DIVISION OF DRINKING WATER
R309-511 HYDRAULIC MODELING RULE CHECKLIST

Rule Applicability

I. Is R309-511 *Hydraulic Modeling Requirements* applicable for a proposed project? **Hydraulic modeling certifications may NOT be required if any of the following applies *[R309-511-4(1)(a)]***.

- □ The water system is a transient system.
- □ The water system is a non-transient non-community water system that has system demand lower than that required by R309-510 and does not provide water for fire suppression.
- □ The proposed project will not result in negative hydraulic impact. For example, the following examples are not anticipated to have negative hydraulic impact:
    - o Addition of new sources in accordance with R309-515.
    - o Adding disinfection, fluoridation, or other treatment facilities that do not adversely impact flow, pressure or water quality.
    - o Storage tank repair or recoating.
    - o Water main additions with no expansion of service (i.e. looping lines).
    - o Adding transmission lines to storage or sources without adding service connections.
    - o Adding pump station(s) from source or storage upstream of distribution service connections.
    - o public drinking water projects that have negligible hydraulic impact as determined by the Executive Secretary
- □ The project is part of a planned phase of a master plan previously approved by the Executive Secretary.
- □ The water system maintains and updates a hydraulic model of the system, and has designated a professional engineer responsible for overseeing the hydraulic analysis.
- □ The water system has a means deemed acceptable by the Executive Secretary to gather real time data indicative of hydraulic conditions in model scenarios of R309-511-5(9), and the real time data shows the system is capable of meeting the flow and pressure requirements for the additional demands placed on the existing system.

II. The following are considered **public drinking water projects *[R309-500-5(1)]***, but usually have **negligible hydraulic impact**. Therefore, these are subject to the plan review requirement but usually NOT the hydraulic modeling requirement.

- o The interior re-coating or re-lining of any raw or drinking water storage tank, or water storage chamber within any treatment facility.
- o The "in-situ" re-lining of any pipeline.
- o A change or addition of any primary coagulant water treatment chemical (excluding filter, flocculent or coagulant aids) when the proposed chemical does not appear on a list of chemicals pre-approved by the Executive Secretary for a specific treatment facility.
- o Re-development of any spring or well source.

III. The following are considered **on-going operational and maintenance procedures *[R309-***

500-5(2)]. Therefore, neither plan review nor hydraulic modeling requirements apply.

- Pipeline leak repair.
- Replacement of existing deteriorated pipeline where the new pipeline segment is the same size as the old pipeline or the new segment is upgraded to meet the minimum pipeline sizes required by R309-550-5(4) or larger sizes as determined by a hydraulic analysis in accordance with R309-550-5(3).
- Tapping existing water mains with corporation stops so as to make connection to new service laterals to individual structures.
- Distribution pipeline additions where the pipeline size is the same as the main supplying the addition or the pipeline addition meets the minimum pipeline sizes required by R309-550-5(4) or larger sizes as determined by a hydraulic analysis in accordance with R309-550-5(3), the length is less than 500 feet and contiguous segments of new pipe total less than 1000 feet in any fiscal year.
- Entry into a drinking water storage facility for the purposes of inspection, cleaning and maintenance.
- Replacement of equipment or pipeline appurtenances with the same type, size and rated capacity (fire hydrants, valves, pressure regulators, meters, service laterals, chemical feeders and booster pumps including deep well pumps).

Minimum Requirements for the Hydraulic Model ***[R309-511-5]***

Are all the following requirements covered in the hydraulic model?

1) Includes at least 80% of the total pipe lengths in the distribution system affected by the proposed project.
2) Accounts for 100 % of the flow in the distribution system affected by the proposed project. Water demand allocation must account for at least 80 percent of the flow delivered by the distribution system affected by the proposed project if customer usage in the system is metered.
3) Includes all 8-inch diameter and larger pipes. Pipes smaller than 8-inch diameter should also be included if they connect pressure zones, storage facilities, major demand areas, pumps, and control valves, or if they are known or expected to be significant conveyers of water such as fire suppression demand.
4) Includes all pipes serving areas at higher elevations, dead ends, remote areas of a distribution system, and areas with known under-sized pipelines.
5) Includes all storage facilities and accompanying controls or settings applied to govern the open/closed status of the facility that reflect standard operations.
6) If applicable, includes all pump stations, drivers (constant or variable speed), and accompanying controls or settings applied to govern their on/off/speed status that reflect various operating conditions and drivers.
7) Includes all control valves or other system features that could significantly affect the flow of water through the distribution system (i.e. interconnections with other systems, pressure reducing valves between pressure zones) reflecting various operating conditions.
8) Imposes peak day and peak instantaneous demands to the water system's facilities.
9) The model has been calibrated to adequately represent the actual field conditions using field measurements and observations.

10) Accounts for fire suppression requirements if fire hydrants are connected to the distribution system.
11) Accounts for outdoor use, such as irrigation, if the drinking water system supplies water for outdoor use.

<u>Certification Elements</u> *[R309-511-5]*

- Does the Engineer's certification cover these elements?

    1) The hydraulic model meets the minimum requirements in R309-511-5.
    2) The demand requirements specified in Rules R309-510 and -511 have been used to evaluate various operating conditions of the public drinking water system.
    3) The hydraulic model predicts that new construction will not result in any service connection within the new expansion area not meeting the minimum distribution system pressures as specified in R309-105-9.
    4) The hydraulic model predicts that new construction will not decrease the pressures within the existing water system to such that the minimum distribution system pressures as specified in R309-105-9 are not met.
    5) The calibration methodology is described and the model is sufficiently accurate to represent conditions likely to be experienced in the water delivery system.
    6) Identify the hydraulic modeling method. If computer software was used, identify the software name and version.
    7) The certification is signed, dated, and stamped by a registered professional engineer, licensed to practice in the State of Utah.

- For community public water systems, has the water system management certified that they have received a copy of input and output data for the hydraulic model with the simulation showing the worst case results in terms of water system pressure and flow?

<u>Hydraulic Model Design Elements Report</u> *[R309-511-7]*

Does the Hydraulic Model Design Elements Report include these elements?

1) If the public drinking water system provides water for outdoor use, the report must describe the criteria used to estimate this demand.
2) The total number of connections served by the water system including existing connections and anticipated new connections served by the water system after completion of the construction of the project.
3) The total number of equivalent residential connections (ERC) including both existing connections as well as anticipated new connections associated with the project.
4) Provide the following information:
    - □ methodology used for calculating demand and allocating it to the model;
    - □ a summary of pipe length by diameter;
    - □ a hydraulic schematic of the distribution piping showing pressure zones, general pipe connectivity between facilities and pressure zones, storage, elevation and sources; and
    - □ a list or ranges of values of friction coefficient used in the hydraulic model according to pipe material and condition in the system.
5) A statement stating either "yes fire hydrants exist or will exist within the system" or "there

are no fire hydrants connected to the system and there is no plan to add fire hydrants with this project." Identify the local fire authority's name, address, and contact information, as well as the fire flow quantity and duration if required.

6) The locations of the lowest pressures within the distribution system, and areas identified by the hydraulic model as not meeting each scenario of the minimum pressure requirements in R309-105-9.
7) Calibration method and quantitative summary of the calibration results (i.e., comparison tables, graphs).

<u>System Capacity and Expansion Report</u> ***[R309-511-8 & R309-110-4 "Master Plan" Definition]***

If the System Capacity and Expansion Report is required, does it contain these elements?

1) A listing of sources including source name, source type for both existing and additional sources needed for system expansion, minimum reliable flow of the source in gpm, status of the water right, and the water right limit.
2) A listing of storage facilities including storage tank name, the type of material, the diameter, the total volume in gallons, the elevation of the overflow, the lowest level of the equalization volume, the fire suppression volume, and the emergency volume or the outlet.
3) A listing of pump stations including pump station name and pumping capacity in gpm.
4) A listing of the pipe sizes with their associated pipe materials and, if readily available, the approximate length of pipe in each size and material category. A schematic of the distribution piping showing node points, elevations, length and size of lines, pressure zones, demands, and coefficients used for the hydraulic analysis.
5) A listing by customer type along with an assessment of their associated number of ERC's.
6) The number of future connections along with their associated ERC value that the public drinking water system is committed to serve, but has not yet physically connected to the infrastructure.
7) A description of the nature and extent of the area currently served by the water system and a plan of action to control addition of new service connections or expansion of the public drinking water system to serve new development(s). The plan shall include current number of service connections and water usage as well as land use projections and forecasts of future water usage.
8) A hydraulic analysis of the existing distribution system along with any proposed distribution system expansion already identified.
9) A description of potential alternatives to manage system growth, including interconnections with other existing public drinking water systems, developer responsibilities and requirements, water rights issues, source and storage capacity issues and distribution issues.