 2 DBPR sites, and preparing the IDSE report. The application of the basic guidance on standard monitoring location selection and Stage 2 DBPR compliance monitoring location selection is shown in this example.

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Form 6: Standard Monitoring Plan

I. GENERAL INFORMATION

A. PWS Information*

B. Date Submitted* **Sept 15, 2006**

PWSID: US1111111

PWS Name: Elm City

PWS Address: 1234 Main Street

City: Elm City State: US Zip: 99999

Population Served: 160,000

System Type:	Source Water Type:	Buying / Selling Relationships:
☒ CWS ☐ NTNCWS	☒ Subpart H ☐ Ground	☐ Consecutive System ☐ Wholesale System ☒ Neither

C. PWS Operations

Residual Disinfectant Type: ☒ Chlorine ☐ Chloramines ☐ Other:______________

Number of Disinfected Sources: 2___ Surface ___GWUDI ____ Ground ___ Purchased

D. Contact Person*

Name: Mr. Ronald Doe, P.E.

Title: Water System Superintendent

Phone #: 123-555-0000 Fax #: 123-555-0001

E-mail: Rdoe@ci.elmcity.us

II. IDSE REQUIREMENTS*

A. Number of Sites		B. Schedule	C. Standard Monitoring Frequency
Total:	16		
Near Entry Point:	3	☒ Schedule 1	☐ During peak historical month (1 monitoring period)
Avg Residence Time:	4	☐ Schedule 2	
High TTHM:	5	☐ Schedule 3	☐ Every 90 days (4 monitoring periods)
High HAA5:	4	☐ Schedule 4	☒ Every 60 days (6 monitoring periods)

Form 6: Standard Monitoring Plan

III. SELECTING STANDARD MONITORING SITES

A. Data Evaluated Put a "✓" in each box corresponding to the data that you used to select each type of standard monitoring site. Check all that apply.

Data Type	Type of Site			
	Near Entry Pt.	**Avg. Residence Time**	**High TTHM**	**High HAA5**
System Configuration				
Pipe layout, locations of storage facilities		✓	✓	✓
Locations of sources and consecutive system entry points	✓			
Pressure zones		✓	✓	✓
Information on population density			✓	
Locations of large customers		✓		
Water Quality and Operational Data				
Disinfectant residual data		✓	✓	✓
Stage 1 DBP data			✓	✓
Other DBP data				
Microbiological monitoring data (e.g., HPC)		✓	✓	
Tank level data, pump run times		✓	✓	✓
Customer billing records		✓	✓	✓
Advanced Tools				
Water distribution system model				
Tracer study				

B. Summary of Data* Provide a summary of data you relied on to justify standard monitoring site selection. (*attach additional sheets if needed*)

Both plants operate year round. We used residual and HPC data from Total Coliform sites collected from 2003 through 2005 with our current system map to select sites. We evaluated chlorine residual data from June and July (range from 0.2 - 2.3 mg/L), and calculated our system average (1-1.2 mg/L). We looked for sites with levels close to this average for average residence time sites, although we used HPC data, water age estimates, and pipe data to determine the cause of low residuals. We have estimated our high water age in the distribution system to be near 5 days. We relied on tank and residual data to select high TTHM sites. For high HAA5 sites, we also evaluated HPC data to eliminate areas of suspected biological activity, and Stage 1 sites as a reference point. We plotted all of our candidate sites on our map to ensure that they are geographically and hydraulically diverse.

Form 6: Standard Monitoring Plan

IV. JUSTIFICATION OF STANDARD MONITORING SITES*

Standard Monitoring Site ID (from map)[1]	Site Type	Justification
Standard Monitoring #1	☒ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #2	☒ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #3	☐ Near Entry Pt ☒ Avg. Res. Time ☐ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #4	☐ Near Entry Pt ☒ Avg. Res. Time ☐ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #5	☐ Near Entry Pt ☒ Avg. Res. Time ☐ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #6	☐ Near Entry Pt ☒ Avg. Res. Time ☐ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #7	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☒ High HAA5	See attached sheets.
Standard Monitoring #8	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☒ High HAA5	See attached sheets.

[1] *Verify that site IDs match IDs in Section IV and on your distribution system schematic (See Section VII of this form). Attach additional copies if you are required to select more than 8 standard monitoring locations or need more room.*

Form 6: Standard Monitoring Plan

V. PEAK HISTORICAL MONTH AND PROPOSED STANDARD MONITORING SCHEDULE

A. Peak Historical Month* __July______________

B. If Multiple Sources, Source Used to Determine Peak Historical Month
(write "N/A" if only one source in your system)

Both Hardwood WTP and Softwood WTP had same peak historical month based on Stage 1 TTHM data.

C. Peak Historical Month Based On* (check all that apply)

☒ High TTHM

☐ Warmest water temperature

☐ High HAA5

If you used other information to select your peak historical month, explain here (*attach additional sheets if needed*)

____

____

____

D. Proposed Standard Monitoring Schedule*

Standard Monitoring Site ID (from map) [1]	Projected Sampling Date (date or week) [2]					
	period 1	period 2	period 3	period 4	period 5	period 6
SM #1	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2
SM #2	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2
SM #3	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2
SM #4	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2
SM #5	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2
SM #6	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2
SM #7	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2
SM #8	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2

[1] *Verify that site IDs match IDs in Section IV and on your distribution system schematic (See Section VII of this form). Attach additional copies if you are required to select more than 8 standard monitoring locations.*

[2] *period = monitoring period. Complete for the number of periods from Section II.C. Can list exact date or week (e.g., week of 7/9/07)*

Form 6: Standard Monitoring Plan

VI. PLANNED STAGE 1 DBPR COMPLIANCE MONITORING SCHEDULE*

Stage 1 DBPR Monitoring Site ID (from map) [1]	Projected Sampling Date (date or week) [2]			
	Period 1	Period 2	Period 3	Period 4
Stage 1 #1	10/2007, wk 2	1/2008, wk 2	4/2008, wk2	7/2008, wk 2
Stage 1 #2	10/2007, wk 2	1/2008, wk 2	4/2008, wk2	7/2008, wk 2
Stage 1 #3	10/2007, wk 2	1/2008, wk 2	4/2008, wk2	7/2008, wk 2
Stage 1 #4	10/2007, wk 2	1/2008, wk 2	4/2008, wk2	7/2008, wk 2
Stage 1 #5	10/2007, wk 2	1/2008, wk 2	4/2008, wk2	7/2008, wk 2
Stage 1 #6	10/2007, wk 2	1/2008, wk 2	4/2008, wk2	7/2008, wk 2
Stage 1 #7	10/2007, wk 2	1/2008, wk 2	4/2008, wk2	7/2008, wk 2
Stage 1 #8	10/2007, wk 2	1/2008, wk 2	4/2008, wk2	7/2008, wk 2

[1] Verify that site IDs match IDs on your distribution system schematic (See Section VII of this form). Attach additional copies if you are required to monitor at more than 8 Stage 1 DBPR sites.

[2] period = monitoring period. Complete for the number of periods in which you must conduct Stage 1 DBPR monitoring during IDSE monitoring. Can list exact date or week (e.g., week of 7/9/07)

VII. DISTRIBUTION SYSTEM SCHEMATIC*

ATTACH a schematic of your distribution system.

Distribution system schematics are not confidential and should not contain information that poses a ***security risk*** to your system. EPA recommends that you use one of two options:

Option 1: Distribution system schematic with no landmarks or addresses indicated. Show locations of sources, entry points, storage facilities, standard monitoring locations, and Stage 1 compliance monitoring locations (required). Also include pressure zone boundaries and locations of pump stations. Provide map scale.

Option 2: City map without locations of pipes indicated. Show locations of sources, entry points, storage facilities, standard monitoring locations, and Stage 1 compliance monitoring locations (required). Also include boundaries of the distribution system, pressure zone boundaries and locations of pump stations. Provide map scale.

Form 6: Standard Monitoring Plan

VIII. ATTACHMENTS

- ☒ Distribution System Schematic* (Section VII).
- ☒ Additional sheets for the summary of data or site justifications (Sections III and IV).
- ☒ Additional copies of Page 3 for justification of Standard Monitoring Sites (Section IV). **Required if** you are a subpart H system serving **more than 49,999 people** or a ground water system serving **more than 499,999 people**.
- ☐ Additional sheets for explaining how you used data other than TTHM, HAA5, and temperature data to select your peak historical month (Section V).
- ☒ Additional copies of Page 4 for proposed monitoring schedule (Section V). **Required if** you are a subpart H system serving **more than 49,999 people** or a ground water system serving **more than 499,999 people**.
- ☐ Additional sheets for planned Stage 1 DBPR compliance monitoring schedule (Section VI).

Total Number of Pages in Your Plan 11___

Note: Fields with an asterisk (*) are required by the Stage 2 DBPR

Form 6: Standard Monitoring Plan

Attachment #1

IV. JUSTIFICATION OF STANDARD MONITORING SITES*

Standard Monitoring Site ID (from map)[1]	Site Type	Justification
Standard Monitoring #9	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☒ High HAA5	See attached sheets.
Standard Monitoring #10	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☒ High HAA5	See attached sheets.
Standard Monitoring #11	☐ Near Entry Pt ☐ Avg. Res. Time ☒ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #12	☐ Near Entry Pt ☐ Avg. Res. Time ☒ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #13	☐ Near Entry Pt ☐ Avg. Res. Time ☒ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #14	☐ Near Entry Pt ☐ Avg. Res. Time ☒ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #15	☐ Near Entry Pt ☐ Avg. Res. Time ☒ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #16	☐ Near Entry Pt ☐ Avg. Res. Time ☒ High TTHM ☐ High HAA5	See attached sheets.

[1] Site IDs should match IDs in Section IV and on your distribution system schematic (See Section VII of this form). Attach additional copies of this sheet if you are required to select more than 8 standard monitoring locations or need more room.

Standard Monitoring #1
Entry point to the distribution system for the southern part of the system (Hardwood Water Treatment Plant). This is where the first group of customers receives water.

Standard Monitoring #2
Entry point to the distribution system for the Softwood River Water Treatment Plant. This location is just after the high service pumps at the Water Treatment Plant.

Standard Monitoring #3
Represents average residence time of water in the southern section of the system. In the summer months, this TCR site typically has chlorine residuals that are close to our calculated system-wide average for the area served by the Hardwood WTP (1.2 mg/L). There are no storage facilities between the treatment plant and this location. The site is on an 8 inch water main.

Standard Monitoring #4
Represents average residence time of water in the southern part of the system. There are no storage facilities between the treatment plant and this location. Although this site is physically close to standard monitoring site #3, site #3 and site #4 are at the edges of different pressure zones. The chlorine residual concentration at this location is typically 30 percent less than the system-wide average (0.8 mg/L) in the summer months. However, we attribute this additional loss of chlorine to the fact that the transmission and distribution lines serving this area are older unlined cast iron and have been observed to show significant build-up of corrosion by-products. The site is on a 12 inch transmission main.

Standard Monitoring #5
Represents average residence time of water in northern part of the system. In the summer months, this TCR site typically has chlorine residuals that are close to our calculated system-wide average for the area served by the Softwood WTP (1.0 mg/L). There are no storage facilities between the treatment plant and this location. The site is in a residential area with predominantly 8 and 10 inch water mains.

Standard Monitoring #6
Represents average residence time in the northern part of the system. Although chlorine residual in the summer months is on the low end of the system-wide average (1.0 mg/L), we think this can be attributed to some older cast iron water mains in the area. Even though it is close in proximity to standard monitoring site #5, it is at the edge of a different pressure zone from Standard Monitoring Site #5. The site is on a 12 inch main.

Standard Monitoring #7
Represents high HAA5 levels. Sample location is in an area approaching the perimeter of the system in the western pressure zone. Chlorine residual at this location ranges between 0.3 and 0.6 mg/L in the summer months, and the HPCs are consistently below 100 cfu/mL year round. The site is on a 6 inch main and is not downstream of any storage facilities.

Standard Monitoring #8
Represents high HAA5 levels in the southern part of the system and is hydraulically downstream of the Oakville Ground Storage Facility, which has a residence time of about 1 ½ days in the summer months. This is a TCR site with residual concentrations ranging from 0.4 to 0.7 mg/L in the summer months and HPCs are usually less than 200 cfu/mL. The site is on an 8 inch water main.

Standard Monitoring #9
Represents high HAA5 levels in the mixing zone. This site is sometimes served by water that is hydraulically downstream of the Weeping Willow Tank. The chlorine residual varies. It is consistently less than 1.0 mg/L but never below 0.4 mg/L and the HPCs are usually low (below 100 cfu/mL). The site is in a commercial area served by 8 and 10 inch water mains.

Standard Monitoring #10
Represents high HAA5 levels in the northern part of the system. The site is not served by any storage facilities, but the location is near the north-western perimeter of the system where we have not historically monitored for TTHM or HAA5. It is in a business district served mainly by 8 inch water mains. The chlorine residual levels at this location range from 0.5 to 0.8 mg/L in the summer, and HPC levels are generally < 100 cfu/mL.

Standard Monitoring #11
Represents high TTHM levels. This site is in the central portion of the system and is served by the Hardwood WTP. It is in a sparsely populated area with larger service lines (10 and 12 inches). Chlorine residuals near this location are on the low side (0.3 - 0.5) in the summer. We are concerned that this area has high water age because of the relatively large pipe size and low demand. We have not historically monitored for TTHM or HAA5 in this area.

Standard Monitoring #12
Represents high TTHM levels. This site is at a location on the northern edge of the central pressure zone, geographically distant from the Hardwood WTP. It is at the entrance to a small subdivision (approx 15 houses) in the Oakville community and is on a 6 inch water line. It is not served by any storage facilities, but residuals in this area are very low in the summer months (< 0.2 mg/L). Also, our operations staff noted that this is a historic problem area in terms of customer complaints of stale or discolored water and chlorine residual maintenance.

Standard Monitoring #13
Represents high TTHM levels in the south-eastern portion of this system on a 4-inch water line. This location has been problematic in the past due to positive total coliform test results, non-detectable chlorine residuals, high heterotrophic plate count results, and odor complaints. A 4-inch blow-off was installed downstream of this location, but it continues to have periodic poor water quality. Although close in proximity, it is at the edge of a different pressure zone from our Stage 1 compliance monitoring site # 8.

Standard Monitoring #14
Represents high TTHM levels. This site is in the mixing zone and is influenced by both the Softwood and Hardwood WTPs. During high demand periods, it receives water from the Appleville Storage Tank, which has a residence time of 2 days in the summer. Chlorine residuals at this location are generally very low, indicating this may be a hydraulic dead end.

Standard Monitoring #15
Represents high TTHM levels in the northwestern corner of the system. This location is downstream from the Cypressville Storage Tank, which has a residence time of 1 to 2 days in the summer. The site is on a 6 inch water main leading into several sparsely populated residential areas. There are often low chlorine residuals in the areas downstream of this tank.

Standard Monitoring #16
Represents high TTHM levels at the edge of the mixing zone. This sampling location is in the mixed zone before the last group of connections near the end of the distribution system. It is on a 6 inch line and receives water from the Cypressville Storage Tank. We have limited chlorine residual data for this area, but operators suspect that it is low in the summer due to the high water age in this area.

Form 6: Standard Monitoring Plan

Attachment #4

V. PEAK HISTORICAL MONTH AND PROPOSED STANDARD MONITORING DATES

A. Peak Historical Month* ______________

B. If Multiple Sources, Source Used to Determine Peak Historical Month
(write "N/A" if only one source in your system)

____

C. Peak Historical Month Based On* (check all that apply)

☐ High TTHM

☐ Warmest water temperature

☐ High HAA5

If you used other information to select your peak historical month, explain here (*attach additional sheets if needed*)

____

____

____

D. Proposed Standard Monitoring Schedule*

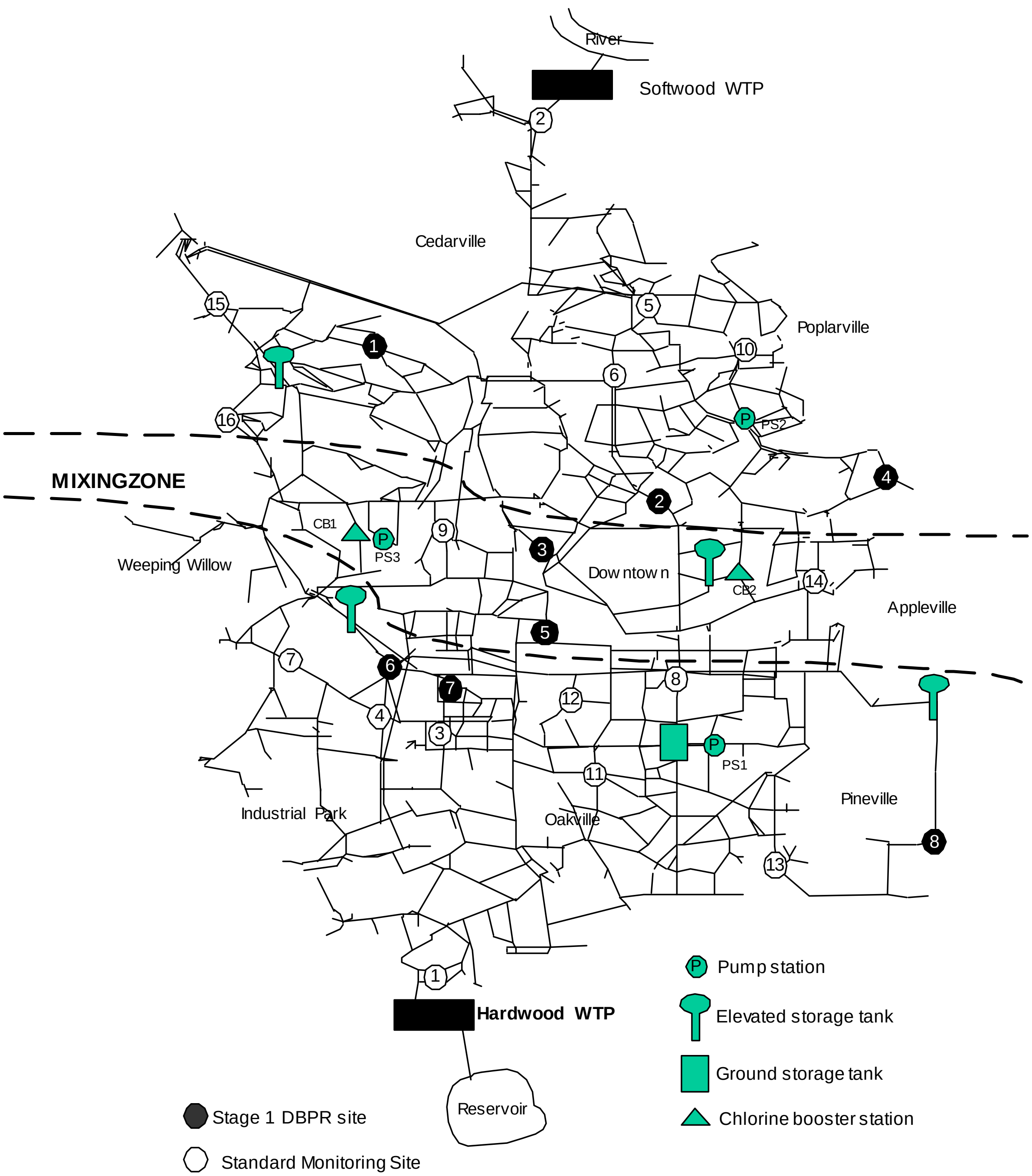
Standard Monitoring Site ID (from map) [1]	Projected Sampling Date (date or week) [2]					
	period 1	period 2	period 3	period 4	period 5	period 6
SM #9	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2
SM #10	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2
SM #11	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2
SM #12	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2
SM #13	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2
SM #14	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2
SM #15	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2
SM #16	11/2007, wk 2	1/2008, wk 2	3/2008, wk 2	5/2008, wk 2	7/2008, wk 2	9/2008, wk 2

[1] *Verify that site IDs match IDs in Section IV and on your distribution system schematic (See Section VII of this form). Attach additional copies if you are required to select more than 8 standard monitoring locations.*

[2] *period = monitoring period. Complete for the number of periods from Section II.C. Can list exact date or week (e.g., week of 7/9/07)*

Elm City Distribution System Schematic
Scale: 1:5000'

Attachment #5



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Form 7: IDSE Report for Standard Monitoring

I. GENERAL INFORMATION

A. PWS Information*

B. Date Submitted* **Dec 1, 2008**

PWSID: US1111111

PWS Name: Elm City

PWS Address: 1234 Main Street

City: Elm City State: US Zip: 99999

Population Served 160,000

System Type:	Source Water Type:	Buying / Selling Relationships:
☒ CWS	☒ Subpart H	☐ Consecutive System
☐ NTNCWS	☐ Ground	☐ Wholesale System
		☒ Neither

C. PWS Operations

Residual Disinfectant Type: ☒ Chlorine ☐ Chloramines ☐ Other:______________

Number of Disinfected Sources: 2__ Surface ___GWUDI ____ Ground ___ Purchased

D. Contact Person*

Name: Mr. Ronald Doe, P.E.

Title: Water Superintendent

Phone #: 123-555-0000 Fax #: 123-555-0001

E-mail: Rdoe@ci.elmcity.us

II. STAGE 2 DBPR REQUIREMENTS*

A. Number of Compliance Monitoring Sites		B. Schedule	C. Compliance Monitoring Frequency
Highest TTHM:	3	☒ Schedule 1	☐ During peak historical month (1 monitoring period)
Highest HAA5:	3	☐ Schedule 2	
Existing Stage 1:	2	☐ Schedule 3	☒ Every 90 days (4 monitoring periods)
Total:	8	☐ Schedule 4	

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS*

A. Did you deviate in any way from your approved standard monitoring plan? ☒ Yes ☐ No

If YES, explain (attach additional pages if necessary):

The IDSE Monitoring Plan indicated samples should be taken during the second week of March, 2008. Our sampler was very ill this week and could not collect all of the standard monitoring samples. He collected all remaining samples on Monday and Tuesday of the next week.

B. Where were your TTHM and HAA5 samples analyzed?

☒ In-House

Is your in-house laboratory certified? ☒ Yes ☐ No

☐ Certified Laboratory

Name of certified laboratory: ____________________

C. What method(s) was used to analyze your TTHM and HAA5 samples?

TTHM	HAA5
☐ EPA 502.2	☐ EPA 552.1
☐ EPA 524.3	☐ EPA 552.2
☒ EPA 551.1	☒ EPA 552.3
	☐ SM 6251 B

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

D. IDSE Standard Monitoring Results - TTHM

Site ID[1]	Data Type	TTHM (mg/L)						LRAA
Standard Monitoring #1	Sample Date	11/13/07	1/9/08	3/14/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.022	0.016	0.028	0.036	0.037	0.030	**0.028**
Standard Monitoring #2	Sample Date	11/13/07	1/9/08	3/14/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.031	0.027	0.035	0.031	0.039	0.030	**0.032**
Standard Monitoring #3	Sample Date	11/13/07	1/9/08	3/14/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.042	0.033	0.039	0.040	0.048	0.045	**0.041**
Standard Monitoring #4	Sample Date	11/13/07	1/9/08	3/14/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.048	0.041	0.047	0.055	0.056	0.043	**0.048**
Standard Monitoring #5	Sample Date	11/13/07	1/9/08	3/14/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.025	0.023	0.042	0.048	0.049	0.035	**0.037**
Standard Monitoring #6	Sample Date	11/13/07	1/9/08	3/14/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.033	0.017	0.041	0.050	0.058	0.045	**0.041**
Standard Monitoring #7	Sample Date	11/13/07	1/9/08	3/17/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.044	0.026	0.056	0.052	0.070	0.042	**0.048**
Standard Monitoring #8	Sample Date	11/13/07	1/9/08	3/17/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.040	0.035	0.050	0.064	0.064	0.052	**0.051**

[1] *Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan.*

Attach additional sheets as needed for IDSE standard monitoring results.

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

E. IDSE Standard Monitoring Results - HAA5

Site ID[1]	Data Type	HAA5 (mg/L)						LRAA
Standard Monitoring #1	Sample Date	11/13/07	1/9/08	3/14/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.030	0.028	0.032	0.027	0.033	0.026	**0.029**
Standard Monitoring #2	Sample Date	11/13/07	1/9/08	3/14/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.025	0.026	0.022	0.034	0.030	0.021	**0.026**
Standard Monitoring #3	Sample Date	11/13/07	1/9/08	3/14/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.041	0.030	0.022	0.029	0.036	0.040	**0.033**
Standard Monitoring #4	Sample Date	11/13/07	1/9/08	3/14/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.027	0.019	0.020	0.025	0.025	0.029	**0.024**
Standard Monitoring #5	Sample Date	11/13/07	1/9/08	3/14/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.040	0.028	0.023	0.056	0.040	0.052	**0.040**
Standard Monitoring #6	Sample Date	11/13/07	1/9/08	3/14/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.029	0.019	0.014	0.020	0.021	0.023	**0.021**
Standard Monitoring #7	Sample Date	11/13/07	1/9/08	3/17/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.062	0.035	0.055	0.052	0.052	0.063	**0.053**
Standard Monitoring #8	Sample Date	11/13/07	1/9/08	3/17/08	5/13/08	7/10/08	9/9/08	
	Sample Result	0.049	0.047	0.050	0.059	0.058	0.050	**0.052**

[1] Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan.

Attach additional sheets as needed for IDSE standard monitoring results.

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

F. Stage 1 DBPR Compliance Monitoring Results - TTHM

Site ID[1]	Data Type	TTHM (mg/L)				LRAA
Stage 1 #1 (avg. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.062	0.045	0.034	0.056	**0.049**
Stage 1 #2 (avg. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.045	0.036	0.042	0.045	**0.042**
Stage 1 #3 (avg. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.048	0.032	0.034	0.067	**0.045**
Stage 1 #4 (max. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.056	0.042	0.057	0.076	**0.058**
Stage 1 #5 (avg. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.042	0.044	0.020	0.062	**0.042**
Stage 1 #6 (avg. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.039	0.046	0.049	0.050	**0.046**
Stage 1 #7 (avg. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.050	0.041	0.022	0.059	**0.043**
Stage 1 #8 (max. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.060	0.065	0.050	0.073	**0.062**

[1] Verify that site IDs for Stage 1 compliance monitoring sites match the site IDs in your Standard Monitoring Plan.

Attach additional sheets as needed for Stage 1 compliance monitoring results.

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

G. Stage 1 DBPR Compliance Monitoring Results - HAA5

Site ID[1]	Data Type	HAA5 (mg/L)				LRAA
Stage 1 #1 (avg. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.045	0.024	0.032	0.043	**0.036**
Stage 1 #2 (avg. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.056	0.047	0.050	0.055	**0.052**
Stage 1 #3 (avg. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.049	0.032	0.062	0.045	**0.047**
Stage 1 #4 (max. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.028	0.021	0.025	0.026	**0.025**
Stage 1 #5 (avg. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.041	0.034	0.045	0.033	**0.038**
Stage 1 #6 (avg. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.041	0.022	0.030	0.039	**0.033**
Stage 1 #7 (avg. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.058	0.048	0.046	0.064	**0.054**
Stage 1 #8 (max. res. time)	Sample Date	10/10/07	1/7/08	4/7/08	7/8/08	
	Sample Result	0.030	0.019	0.022	0.037	**0.027**

[1] *Verify that site IDs for Stage 1 compliance monitoring sites match the site IDs in your Standard Monitoring Plan.*

Attach additional sheets as needed for Stage 1 compliance monitoring results.

Form 7: IDSE Report for Standard Monitoring

IV. JUSTIFICATION OF STAGE 2 DBPR COMPLIANCE MONITORING SITES*

Stage 2 Compliance Monitoring Site ID	Site Type	Justification
Standard Monitoring #13	☒ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	This site had the highest TTHM LRAA among all the sites.
Standard Monitoring #10	☐ Highest TTHM ☒ Highest HAA5 ☐ Stage 1 DBPR	This site had the highest HAA5 LRAA (and was not selected as the highest TTHM site)
Stage 1 #7	☐ Highest TTHM ☐ Highest HAA5 ☒ Stage 1 DBPR	Among the Stage 1 DBPR compliance monitoring locations with average water residence time, this site had the highest HAA5 LRAA
Stage 1 #8	☒ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	This site had the second highest TTHM LRAA
Standard Monitoring #14	☒ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	This site had the third highest TTHM LRAA
Standard Monitoring # 7	☐ Highest TTHM ☒ Highest HAA5 ☐ Stage 1 DBPR	This site had the second highest HAA5 LRAA
Stage 1 #1	☐ Highest TTHM ☐ Highest HAA5 ☒ Stage 1 DBPR	Among the Stage 1 DBPR compliance monitoring locations with average water residence time, this site had the highest TTHM LRAA. Stage 1 DBPR site #4 had higher TTHM LRAAs but is maximum residence time site, therefore, it was not chosen.
Stage 1 # 2	☐ Highest TTHM ☒ Highest HAA5 ☐ Stage 1 DBPR	This site had the third highest HAA5 LRAA. Standard Monitoring Site #8 had the same LRAA, but we chose to use Stage 1 site #2 to maintain a historical record.

Attach additional copies of this sheet if you need more room.

Form 7: IDSE Report for Standard Monitoring

V. PEAK HISTORICAL MONTH AND PROPOSED STAGE 2 DBPR COMPLIANCE MONITORING SCHEDULE

A. Peak Historical Month* ____July___________

B. Is Your Peak Historical Month the Same as in Your IDSE Standard Monitoring Plan?

☒ Yes ☐ No

If no, explain how you selected your new peak historical month *(attach additional sheets if needed)*

____

____

____

____

____

C. Proposed Stage 2 DBPR Compliance Monitoring Schedule*

Stage 2 Compliance Monitoring Site ID	Projected Sampling Date (date or week)[1]			
	period 1	period 2	period 3	period 4
SM # 13	4/2012 wk 2	7/2012 wk 2	10/2012 wk 2	1/2013 wk 2
SM # 10	4/2012 wk 2	7/2012 wk 2	10/2012 wk 2	1/2013 wk 2
Stage 1 # 7	4/2012 wk 2	7/2012 wk 2	10/2012 wk 2	1/2013 wk 2
Stage 1 # 8	4/2012 wk 2	7/2012 wk 2	10/2012 wk 2	1/2013 wk 2
SM #14	4/2012 wk 2	7/2012 wk 2	10/2012 wk 2	1/2013 wk 2
SM # 7	4/2012 wk 2	7/2012 wk 2	10/2012 wk 2	1/2013 wk 2
Stage 1 # 1	4/2012 wk 2	7/2012 wk 2	10/2012 wk 2	1/2013 wk 2
Stage 1 # 2	4/2012 wk 2	7/2012 wk 2	10/2012 wk 2	1/2013 wk 2

[1] period = monitoring period. Complete for the number of monitoring periods from Section II.C.

Attach additional copies of this sheet if you need more room.

Form 7: IDSE Report for Standard Monitoring

VI. DISTRIBUTION SYSTEM SCHEMATIC*

ATTACH a schematic of your distribution system if it has changed since you submitted your Standard Monitoring Plan (Form 6).

VII. ATTACHMENTS

- ☐ Additional sheets for explaining how and why you deviated from your standard monitoring plan (Section III).
- ☒ Additional sheets for Standard Monitoring Results (Section III). **REQUIRED** if you are a subpart H system serving **more than 49,999 people** or a ground water system serving **more than 499,999 people**.
- ☐ Additional sheets for Stage 2 DBPR Compliance Monitoring Sites (Section IV). **REQUIRED** if you are a subpart H system serving **more than 249,999 people**.
- ☐ Additional sheets for explaining how you selected the peak historical month (Section V).
- ☐ Additional sheets for proposed Stage 2 DBPR peak historical month and compliance monitoring schedule (Section V). **REQUIRED** if you are a subpart H system serving **more than 249,999 people**.
- ☐ Distribution system schematic* (Section VI). **REQUIRED if it has changed from your approved IDSE standard monitoring plan**.
- ☐ Compliance calculation procedures (for Stage 2 Compliance Monitoring Plan).

Total Number of Pages in Your Report: _11_____

Note: Fields with an asterisk (*) are required by the Stage 2 DBPR

Form 7: IDSE Report for Standard Monitoring

Attachment #1

III. MONITORING RESULTS (Continued)*

D. IDSE Standard Monitoring Results - TTHM

Site ID[1]	Data Type	TTHM (mg/L)						LRAA
Standard Monitoring #9	Sample Date	11/14/07	1/10/08	3/17/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.047	0.033	0.049	0.052	0.062	0.037	**0.047**
Standard Monitoring #10	Sample Date	11/14/07	1/10/08	3/17/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.022	0.020	0.051	0.050	0.052	0.042	**0.040**
Standard Monitoring #11	Sample Date	11/14/07	1/10/08	3/18/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.045	0.025	0.062	0.060	0.060	0.064	**0.053**
Standard Monitoring #12	Sample Date	11/14/07	1/10/08	3/18/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.061	0.042	0.056	0.050	0.068	0.051	**0.055**
Standard Monitoring #13	Sample Date	11/14/07	1/10/08	3/18/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.072	0.032	0.065	0.070	0.085	0.071	**0.066**
Standard Monitoring #14	Sample Date	11/14/07	1/10/08	3/18/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.055	0.033	0.068	0.062	0.080	0.062	**0.060**
Standard Monitoring #15	Sample Date	11/14/07	1/10/08	3/18/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.052	0.036	0.048	0.056	0.070	0.065	**0.055**
Standard Monitoring #16	Sample Date	11/14/07	1/10/08	3/18/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.055	0.031	0.072	0.049	0.068	0.069	**0.057**

[1] Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan.

Attach additional sheets as needed for IDSE standard monitoring results.

Form 7: IDSE Report for Standard Monitoring

Attachment #2

III. MONITORING RESULTS (Continued)*

E. IDSE Standard Monitoring Results - HAA5

Site ID[1]	Data Type	HAA5 (mg/L)						LRAA
Standard Monitoring #9	Sample Date	11/14/07	1/10/08	3/17/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.040	0.034	0.045	0.058	0.065	0.048	**0.048**
Standard Monitoring #10	Sample Date	11/14/07	1/10/08	3/17/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.067	0.058	0.056	0.044	0.065	0.050	**0.057**
Standard Monitoring #11	Sample Date	11/14/07	1/10/08	3/18/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.033	0.030	0.042	0.040	0.046	0.038	**0.038**
Standard Monitoring #12	Sample Date	11/14/07	1/10/08	3/18/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.028	0.028	0.039	0.045	0.040	0.033	**0.036**
Standard Monitoring #13	Sample Date	11/14/07	1/10/08	3/18/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.039	0.033	0.041	0.039	0.062	0.045	**0.043**
Standard Monitoring #14	Sample Date	11/14/07	1/10/08	3/18/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.034	0.031	0.042	0.030	0.058	0.038	**0.039**
Standard Monitoring #15	Sample Date	11/14/07	1/10/08	3/18/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.034	0.028	0.028	0.040	0.054	0.038	**0.037**
Standard Monitoring #16	Sample Date	11/14/07	1/10/08	3/18/08	5/14/08	7/9/08	9/10/08	
	Sample Result	0.034	0.025	0.046	0.048	0.038	0.028	**0.037**

[1] *Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan.*

Attach additional sheets as needed for IDSE standard monitoring results.

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Appendix I

Example IDSE Standard Monitoring Plan and Report for a Ground Water System Serving 200,000 People

This appendix is provided as an example IDSE standard monitoring plan and report for a ground water system serving 200,000 people and choosing to complete standard monitoring. For this example, the state did not require any modifications to the study plan.

Chapter 7 discusses the standard monitoring plan, conducting standard monitoring, selection of Stage 2 DBPR sites, and preparing the standard monitoring report. The application of the basic guidance on standard monitoring location selection and Stage 2 DBPR compliance monitoring location selection is shown in this example, along with several instances of the use of best professional judgement being applied.

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Form 6: Standard Monitoring Plan

I. GENERAL INFORMATION

A. PWS Information*

B. Date Submitted* **Sept 25, 2006**

PWSID: US5555555

PWS Name: Oak City

PWS Address: 124 Oak Drive

City: Oak City State: US Zip: 11111-1234

Population Served: 200,000

System Type:	Source Water Type:	Buying / Selling Relationships:
☒ CWS	☐ Subpart H	☐ Consecutive System
☐ NTNCWS	☒ Ground	☐ Wholesale System
		☒ Neither

C. PWS Operations

Residual Disinfectant Type: ☒ Chlorine ☐ Chloramines ☐ Other:______________

Number of Disinfected Sources: ___ Surface ___GWUDI __2_ Ground ___ Purchased

D. Contact Person*

Name: Mr. Joseph Smith, P.E.

Title: Superintendent of Water

Phone #: 123-555-1111 Fax #: 123-555-2222

E-mail: JSmith@ci.oakcity.us

II. IDSE REQUIREMENTS*

A. Number of Sites		B. Schedule	C. Standard Monitoring Frequency
Total:	8		
Near Entry Point:	1	☒ Schedule 1	☐ During peak historical month (1 monitoring period)
Avg Residence Time:	1	☐ Schedule 2	
High TTHM:	3	☐ Schedule 3	☒ Every 90 days (4 monitoring periods)
High HAA5:	3	☐ Schedule 4	☐ Every 60 days (6 monitoring periods)

Form 6: Standard Monitoring Plan

III. SELECTING STANDARD MONITORING SITES

A. Data Evaluated Put a "✓" in each box corresponding to the data that you used to select each type of standard monitoring site. Check all that apply.

Data Type	Type of Site			
	Near Entry Pt.	**Avg. Residence Time**	**High TTHM**	**High HAA5**
System Configuration				
Pipe layout, locations of storage facilities	✓		✓	✓
Locations of sources and consecutive system entry points	✓			
Pressure zones			✓	✓
Information on population density				
Locations of large customers				
Water Quality and Operational Data				
Disinfectant residual data		✓	✓	✓
Stage 1 DBP data			✓	✓
Other DBP data				
Microbiological monitoring data (e.g., HPC)			✓	✓
Tank level data, pump run times				✓
Customer billing records				
Advanced Tools				
Water distribution system model				
Tracer study				

B. Summary of Data* Provide a summary of data you relied on to justify standard monitoring site selection. (*attach additional sheets if needed*)

The Blue Springs Well field is only in operation during high demand in the summer months, so we focused most sites in the influence zone of the Silver Springs Well field which operates year round. We used residual and HPC data from Total Coliform sites collected in 2005 and 2006 along with Stage 1 DBPR data and our system map to select sites. We evaluated chlorine residual data from June, July, and August which ranged from 2.0 mg/L at the Silver Springs disinfection station to no detect in the distribution system. The system average during the summer is typically around 1.1 mg/L. Sites with residuals close to this were considered for average residence time sites. Residuals along with data on storage tanks, booster stations, and operator notes were used to locate areas of high residence time for high TTHM and HAA5 sites. Areas of biological activity were identified using disinfectant residual data because we do not have a lot of HPC data. Sites were plotted on our system map to ensure adequate coverage of the different geographic and operational areas.

Form 6: Standard Monitoring Plan

IV. JUSTIFICATION OF STANDARD MONITORING SITES*

Standard Monitoring Site ID (from map)[1]	Site Type	Justification
Standard Monitoring #1	☒ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #2	☐ Near Entry Pt ☒ Avg. Res. Time ☐ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #3	☐ Near Entry Pt ☐ Avg. Res. Time ☒ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #4	☐ Near Entry Pt ☐ Avg. Res. Time ☒ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #5	☐ Near Entry Pt ☐ Avg. Res. Time ☒ High TTHM ☐ High HAA5	See attached sheets.
Standard Monitoring #6	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☒ High HAA5	See attached sheets.
Standard Monitoring #7	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☒ High HAA5	See attached sheets.
Standard Monitoring #8	☐ Near Entry Pt ☐ Avg. Res. Time ☐ High TTHM ☒ High HAA5	See attached sheets.

[1] Verify that site IDs match IDs in Section IV and on your distribution system schematic (See Section VII of this form). Attach additional copies if you are required to select more than 8 standard monitoring locations or need more room.

Form 6: Standard Monitoring Plan

V. PEAK HISTORICAL MONTH AND PROPOSED STANDARD MONITORING SCHEDULE

A. Peak Historical Month* <u>August</u>

B. If Multiple Sources, Source Used to Determine Peak Historical Month
(write "N/A" if only one source in your system)

Silver Springs Well field

C. Peak Historical Month Based On* (check all that apply)

☒ High TTHM ☒ Warmest water temperature

☒ High HAA5

If you used other information to select your peak historical month, explain here (*attach additional sheets if needed*)

D. Proposed Standard Monitoring Schedule*

Standard Monitoring Site ID (from map) [1]	Projected Sampling Date (date or week) [2]					
	period 1	period 2	period 3	period 4	period 5	period 6
SM #1	2nd week 11/2007	2nd week 2/2008	2nd week 5/2008	2nd week 8/2008		
SM #2	2nd week 11/2007	2nd week 2/2008	2nd week 5/2008	2nd week 8/2008		
SM #3	2nd week 11/2007	2nd week 2/2008	2nd week 5/2008	2nd week 8/2008		
SM #4	2nd week 11/2007	2nd week 2/2008	2nd week 5/2008	2nd week 8/2008		
SM #5	2nd week 11/2007	2nd week 2/2008	2nd week 5/2008	2nd week 8/2008		
SM #6	2nd week 11/2007	2nd week 2/2008	2nd week 5/2008	2nd week 8/2008		
SM #7	2nd week 11/2007	2nd week 2/2008	2nd week 5/2008	2nd week 8/2008		
SM #8	2nd week 11/2007	2nd week 2/2008	2nd week 5/2008	2nd week 8/2008		

[1] *Verify that site IDs match IDs in Section IV and on your distribution system schematic (See Section VII of this form). Attach additional copies if you are required to select more than 8 standard monitoring locations.*

[2] *period = monitoring period. Complete for the number of periods from Section II.C. Can list exact date or week (e.g., week of 7/9/07)*

Form 6: Standard Monitoring Plan

VI. PLANNED STAGE 1 DBPR COMPLIANCE MONITORING SCHEDULE*

Stage 1 DBPR Monitoring Site ID (from map) [1]	Projected Sampling Date (date or week) [2]			
	Period 1	Period 2	Period 3	Period 4
Stage 1 #1 max. residence time site	2nd week of 11/2007	2nd week of 2/2008	2nd week of 5/2008	2nd week of 8/2008
Stage 1 #2 max. residence time site	2nd week of 11/2007	2nd week of 2/2008	2nd week of 5/2008	2nd week of 8/2008

[1] Verify that site IDs match IDs on your distribution system schematic (See Section VII of this form). Attach additional copies if you are required to monitor at more than 8 Stage 1 DBPR sites.

[2] period = monitoring period. Complete for the number of periods in which you must conduct Stage 1 DBPR monitoring during IDSE monitoring. Can list exact date or week (e.g., week of 7/9/07)

VII. DISTRIBUTION SYSTEM SCHEMATIC*

ATTACH a schematic of your distribution system.

Distribution system schematics are not confidential and should not contain information that poses a ***security risk*** to your system. EPA recommends that you use one of two options:

Option 1: Distribution system schematic with no landmarks or addresses indicated. Show locations of sources, entry points, storage facilities, standard monitoring locations, and Stage 1 compliance monitoring locations (required). Also include pressure zone boundaries and locations of pump stations. Provide map scale.

Option 2: City map without locations of pipes indicated. Show locations of sources, entry points, storage facilities, standard monitoring locations, and Stage 1 compliance monitoring locations (required). Also include boundaries of the distribution system, pressure zone boundaries and locations of pump stations. Provide map scale.

Form 6: Standard Monitoring Plan

VIII. ATTACHMENTS

- ☒ Distribution System Schematic* (Section VII).
- ☒ Additional sheets for the summary of data or site justifications (Sections III and IV).
- ☐ Additional copies of Page 3 for justification of Standard Monitoring Sites (Section IV). **Required if** you are a subpart H system serving **more than 49,999 people** or a ground water system serving **more than 499,999 people**.
- ☐ Additional sheets for explaining how you used data other than TTHM, HAA5, and temperature data to select your peak historical month (Section V).
- ☐ Additional copies of Page 4 for proposed monitoring schedule (Section V). **Required if** you are a subpart H system serving **more than 49,999 people** or a ground water system serving **more than 499,999 people**.
- ☐ **Additional sheets for planned Stage 1 DBPR compliance monitoring schedule** (Section VI).

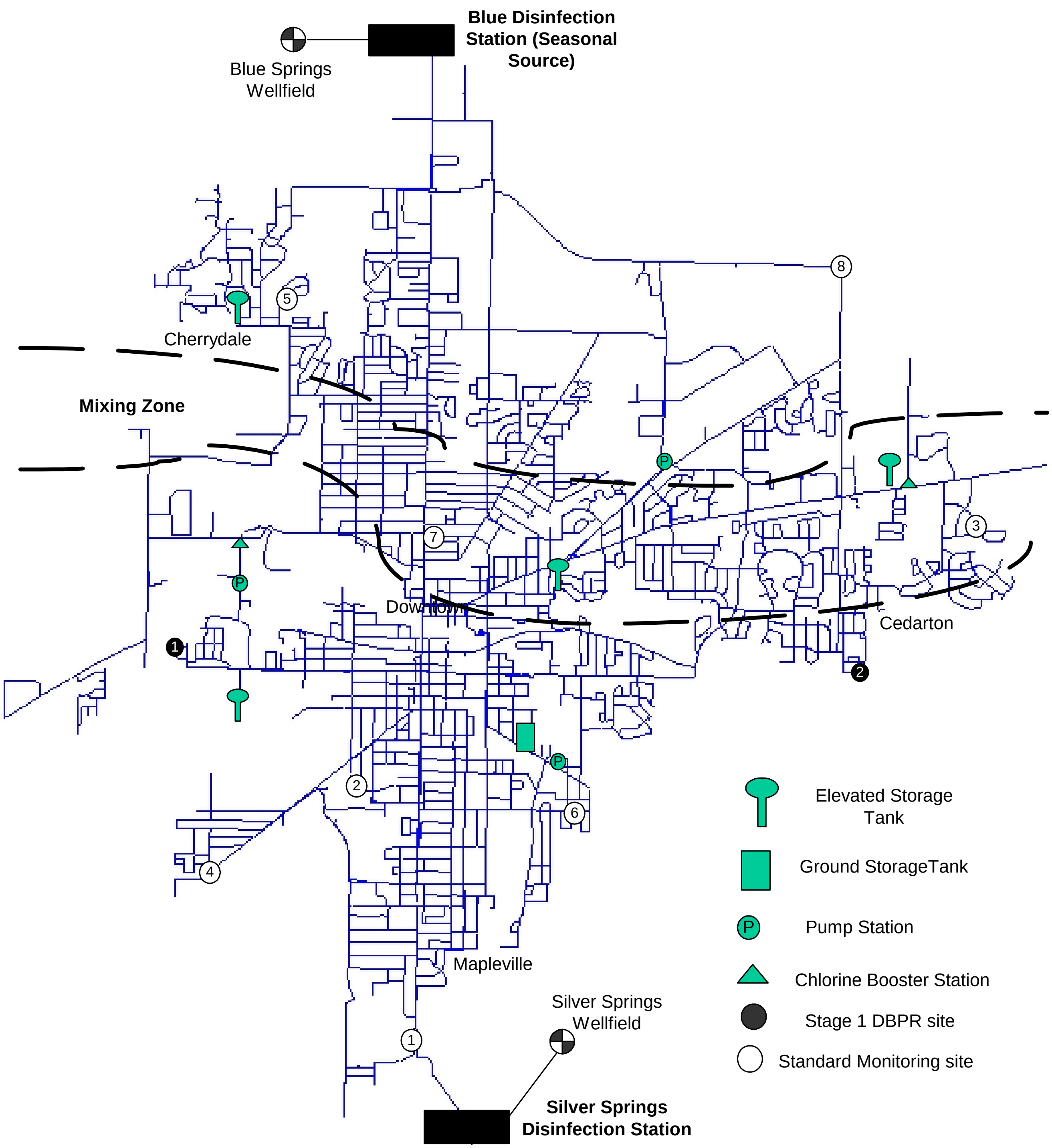
Total Number of Pages in Your Plan __10___

Note: Fields with an asterisk (*) are required by the Stage 2 DBPR

Oak City Distribution System Schematic

Attachment #1

Scale = 1:6,000'



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Justification of IDSE Monitoring Sites

Standard Monitoring #1

Chosen to represent the entry point to the distribution system from the Silver Spring disinfection station. The Silver Spring disinfection station has a much higher annual flow than the Blue disinfection station, which uses a seasonal source. The site is located on a 16 inch water main.

Standard Monitoring #2

Chosen to represent average residence time in the system. Chlorine residual concentrations in the surrounding area are close to system average (1.1 mg/L). There are no storage facilities or booster stations between the entry point and this site located at the edge of the mixing zone in the Silver Spring disinfection station Service area. The site is located in a residential zone on a 6 inch main.

Standard Monitoring #3

Chosen to represent high TTHM levels in the Silver Spring disinfection station influence zone and the mixing zone. This monitoring location is located before the last group of connections on a 6 inch pipe in proximity to the end of the distribution system in the mixing zone. It is also downstream of a booster station. At this location, water demand tends to be low, total chlorine levels are always low (ranging between 0.3 and 0.9 mg/L) and HPCs are often greater than 200 cfu/mL. Operations staff indicate this site has a lot of customers complaints.

Standard Monitoring #4

Chosen to represent high TTHM levels in the Silver Spring disinfection station influence zone. This monitoring location is located near the TCR #4 sample site, and before the last group of connections before the end of the distribution system. This site is in a 12 inch main in the extremities of the system and is likely to have high water age during periods of low demand.

Standard Monitoring #5

Chosen to represent high TTHM levels in both influence zones. This monitoring location is after the first group of connections (approximately 0.5 miles) downstream of a 1.5 MG elevated storage facility in the influence zone of the Blue disinfection station. Operations data indicate this reservoir may have high water age during the summer months. DBP data at the nearby Stage 1 DBPR sampling site indicate high TTHM and HAA5 levels for this area.

Standard Monitoring #6

Chosen to represent high HAA5 levels in the Silver Spring disinfection station influence zone. Sample tap is a hose bib at an elementary school located in a zone of the distribution system with water age greater than average near a storage tank. Total chlorine levels at this location range between 0.9 and 1.2 mg/L. The site is located on an 8 inch main.

<u>Standard Monitoring #7</u>

Chosen to represent high HAA5 levels in the Silver Spring disinfection station influence zone and the mixing zone. This location is a dedicated sampling location on an 8 inch main routinely used for monitoring water quality in downtown Oak City. It is located near an elevated storage tank. In this area, the water age is greater than the average, but the total chlorine is never below 0.7 mg/L.

<u>Standard Monitoring #8</u>

Chosen to represent high HAA5 levels in the Blue disinfection station influence zone. Total chlorine levels at this location range between 0.8 and 1.4 mg/L. The site is on the extremities of the system, in an area where DBP monitoring has not traditionally been performed. It is on a 6 inch main.

Form 7: IDSE Report for Standard Monitoring

I. GENERAL INFORMATION

A. PWS Information*

B. Date Submitted* **Nov 30, 2008**

PWSID: US5555555

PWS Name: Oak City

PWS Address: 124 Oak Drive

City: Oak City   State: US   Zip: 11111-1234

Population Served: 200,000

System Type:	Source Water Type:	Buying / Selling Relationships:
☒ CWS	☐ Subpart H	☐ Consecutive System
☐ NTNCWS	☒ Ground	☐ Wholesale System
		☒ Neither

C. PWS Operations

Residual Disinfectant Type: ☒ Chlorine ☐ Chloramines ☐ Other:______________

Number of Disinfected Sources: ___ Surface ___GWUDI __2_ Ground ___ Purchased

D. Contact Person*

Name: Mr. Joseph Smith, P.E.

Title: Superintendent of Water

Phone #: 123-555-1111   Fax #: 123-555-2222

E-mail: JSmith@ci.oakcity.us

II. STAGE 2 DBPR REQUIREMENTS*

A. Number of Compliance Monitoring Sites		B. Schedule	C. Compliance Monitoring Frequency
Highest TTHM:	3	☒ Schedule 1	☐ During peak historical month (1 monitoring period)
Highest HAA5:	2	☐ Schedule 2	
Existing Stage 1:	1	☐ Schedule 3	☒ Every 90 days (4 monitoring periods)
Total:	6	☐ Schedule 4	

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS*

A. Did you deviate in any way from your approved standard monitoring plan? ☒ Yes ☐ No

If YES, explain (attach additional pages if necessary):

Sampling was planned for August 13, 2007 but system maintenance was planned in the area of Standard monitoring location #1 for that day. The maintenance required extensive system flushing so the samples were taken on the previous Friday.

B. Where were your TTHM and HAA5 samples analyzed?

☐ In-House

Is your in-house laboratory certified? ☐ Yes ☐ No

☒ Certified Laboratory

Name of certified laboratory: Oak City Laboratories

C. What method(s) was used to analyze your TTHM and HAA5 samples?

TTHM	HAA5
☐ EPA 502.2	☐ EPA 552.1
☒ EPA 524.3	☐ EPA 552.2
☐ EPA 551.1	☐ EPA 552.3
	☒ SM 6251 B

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

D. IDSE Standard Monitoring Results - TTHM

Site ID[1]	Data Type	TTHM (mg/L)						LRAA
Standard Monitoring #1	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.026	0.022	0.030	0.035			0.028
Standard Monitoring #2	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.054	0.039	0.042	0.056			0.048
Standard Monitoring #3	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.062	0.061	0.072	0.075			0.068
Standard Monitoring #4	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.049	0.058	0.072	0.069			0.062
Standard Monitoring #5	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.038	0.068	0.075	0.071			0.063
Standard Monitoring #6	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.033	0.029	0.041	0.042			0.036
Standard Monitoring #7	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.035	0.029	0.037	0.047			0.037
Standard Monitoring #8	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.031	0.033	0.038	0.041			0.036

[1] *Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan.*

Attach additional sheets as needed for IDSE standard monitoring results.

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

E. IDSE Standard Monitoring Results - HAA5

Site ID[1]	Data Type	HAA5 (mg/L)						LRAA
Standard Monitoring #1	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.020	0.024	0.033	0.037			0.028
Standard Monitoring #2	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.022	0.029	0.036	0.040			0.032
Standard Monitoring #3	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.021	0.025	0.026	0.028			0.025
Standard Monitoring #4	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.020	0.021	0.038	0.028			0.027
Standard Monitoring #5	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.024	0.028	0.042	0.045			0.035
Standard Monitoring #6	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.043	0.038	0.048	0.052			0.045
Standard Monitoring #7	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.036	0.040	0.046	0.040			0.041
Standard Monitoring #8	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08			
	Sample Result	0.033	0.042	0.043	0.040			0.040

[1] *Verify that site IDs for IDSE standard monitoring sites match the site IDs in your Standard Monitoring Plan.*

Attach additional sheets as needed for IDSE standard monitoring results.

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

F. Stage 1 DBPR Compliance Monitoring Results - TTHM

Site ID[1]	Data Type	TTHM (mg/L)				LRAA
Stage 1 #1 max. residence time site	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08	
	Sample Result	0.055	0.044	0.066	0.072	0.059
Stage 1 #2 max. residence time site	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08	
	Sample Result	0.060	0.068	0.068	0.098	0.074
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					

[1] *Verify that site IDs for Stage 1 compliance monitoring sites match the site IDs in your Standard Monitoring Plan.*

Attach additional sheets as needed for Stage 1 compliance monitoring results.

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS (Continued)*

G. Stage 1 DBPR Compliance Monitoring Results - HAA5

Site ID[1]	Data Type	HAA5 (mg/L)				LRAA
Stage 1 #1 max. residence time site	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08	
	Sample Result	0.024	0.032	0.043	0.045	0.036
Stage 1 #2 max. residence time site	Sample Date	11/19/07	2/18/08	5/19/08	8/17/08	
	Sample Result	0.042	0.033	0.030	0.038	0.036
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					
	Sample Date					
	Sample Result					

[1] *Verify that site IDs for Stage 1 compliance monitoring sites match the site IDs in your Standard Monitoring Plan.*

Attach additional sheets as needed for Stage 1 compliance monitoring results.

Form 7: IDSE Report for Standard Monitoring

IV. JUSTIFICATION OF STAGE 2 DBPR COMPLIANCE MONITORING SITES*

Stage 2 Compliance Monitoring Site ID	Site Type	Justification
Stage 1 #2	☒ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	Stage 1 DBPR location #2 had the highest TTHM LRAA.
Standard Monitoring #6	☐ Highest TTHM ☒ Highest HAA5 ☐ Stage 1 DBPR	Standard Monitoring location #6 had the highest HAA5 LRAA.
Stage 1 #1	☐ Highest TTHM ☐ Highest HAA5 ☒ Stage 1 DBPR	As one of the two Stage 1 DBPR maximum residence time sites was already selected as a Stage 2 DBPR location #1 was chosen as the third Stage 2 DBPR compliance monitoring location.
Standard Monitoring #3	☒ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	Standard monitoring location #3 had the next highest TTHM LRAA among the locations not previously selected.
Standard Monitoring #5	☒ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	Standard monitoring location #5 had the next highest TTHM LRAA among the locations not previously selected.
Standard Monitoring #8	☐ Highest TTHM ☒ Highest HAA5 ☐ Stage 1 DBPR	Standard monitoring locations #7 and #8 had similar HAA5 LRAAs among locations not previously selected. Standard monitoring location #8 was chosen for geographic representation as this quadrant of the distribution has no sample sites.
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	

Attach additional copies of this sheet if you need more room.

Form 7: IDSE Report for Standard Monitoring

V. PEAK HISTORICAL MONTH AND PROPOSED STAGE 2 DBPR COMPLIANCE MONITORING SCHEDULE

A. Peak Historical Month* __August__________

B. Is Your Peak Historical Month the Same as in Your IDSE Standard Monitoring Plan?

☒ Yes ☐ No

If no, explain how you selected your new peak historical month *(attach additional sheets if needed)*

____

____

____

____

____

____

C. Proposed Stage 2 DBPR Compliance Monitoring Schedule*

Stage 2 Compliance Monitoring Site ID	Projected Sampling Date (date or week)[1]			
	period 1	period 2	period 3	period 4
Stage 1 #2	5/2012 3rd week	8/2012 3rd week	11/2012 3rd week	2/2013 3rd week
SM #6	5/2012 3rd week	8/2012 3rd week	11/2012 3rd week	2/2013 3rd week
Stage 1 #1	5/2012 3rd week	8/2012 3rd week	11/2012 3rd week	2/2013 3rd week
SM #3	5/2012 3rd week	8/2012 3rd week	11/2012 3rd week	2/2013 3rd week
SM #5	5/2012 3rd week	8/2012 3rd week	11/2012 3rd week	2/2013 3rd week
SM #8	5/2012 3rd week	8/2012 3rd week	11/2012 3rd week	2/2013 3rd week

[1] period = monitoring period. Complete for the number of monitoring periods from Section II.C.

Attach additional copies of this sheet if you need more room.

Form 7: IDSE Report for Standard Monitoring

VI. DISTRIBUTION SYSTEM SCHEMATIC*

ATTACH a schematic of your distribution system if it has changed since you submitted your Standard Monitoring Plan (Form 6).

VII. ATTACHMENTS

- ☐ Additional sheets for explaining how and why you deviated from your standard monitoring plan (Section III).
- ☐ Additional sheets for Standard Monitoring Results (Section III). **REQUIRED** if you are a subpart H system serving **more than 49,999 people** or a ground water system serving **more than 499,999 people**.
- ☐ Additional sheets for Stage 2 DBPR Compliance Monitoring Sites (Section IV). **REQUIRED** if you are a subpart H system serving **more than 249,999 people**.
- ☐ Additional sheets for explaining how you selected the peak historical month (Section V).
- ☐ Additional sheets for proposed Stage 2 DBPR peak historical month and compliance monitoring schedule (Section V). **REQUIRED** if you are a subpart H system serving **more than 249,999 people**.
- ☐ Distribution system schematic* (Section VI). **REQUIRED if it has changed from your approved IDSE standard monitoring plan**.
- ☐ Compliance calculation procedures (for Stage 2 Compliance Monitoring Plan)

Total Number of Pages in Your Report: ___9___

Note: Fields with an asterisk (*) are required by the Stage 2 DBPR

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