Division of Water Resources
Guidelines for Water Quality Modeling Documentation

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While the Division of Water Resources (DWR) recognizes that model documentation will be project specific, the purpose of this outline is to provide guidance on the types of information that should be provided in a water quality modeling document.

This document is provided on DWR's model requirements website (http://portal.ncdenr.org/web/wq/ps/mtu/modeling) along with a separate guidance document that provides information on the development of water quality modeling plans. The purpose of these guidance documents is to enable DWR to confidently use water quality models developed by third parties for decision making purposes.

The roles of documentation include:

- Communicate the modeling approaches and results
- Record keeping of completed tasks so that results can be reviewed and reproduced
- Provide background for future work
- Document the underlying assumptions and limitations

Interim Technical Memos

Technical memos should be prepared to describe the work done and results from completed tasks at key stages in the model development process. Technical memos are helpful tools to facilitate timely reviews of the modeling study. Examples of technical memo subjects include: data processing, initial model setup, and calibration and corroboration. The final report should compile or include references to developed technical memos. Technical memo subjects should be agreed upon prior to project initiation.

Final Modeling Report

It is recommended that the final modeling report contain the following information:

Introduction – This section should introduce the project and describe the project goals. Project goals should be consistent with the water quality modeling plan developed prior to beginning the project. The introduction should also include a description of the geographical location, provide the reason(s) for developing a water quality model, and describe any advisory groups that contributed to the effort.

Monitoring – This section should describe the specific monitoring efforts involved in the project and major findings.

Modeling Approach –Describe the model selected for the project, the reasons why it was selected, and the major features of the model. A model framework or structure diagram and explanation should be

included. More detail should also be provided on specific components of the model that are relevant to the goal of the modeling study (e.g., for BMP assessment describe how BMPS are represented in the model in more detail).

Model Input – This section should include a complete description of all data used in the modeling project. All data sources should be provided in this section. Include an explanation of how data were used (model setup, model drivers such as meteorological data, calibration, etc.). Any approaches to data manipulation should be clearly described (e.g., methods used to fill data gaps in a time series, methods used to address nondetect values). Any data used in the project that are not publicly available should be included in an appendix to the report and provided in electronic files.

Process for Calibration and Corroboration – Describe the process used for calibration and corroboration including the key calibration parameters with expected ranges from literature, relevant data sets, and performance targets.

Model Results – Provide the results of calibration and corroboration in this section. Describe the results using statistical measures, graphical display, etc., and compare results to performance targets. Provide results for all calibration and corroboration locations.

Uncertainty and/or Sensitivity Analysis – Where applicable. These analyses can be either qualitative and/or quantitative depending on the purpose of the modeling project.

Scenario Analysis – Where applicable, scenario analysis should be included in the final report.

Model Limitations and Key Assumptions – This section should clearly describe model limitations and their sources (e.g., lack of data, model framework) and key assumptions. It is important that model limitations be considered when interpreting model results. This section should provide recommendations on the application of the model given the limitations.

Summary –Summarize the project, the modeling results, the model limitations, and make any recommendations as appropriate.

Modeling Files - All electronic files (and any specific guidance relevant to model use and application) necessary to run the model and process output should be provided to DWR at the end of the study. If modeling code has been modified to accommodate the project needs, the modified code must be included.