



Initial Distribution System Evaluation (IDSE)  
 System Specific Study Plan (SSS) Using a  
 Distribution System Hydraulic Model  
 Stage 2 Disinfectants and Disinfection Byproducts Rule

**I. GENERAL INFORMATION**

**A. System Information\***

**B. Date Submitted\***

PWS ID#: AZ04 \_\_\_\_\_  
 PWS Name: \_\_\_\_\_  
 Street Address: \_\_\_\_\_  
 City: \_\_\_\_\_  
 State: \_\_\_\_\_  
 Zip: \_\_\_\_\_

\_\_\_\_\_

Population Served: \_\_\_\_\_

Source Water Type: \_\_\_Ground \_\_\_Surface/GUDI  
 System Type: \_\_\_CWS \_\_\_NTNCWS  
 Combined Distribution System: \_\_\_Wholesale \_\_\_Consecutive \_\_\_Neither

If wholesale, list system(s) you wholesale to: (Please specify PWS # and name)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

If consecutive, list system(s) you are consecutive with: (Please specify PWS # and name)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**C. PWS Operations**

Residual Disinfectant Type: \_\_\_Chlorine \_\_\_Chloramines \_\_\_Other \_\_\_\_\_  
 Number of Disinfected Sources: \_\_\_Surface \_\_\_GUDI \_\_\_Ground \_\_\_Purchased

**D. Contact Person\***

Name: \_\_\_\_\_  
 Title: \_\_\_\_\_  
 Phone Number: \_\_\_\_\_ Fax Number (if applicable): \_\_\_\_\_  
 Email Address (if applicable): \_\_\_\_\_



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**II. IDSE REQUIREMENTS\***

**A. SSS monitoring**

Number of samples per monitoring period: \_\_\_\_\_

Number of monitoring periods: \_\_\_\_\_

Total: \_\_\_\_\_

**B. IDSE Schedule (circle one):**      Schedule 1      Schedule 2      Schedule 3      Schedule 4

**C. SSS Monitoring Frequency**

\_\_\_\_ During peak month of TTHM formation (1 monitoring period)

\_\_\_\_ Additional (describe) \_\_\_\_\_

**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



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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 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 as needed)**

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**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?

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2. How did you estimate diurnal demand variation? How did you determine total system demand?

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3. How many demand categories did you use?

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4. How did you address large water users?

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**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?

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2. What types of data were used in the calibration?

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3. When was the calibration data collected?

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4. What field tests have been performed to collect calibration data?

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5. How did you determine friction factors (C-factors)?

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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?

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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)

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8. If you are using a water quality model, what parameters are modeled? How was the model calibrated?

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**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):

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**V. MODELING INFORMATION\***

**A. How was the SSS modeling performed? (attach additional sheets if needed)**

1. Was modeling done for the operating conditions during the peak month for TTHM formation?

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2. How were operational controls represented in the model?

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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.

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4. What are the average water age results for your distribution system? (See Attachments (Section VIII) for additional submission requirements)

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**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 level 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 SSS plan: \_\_\_\_\_

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



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**Please submit SSS Plan Using a Distribution System Hydraulic Model to:**

Arizona Department of Environmental Quality  
Attn: Starr Abounader  
Drinking Water Monitoring and Protection Unit, Mail Code 5415B-2  
1110 West Washington Street  
Phoenix, AZ 85007

**If your public water system is in Maricopa County, you must also submit your SSS Plan to:**

Maricopa County Environmental Services Department  
Attn: John Kolman  
Drinking Water Program  
1001 North Central Avenue, Suite 250  
Phoenix, AZ 85004



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INSTRUCTIONS FOR COMPLETING THE FORM

**I. General Information**

I.A. PWS ID – Enter your public water system identification number here.

PWS name – Enter the name of your system here.

PWS Address – Enter the primary mailing address for you water system here.

Population served – Enter the number of people served by your PWS. This is your retail population served, not including the population served by consecutive systems that purchase water from you.

Source Water Type – Put a check mark to identify whether your system is a subpart H (surface water/GUDI) system or a groundwater system. If you use any surface water or GUDI as a source, put a check mark next to surface/GUDI.

System Type – Put a check mark to identify whether your system is a community water system (CWS) or nontransient noncommunity water system (NTNCWS).

Buying/Selling Relationships – Put a check mark to identify whether your system is a wholesale system, consecutive system, or neither. If you are both a consecutive and wholesale system (e.g., you buy and sell water), check both. If you are a wholesale system, list the system(s) you wholesale to in the space provided. If you are a consecutive system, list the system(s) you are consecutive with in the space provided.

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 the express delivery service. Be sure to submit your SSS plan before the deadline.

I.C. Residual Disinfectant Type – Put a check mark 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 chloramines but switch to free chlorine for a short time, you should still check chloramines only. If you use chloramines and chlorine regularly in your system (e.g., 4 months of free chlorine and 8 months of chloramines), check both chlorine and chloramines. If you maintain your residual with a disinfectant other than chlorine or chloramines (e.g., chlorine dioxide), you should place a check next to “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



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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 state reviewers.

## II. IDSE Requirements

- II.A. SSS monitoring – Copy the required number of samples from the table in Exhibit 6.9 of the IDSE Guidance Manual that corresponds to your source water type and the population served by your system.
- II.B. IDSE Schedule – Circle the schedule number your system is placed on under the Stage 2 DBPR – Schedule 1, 2, 3, or 4. Your schedule is based on your system’s population size if you are a standalone system (not connected to another system), or if you are part of a combined distribution system (CDS), then your schedule is based on the system with the largest population served in the CDS. If you are not sure what your schedule is, you can refer to Exhibit 2.1 of the IDSE Guidance Manual (page 2-2) to determine your IDSE schedule number.
- 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



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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 in the Guidance Manual 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 of the Guidance Manual 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**

V.A. How was the SSS modeling performed? – 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.

#### **VI. Planned Stage 1 DBPR Compliance Monitoring Schedule**

Enter the projected sampling schedule for the number of Stage 1 BPR 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. Attach additional sheets if needed. You may also want to attach your Stage 1 DBPR monitoring plan.



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## 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 are not 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*. ADEQ 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 a 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 8 ½ 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)
- Image file (.gif, .bmp, .jpg, .jpeg)

## VIII. Attachments

Put a check mark next 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.

Enter the total number of pages in your study plan (including attachments) in the space provided. This will allow ADEQ to ensure that all pages were received.