

WATER SUPPLY AND DEMAND ANALYSIS GUIDELINES

OVERVIEW

Under the Drought Management Rule adopted in 2015, public water systems may impose more stringent restrictions on outdoor water use during non-drought periods, but only upon first obtaining a variance from EPD. During state-declared drought response periods, variance applications may be submitted by systems seeking to impose more or less stringent restrictions. The purpose of the analysis is to demonstrate the necessity of actions to avoid or relieve a local water shortage. Specific provisions regarding variances can be found in Rule 391-3-30-.08 *Variance Requests*.

The Water Supply and Demand Analysis referenced by the rule is an Excel spreadsheet tool (tool) for use by public water supply systems whose primary source of water is surface water and who are submitting a variance application. For these systems, the relevant worksheets are required components of their variance application.

Applicants with reservoirs will use the reservoir worksheet in the tool to evaluate the response of storage in their reservoir to specified water demands. The analysis relies on the assumption that the same level of water use that occurred in each month of the preceding calendar year will continue for the next 24 months. The tool will then evaluate the response of storage under the hydrologic conditions experienced from January 2007 through December 2008.

Applicants will enter these data into the worksheet, which will then plot a graph showing the response of reservoir storage to these conditions. Any unusual conditions affecting withdrawals in the preceding calendar year, and implications of such conditions for the variance request, should also be noted in the variance application.

If an applicant with a reservoir also has a permit for withdrawal from a stream or river that is used to fill that reservoir, the applicant must also complete the streamflow spreadsheet.

Applicants without reservoir storage will use the streamflow worksheet in the tool to evaluate the effect of specified water demands on their water source. The analysis relies on the assumption that the same level of water use that occurred in each month of the preceding calendar year will continue for the next 24 months. The tool compares this water use with streamflow values seen from January 2007 through December 2008.

Applicants will enter these data into the worksheet, which in turn calculates withdrawals as a percent of streamflow. Any unusual conditions affecting withdrawals in the preceding calendar year, and implications of such conditions for a variance request, should be noted in the application.

Applicants with multiple sources (i.e., multiple reservoirs) must provide a schematic and document completion of spreadsheet(s) for all of the sources necessary to evaluate the variance request.

Applicants with and without reservoir storage may choose to use, and include with the variance application, additional versions of the worksheets to demonstrate quantity estimates of the effects of the specific Drought Response Level that the water system seeks to apply, as described in Rule 391-3-30.08(1) (see sub-paragraph (d) in particular). If an applicant uses additional version(s) of the worksheet for this purpose, each version should be clearly annotated in a manner that documents the inputs and assumptions used in the analysis.

INSTRUCTIONS FOR COMPLETING THE WORKSHEET

Applicants withdrawing from reservoirs:

Enter the following information and data into the “Reservoir Worksheet”:

Information:

1. The name and title of the person completing the spreadsheet.
2. The water system name and identification or withdrawal permit number.
3. The permitted name of the reservoir.
4. The date the spreadsheet was completed.
5. The first day of the preceding calendar year.
6. The total reservoir storage capacity in acre-feet.
7. The reservoir storage volume in acre-feet at the beginning of 2007.
8. The reservoir storage volume in acre-feet at the beginning of the 24-month projection period.
9. The functional reservoir storage limit in acre-feet (equivalent to the dead pool or designed sediment storage volume in acre-feet).
10. The protected low flow in cubic feet per second required to be released from the reservoir unless the inflow is lower

Data:

1. The “Inflow to Reservoir” in cubic feet per second (cfs) for each calendar month of 2007 and 2008.
2. The “Releases from Reservoir” in cfs for each calendar month of the same time period(s).
3. The “Withdrawal” from the reservoir in million gallons per day (MGD) for each calendar month of the calendar year preceding the year in which the variance application is filed.

If direct measurements are not available for the full period for any of these data, add an embedded note in the relevant cell(s) explaining which data points are estimated and describing the methodologies used for the estimation.

Once the above information and data are entered, the associated worksheet automatically calculates and displays the following for a 24-month projection period beginning the January of the calendar year in which the variance is filed: “Assumed Withdrawals (cfs),” “Net Storage Change (MG),” and “Remaining Storage (acre-feet).”

The spreadsheet also re-displays the “Functional Reservoir Limit (acre-feet)” and calculates and displays the “Usable Remaining Storage (acre-feet),” the “Usable Remaining Storage (MG),” and the “Demand Days Left.”

The associated “Reservoir Graph” automatically plots a graph showing the Projected Reservoir Storage based on January 2007-December 2008 Reservoir Inflows and Releases and Withdrawals for Preceding Calendar Year. It also shows the “Functional Reservoir Limit (acre-feet)”.

Note on “Assumed Withdrawals:” If the applicant has actual withdrawal data for any of the months covered by the “Assumed Withdrawals” shown in the 24-month projection period, those data should be entered in lieu of the calculated “Assumed Withdrawals”. For those months that the applicant does not have actual withdrawal data, “Assumed Withdrawals” will be used. These data are calculated from the withdrawals entered by the applicant for the calendar year immediately preceding the year in which the variance application is filed (values converted to cfs from MGD).

Applicants withdrawing from flowing or unimpounded waterways:

Enter the following information and data into the “Streamflow Worksheet”:

Information:

1. The name and title of the person completing the spreadsheet.
2. The water system name and identification or withdrawal permit number.
3. The permitted name of the waterway.
4. The date the spreadsheet was completed.
5. The first day of the preceding calendar year.
6. The drainage area at the intake and the identification number of the nearest USGS gage
7. The Protected Streamflow (cfs) specified in the applicant’s permit, by Tier if applicable.
8. The Withdrawal Threshold (MGD) for each Tier of protected streamflow, if the applicant’s permit includes such provision(s).
9. The Reservoir Storage Volume Threshold (acre-feet) for each Tier of protected streamflow, if the applicant’s permit includes such provision(s).

Data:

1. The mean monthly “Streamflow” in cubic feet per second (cfs) for each calendar month of 2007 and 2008.
2. The “Withdrawal” in million gallons per day (MGD) for each calendar month of the calendar year preceding the year in which the variance application is filed.

If direct measurements are not available for the full period for any of these data, add an embedded note in the relevant cell(s) explaining which data points are estimated and describing the methodologies used for the estimation.

Once the above information and data are entered, the associated worksheet automatically calculates and displays the following for a 24-month projection period beginning the January of the calendar year in which the variance is filed: “Assumed Withdrawals (cfs),” “Withdrawal Versus Streamflow,” and “Remaining Streamflow (cfs).” The spreadsheet also re-displays the “Protected Streamflows (cfs)” for the first two applicable Tiers.

Note on “Assumed Withdrawals:” If the applicant has actual withdrawal data for any of the months covered by the “Assumed Withdrawals” shown in the 24-month projection period, those data should be entered in lieu of the calculated “Assumed Withdrawals”. For those months that the applicant does not have actual withdrawal data, “Assumed Withdrawals” will be used. These data are calculated from the withdrawals entered by the applicant for the calendar year immediately preceding the year in which the variance application is filed (values converted to cfs from MGD).

The associated “Streamflow Graph” automatically plots a graph showing the “Assumed Withdrawals (cfs)” and the “Remaining Streamflow (cfs).” It also plots the “Protected Streamflow (cfs)” for the first two applicable Tiers.

Applicants withdrawing from both reservoirs and flowing or unimpounded waterways:

Permittees will enter the above information and data into both worksheets.

Analysis of an alternate drought of record:

The Drought Management Rule specifies use of 2007-2008 hydrologic conditions for analysis of water supply and demand. Full analysis using 2007-2008 hydrologic conditions should be completed at a minimum, as described above. In addition, applicants may choose to analyze a second 24-month period that represents a different drought of record for the location of their water source.

To do so, an applicant should complete an additional set of worksheets and graphs as appropriate for their water system (e.g., a reservoir worksheet and graph for a water system that only has a single reservoir withdrawal; reservoir and streamflow worksheets and graphs for a water system that has a reservoir that is filled via pumping from a separate permitted withdrawal, etc.).

These additional worksheets should be clearly labeled as analysis of a second, alternate drought of record. Starting from the worksheets completed for the 2007-2008 period, dates of the alternate 24-

month period should be clearly indicated in each relevant call of a worksheet. In addition, the following information and data should be changed, as appropriate to the applicant's water system:

Reservoir Worksheet

1. Storage at the beginning of the time period
2. Inflow to Reservoir
3. Releases from Reservoir

Streamflow Worksheet

1. Mean streamflow

This additional information must be clearly annotated in a manner that documents relevant inputs and assumptions used in the analysis.