DIVISION OF ENVIRONMENT
QUALITY MANAGEMENT PLAN

PART III:

WATERSHED PLANNING AND STANDARDS UNIT
QUALITY ASSURANCE MANAGEMENT PLAN

Revision 11
1/30/2019

Kansas Department of Health and Environment
Division of Environment
Bureau of Water
Watershed Planning, Monitoring, and Assessment Section
1000 SW Jackson St. Suite 420
Curtis State Office Building
Topeka, Kansas 666

SIGNATURES/APPROVALS

Bureau of Water:

Jaime Geiger

(Signature, Bureau Director)

4.2.19

(Date)

Watershed Planning, Monitoring, and Assessment Section:

(Signature, Section Chief)

4/10/2019

(Date)

Watershed Planning & Standards Unit:

Michelle Pinkerton

(Signature, Unit Chief)

4/9/19

(Date)

Bureau of Water QA Representative:

(Signature, Bureau QA Rep)

04/10/2019

(Date)

TABLE OF CONTENTS

Section **Page No.**

1 INTRODUCTION
- 1.1 Purpose of Document 6
- 1.2 Document History 6
- 1.3 Historical Overview of Section 7
- 1.4 Section Responsibilities 7
- 1.5 Current Quality Assurance Goal 8

2 QUALITY ASSURANCE POLICIES
- 2.1 Quality Assurance Policies 9

3 QUALITY ASSURANCE ORGANIZATION
- 3.1 General Section Activities 11
- 3.2 Staff and Supervisor Responsibilities 11

4 QUALITY SYSTEM DESCRIPTION
- 4.1 Quality Assurance Management Plan 13
  - 4.1.1 Quality Assurance Program/Project Plans 13
  - 4.1.2 Standard Operating Procedures 15
- 4.2 Management System Reviews 17
- 4.3 Program/Project Audits 17
- 4.4 Data Quality Assessments 17
- 4.5 Internal Program/Project Reviews 18
- 4.6 Staff/Supervisor Performance Evaluations 18
- 4.7 Annual Program/Project Evaluations 18

5 PERSONNEL QUALIFICATIONS AND TRAINING
- 5.1 Personnel Qualifications 19
- 5.2 Continuing Educational Opportunities 19
- 5.3 Quality Assurance Training 19
- 5.4 Supervisory Expectations 20
- 5.5 New Employee Orientation 20
- 5.6 Annual Review Affidavit 20

Section **Page No.**

5.7 Safety Considerations 20

6 PROCUREMENT OF GOODS AND SERVICES
6.1 Procurement of Services 22
6.2 Procurement of Equipment and Supplies 22

7 COMPUTER TECHNOLOGY
7.1 Computer Hardware and Software 23
7.2 Data Entry Requirements 23
7.3 Verification of Calculations 23

8 DOCUMENTS AND RECORDS 25

9 PLANNING AND IMPLEMENTATION OF WORK
9.1 Planning Requirements 26
9.2 Implementation Requirements 26

10 ASSESSMENT AND RESPONSE
10.1 Assessments 27
10.2 Corrective Actions 28

11 QUALITY IMPROVEMENT
11.1 Quality Management Plan Review 29
11.2 Quality Assurance Communication 30

APPENDIX A: KANSAS 2012 303(d) LISTING METHODOLOGY METHODOLOGY NARRATIVE SECTION 31

APPENDIX B: KANSAS TMDL VISION PROCESS 32

APPENDIX C: STANDARD OPERATION PROCEDURE FOR ANNUALIZED AGRICULTURAL NONPOINT SOURCE POLLUTION (ANNAGNPS) AND GENERALIZED WATERSHED LOADING FUNCTION (QWLF) MODELS ..... Archived

APPENDIX D: STANDARD OPERATION PROCEDURE FOR EUTROPHICATION (BATHTUB) MODEL 63

APPENDIX E: STANDARD OPERATION PROCEDURE FOR HANDLING 305 (b) BIOLOGICAL DATA OF KANSAS SURFACE WATER 65

APPENDIX F: STANDARD OPERATION PROCEDURE FOR TMDL INTERPRETATION AND ESTIMATING POLLUTANT LOAD REDUCTIONS FOR WRAPS PROJECTS 70

APPENDIX G: STANDARD OPERATION PROCEDURE FOR MAPS PRODUCED BY THE WATERSHED PLANNING SECTION 71

APPENDIX H: STANDARD OPERATING PROCEDURE FOR SURFACE WATER QUALITY STANDARDS 72

APPENDIX I: STANDARD OPERATING PROCEDURE FOR WATER QUALITY CERTIFICATION 73

APPENDIX J: STANDARD OPERATING PROCEDURE FOR BIOTIC LIGAND MODEL (BLM) 76

APPENDIX K: STANDARD OPERATING PROCEDURE FOR CORMIX – ESTIMATING MIXING ZONES 83

APPENDIX R: WPSU QMP PART III REVISION HISTORY 87

Section 1

INTRODUCTION

1.1 Purpose of Document

This document presents quality assurance (QA) goals, policies, organizational responsibilities, and evaluation and reporting requirements applicable to the contracted environmental monitoring programs and data analysis projects administered and utilized by the Watershed Planning and Standards Unit (WPSU), Watershed Planning, Monitoring and Assessment Section (WPMAS), Bureau of Water (BOW), Division of Environment (DOE), Kansas Department of Health and Environment (KDHE).

1.2 Document History

Part I of the quality management plan (QMP) established overarching divisional QA policies and expectations and provided a consistent framework for developing QA documentation at the bureau level (QMP Part II) and at the unit/program/project level (QMP Part III). Part I was revised in January 2018 to comply with new divisional policies and federal requirements. The Bureau of Water's contribution to the QMP was prepared under the auspices of the January 2018 revision and represents one of four bureau/office level QA management plans comprising Part II of the QMP. Initially, this Part III QMP covered the QA activities of Office of Planning and Prevention (OPP), which provided two major functions: TMDL/Planning and Pollution Prevention. A divisional reorganization resulted in the two functions of OPP being split with the TMDL/Planning function being moved to the newly created Watershed Planning section in the Bureau of Water and the Pollution Prevention function moving to the Bureau of Environmental Field Services. The QMP for the Office of Planning and Prevention was revised to reflect this move and became Part III of the QMP for the Bureau of Water/Watershed Planning Section. Changes to this document since the Watershed Planning Section was formed have been minor. Minor edits were made in 2010 to cover the section's use of Geographical Information Systems and the Section's role and involvement with the Kansas Watershed Restoration and Protection Strategies (WRAPS). In 2012, a Division of Environment reorganization expanded the Watershed Planning Section to the Watershed Planning, Monitoring and Assessment Section (WPMAS) with the incorporation of the Fish Tissue Contaminant Monitoring Program, Lake and Wetland Water Quality Monitoring Program, Stream Biological Monitoring Program, Stream Chemistry Monitoring Program, Stream Probabilistic Monitoring Program, Sub-Watershed Monitoring Program, Compliance Monitoring Program, and the Surface Water Use Designation Program, previously functions of the Bureau of Environmental Field Services. The 2012 reorganization also moved the Water Quality Standards program, which includes water quality certifications, from the Technical Services Unit under the BOW Administrative section to WPMAS resulting in the formation of the Watershed Planning and Standards Unit (WPSU). Because the WPMAS monitoring programs operate under their own QMP Part IIIs, in

2013, this document became the Watershed Planning and Standards Unit QMP Part III.

1.3 Historical Overview of Watershed Planning and Standards Unit

On November 1, 1995, the Kansas Natural Resource Council and the Sierra Club filed a complaint against the EPA, compelling it to enforce Section 303(d) of the Clean Water Act by establishing Total Maximum Daily Loads (TMDLs) pursuant to Section 303(d) and to compel EPA to approve or disapprove Kansas's Continuing Planning Process (CPP) relative to Section 303(e) of the Clean Water Act. Kansas intervened in the litigation, since the state had lead responsibility for identifying and ranking in priority the waters requiring TMDLs and establishing such TMDLs. A settlement was reached and a consent decree approving the settlement was made on April 13, 1998. Under the terms of the court decree, a schedule of submittals was agreed upon regarding the Continuing Planning Process document and the TMDLs established for the water quality limited water bodies of the state. The CPP was established on July 1, 1998 to address the requirements of this court decree, specifically the establishment of the state's TMDLs within the agreed upon schedule. The requirements of the Court Decree were met, in total, in June 2006 by the Watershed Planning Section. The Court Decree was dismissed on January 22, 2007.

In February 2015, the CPP was updated to the Kansas TMDL Vision Process. Consistent with the approach supported by EPA's national TMDL Program, the Kansas TMDL Vision is tied to KDHE's Nutrient Reduction Framework and will concentrate on stream phosphorus or nitrate impairments within the 16 Hydrological Unit Code 8 (HUC 8s) deemed high priority as detailed in Appendix B.

1.4 WPSU Responsibilities

The WPSU is responsible for TMDL development and assists with the development of the biennial Kansas Integrated Water Quality Assessment Report (305(b) and 303(d) lists). The WPSU accomplishes this through the utilization of in-house environmental data collected under the purview of the WPMAS Monitoring programs and other bureaus in the DOE, such as the Bureau of Water (BOW) and the Bureau of Environmental Field Services (BEFS) as well as data collected by federal partners including but not limited to the U.S. Army Corps of Engineers (USACE) and the United States Geological Service (USGS). The WPSU is also responsible for reviewing and revising water quality standards through a public process called the Triennial Review. The Triennial Review is conducted at least once every three years, where public hearings are held for the purpose of reviewing applicable water quality standards and modifying the adopted standards as appropriate. WPSU also conducts water quality reviews and certifications as part of the NPDES permitting process.

1.5 Divisional Quality Assurance Goal

The foremost goal of this QA management plan is to ensure that all data used by WPSU in TMDL development, triennial reviews, and NPDES water quality certification are a product of known and documented quality and support, in a scientifically defensible manner, the informational needs and planning functions of DOE and KDHE.

Section 2

QUALITY ASSURANCE POLICIES

2.1 Quality Assurance Policies

The WPSU uses data generated by the environmental monitoring programs managed by WPMAS, and environmental monitoring programs managed by our federal partners. The data used for WPSU projects shall conform to the general policies set forth in Part I, section 2.2, of the QMP. In summary, the referenced section imposes the following requirements:

(1) The objectives of each environmental monitoring program or project shall be clearly delineated during the planning stages of the contract program or project and within the contract itself. These objectives shall be consistent with the mission, policies, and priorities of the Division.

(2) Tolerable levels of data uncertainty shall be identified during the planning stages of each monitoring program or project so that appropriate procedures and resources may be incorporated into the design of the contract program or project.

(3) Quality assurance and QC measures shall be integrated into all contracted environmental monitoring programs or projects in the most cost-effective manner possible without hindering attainment of the stated QA objectives.

(4) A quality assurance project plan (QAPP), describing how the contracted activity will achieve the stated objectives and the required level of data reliability, shall be developed by the contractor.. This document shall be reviewed and approved, at a minimum, by the section chief and by the applicable section QA representative prior to initiation of the contracted data collection. The QAPP will be a required document under provisions of the contract.

(5) Contracted sample collection, sample analysis, and data management activities may be subjected to periodic evaluation by supervisory personnel and outside auditors to identify and correct deficiencies and enhance the credibility of each environmental monitoring program or project.

(6) Measures shall be instituted within each contracted environmental monitoring program or project to ensure that the quality of obtained environmental data is accurately and permanently documented.

Deviations from the above policies may be permitted in the event of unusual or unprecedented emergency situations which are beyond the scope of previously approved QAPPs and Standard Operating Procedures (SOPs) and require an immediate response based on the best professional judgment of the contractor or project analyst. All such deviations should be documented and described at the contract closeout or upon completion of the analysis project and will be reviewed at that time by the section chief and section QA representative. These deviations and findings will be added to the end-of-year program evaluations submitted through the section QA representative to the Divisional QA officer (see Section 4.7).

Section 3

QUALITY ASSURANCE ORGANIZATION

3.1 General Section Activities

The BOW/WPMAS/WPSU maintains its office in Topeka. As it relates to this QMP, the WPSU has responsibility for the state's Total Maximum Daily Load determinations, water quality standard development and review, and NPDES permit limit development and certification. WPSU also assists the WPMAS/Assessment and Information Unit in the development of the 303(d) List and the 305(b) integrated report. WPSU supports the Watershed Management Section by providing information and data that will assist in the development of nine element watershed plans and by being available to interpret TMDLs and provide water quality milestones to watershed groups. WPSU also provides public meetings for various issues.

An organizational chart illustrating the section's current hierarchy can be found at:

http://kdhenet/appnet/ops/orgchart/

3.2 Staff and Supervisor Responsibilities

Staff expectations and responsibilities relative to QA and quality control (QC) are described in the following paragraphs.

Section Chief - This employee ultimately oversees the development, revision, and implementation of the section's QA management plans (Part IIIs of QMP) and associated QAPPs and SOPs. With the assistance of the section QA representative and applicable staff, the section chief ensures that QA requirements are fulfilled in the most cost-effective manner possible without hindering attainment of the stated QA objectives. The section chief prioritizes the training and continuing educational needs of staff and develops funding proposals to accommodate these needs, as necessary.

Unit Leaders/Program Managers/Project Managers – Unit Leaders and Mangers of environmental monitoring programs/projects work closely with nonsupervisory staff to ensure that QAPP and SOP requirements are implemented in a timely, consistent, and technically appropriate fashion. Together with the section chief, these managers strive to improve the efficiency of environmental planning, monitoring and assessment operations through the prudent, day-to-day allocation of staff and other resources. They also bring the QC training needs of staff to the attention of t heir section chiefs, develop QAPPs and SOPs for new monitoring initiatives, and periodically review and revise existing QAPPs and SOPs to meet the evolving informational needs of the Division.

Section QA Representative - This employee is directly responsible for reviewing and approving QAPPs and SOPs developed by the WPMAS or contractors. If necessary, this employee provides guidance to program/project managers involved in the preparation and implementation of QAPPs and SOPs and operates under a degree of autonomy, which allows the employee to make independent assessments of QA performance and the need for corrective action. As needed, the section QA representative analyzes QA evaluation reports and related information submitted by program/project managers.

Section Staff - Individuals directly involved in the collection and analysis of environmental monitoring play an important role in the implementation of the QMP. To a large extent, the quality and usefulness of the Division's environmental monitoring data reflect the willingness of these individuals to abide by approved QAPPs and SOPs and to participate constructively in the ongoing review and revision of these documents. Because they carry out the provisions of QAPPs and SOPs on a routine basis, section staff often develops a keen understanding of the technical strengths and weaknesses of the section's data collection and analysis needs. These employees will also be involved and provide input in the development and review of QAPPs and SOPs.

Section 4

QUALITY SYSTEM DESCRIPTION

4.1 Quality Assurance Management Plan

This document, the WPSU QA management plan, establishes quality assurance (QA) goals, policies, organizational responsibilities, and evaluation and reporting requirements applicable to the environmental monitoring programs and data analysis projects, administered and utilized by the WPSU. Pursuant to Part I of the QMP (section 11), it must be reviewed at least annually and updated, if needed, by the WPSU QA representative. Minor revisions to this plan are reviewed and approved by the section QA representative and section chief. Major revisions, reflecting significant changes in the section quality management system, are reviewed and approved by the section QA representative, section chief, bureau director, Divisional QA officer, and Division director. Changes constituting major revisions are identified by the WPSU QA representative in consultation with the Divisional QA officer. Deviations in the section QA management plan from the overarching Divisional policies set forth in Part I of the QMP are approved only under exceptional circumstances and must be clearly explained and justified within the plan.

4.1.1 Quality Assurance Program/Project Plans

A QAPP or QMP Part III shall be developed for each environmental monitoring program/project by the responsible program/project manager and approved by the section chief and appropriate section QA representative prior to the initiation of data collection. Environmental data set analyses used in the development of TMDLs follow the guidelines in this QMP Part III as Appendix B, which is adopted by this reference as the QAPP for these analyses. As the TMDL Vision Process is updated, it will be adopted by reference and added as a revision to this QAPP. In the unlikely event a QAPP or SOP implemented by WPSU program/project manager is developed by an outside contractual entity, or by a regulated entity, the requirements of Part I, section 4.1 of the QMP shall apply.

Each QAPP or QMP Part III related to environmental monitoring shall be prepared using a standardized document control format in which the report identity, revision number, date of revision, and page number appear in the upper right-hand corner of each page. Each QAPP shall contain the following informational elements unless the reviewing section QA representative and/or section chief determine that a given element falls outside the technical scope of the program/project:

(1) title page identifying program/project, section, bureau, division and agency;

(2) approval page with blocks for appropriate signatures and dates;

(3) table of contents, including a list of any appendices;

(4) overview of program/project, including statement of purpose, developmental history, and any relevant statutory and regulatory requirements;

(5) description of or link to the organizational hierarchy with accompanying list of participating staff positions and statement of staff responsibilities as applicable;

(6) description of data performance criteria expressed in terms of data precision, accuracy, completeness, comparability, and representativeness for each parameter of interest;

(7) description of, and rationale for, intended sampling frequency, sampling network design, and monitoring site selection criteria;

(8) description of sampling equipment and associated decontamination procedures (reference SOPs, as appropriate);

(9) description of field procedures, including sample collection, analysis, preservation, transport and chain-of-custody procedures, and accompanying safety protocols (reference SOPs, as appropriate);

(10) list of laboratory parameters and sample holding times and accompanying description of laboratory analytical and safety protocols (note: SOPs adopted by the Kansas Health and Environmental Laboratories or other cooperating laboratories may be adopted by reference, provided they contain the informational elements stipulated in section 4.1.2, below);

(11) description of data validation, storage, transfer, reporting, and backup requirements and any special documentation requirements (reference SOPs, as appropriate);

(12) description of equipment testing, calibration, and preventative maintenance procedures (reference SOPs, as appropriate);

(13) description of inspection procedures and acceptance requirements for purchased equipment and supplies (reference SOPs, as appropriate);

(14) description of procedures (including statistical procedures) used to evaluate data precision, accuracy, completeness, representativeness, and comparability, including a detailed characterization of internal QC procedures and external performance audit requirements;

(15) description of procedures used to evaluate and enhance utility of environmental monitoring data, including, but not necessarily limited to, procedures and assumptions applied in the identification and treatment of (a) outliers and other anomalous data, (b) nonlinear data requiring statistical transformation, and (c) values reported as less than or greater than established reporting limits;

(16) description of corrective action procedures for out-of-control situations;

(17) description of procedures for determining the quality of ancillary data acquired from external sources not subject to the provisions of the divisional QMP (e.g., meteorological, hydrological, geological, chemical and/or biological data obtained from other state or federal agencies); and

(18) description of program/project deliverables (electronic databases, summary statistics, illustrative materials, interim and final reports, etc.) and schedule for completion.

Additional points to consider when preparing a QAPP are presented in the EPA documents *Guidance for Quality Assurance Project Plans* (EPA QA/G-5) and *EPA Requirements for Quality Assurance Project Plans* (EPA QA/R-5).

4.1.2 Standard Operating Procedures

Standard operating procedures document protocols used in the collection, preservation, transport, transfer, and analysis of environmental samples and in the collection, validation, storage, retrieval, transfer, backup, and analysis of environmental data. As such, they facilitate consistency among contracted staff, serve as valuable references and training tools, and provide formal written records of the methods used to implement environmental monitoring operations. All SOPs must be scientifically rigorous and compatible with the data performance criteria set forth in their respective QAPP or QMP Part III.

Approved SOPs may be appended to the end of a QAPP/QMP Part III or adopted by reference within the text of a QAPP. All SOPs originating within WPMAS shall employ a standardized document control format in which the report identity, revision number, date of revision, and page number appear in the upper right-hand corner of each page. Elements to consider when preparing an administrative, field, or laboratory SOP are presented in the EPA document *Guidance for the Preparation of Standard Operating Procedures (SOPs) for Quality-Related Documents* (EPA QA/G-6). Each technical SOP involving field work and related sample and data collection activities shall contain the following informational elements, unless the reviewing section QA representative and/or section chief determines that a given element or combination of elements falls outside the technical scope of the environmental monitoring program/project:

(1) title page with appropriate blocks for approval signatures/dates;

(2) table of contents including a list of any appendices;

(3) introductory statement describing intended application of SOP and providing overview of procedure;

(4) statement of minimal technical qualifications for participating staff;

(5) instructions for calibrating field instruments and performing associated troubleshooting procedures;

(6) instructions for collecting, preserving, and handling environmental samples and/or performing environmental measurements, emphasizing health and safety considerations, and highlighting any steps requiring special attention, patience, or care;

(7) instructions for collecting and analyzing duplicate or replicate samples and for preparing field blanks, spikes, and split samples, emphasizing health and safety considerations, and highlighting any steps requiring special attention, patience, or care;

(8) instructions for preparing and analyzing samples in the field and performing related troubleshooting procedures, emphasizing health and safety considerations, steps requiring special attention, patience or care, and possible interferences jeopardizing data quality;

(9) instructions for transporting, transferring, and storing environmental samples and accompanying field data and records (e.g., written notes and logs, conventional and digital photographs, audio and audiovisual tapes), emphasizing chain-of-custody procedures, health and safety considerations, and steps requiring special attention, patience or care;

(10) description of data acquisition, storage, retrieval, transfer, verification, backup, and analysis procedures, long-term data/records management procedures, and enabling computer hardware and software;

(11) glossary of technical terms and acronyms employed in SOP (often included as appendix); and

(12) checklist of applicable field equipment and supplies (often included as appendix).

4.2 Management System Reviews

As part of the DOE quality management system, set forth in section 4.2 of the QMP (Part I), management system reviews (MSR) may be conducted for WPSU by the Divisional QA officer. Auditors from EPA may perform MSRs for the entire Division at the discretion of the EPA regional QA manager. The scheduling of an MSR will be determined by input from the section QA representative, the section chief, and the Division director. MSRs normally will follow the guidelines in the EPA document *Guidance for Preparing, Conducting and Reporting the Results of Management System Reviews* (EPA QA/G-3, draft 1993).

4.3 Program/Project Audits

Pursuant to Part I, section 4.3 of the QMP, individual monitoring programs/projects and data analyses may be audited at any time by the divisional QA officer, section QA representative, federal oversight agency, or an independent third party contracted by the Division or oversight agency. The section QA representative is expected to conduct data quality assessments for environmental monitoring programs/projects and data analyses based on perceived need as set forth in the approved QAPPs/QMP Part IIIs. The QA performance of any given monitoring program/project or data analysis project may also be assessed as part of an internal or external management system review (MSR) of the entire division. Staff shall cooperate with requests for information made in conjunction with these assessments, including but not limited to information on the adequacy of physical facilities, equipment, personnel, training, field and laboratory procedures, safety, record keeping, data validation and management, and other aspects of the specified monitoring program/project. If an assessment identifies the need for a corrective action, program/project managers along with non-supervisory staff shall bear primary responsibility for reviewing the available options, selecting the most favorable, and obtaining the approval of both the section QA representative and the section chief prior to implementing the selected action. The implementation status of the corrective action shall be monitored by the section chief and addressed in the end-of-year program/project evaluation reports discussed in section 4.7 of this document.

4.4 Data Quality Assessments

Data Quality is also assessed during data analysis projects for TMDL development and when preparing the Kansas Integrated Water Quality Assessment Report. If necessary, the results of these assessments will be provided to the bureaus or contractors collecting the environmental monitoring data used by WPSU. WPSU will work with the applicable bureaus and contractors, as needed, to develop corrective actions stemming from these assessments. The actions will be addressed in the end-of-year program/project evaluation reports discussed in section 4.7 of this document.

4.5 Internal Program/Project Reviews

Quality control aspects of routine environmental monitoring operations and data analyses are subject to ongoing review/assessment by the section chief and section QA representative. The section chief and WPSU staff are expected to cooperate fully with administrative requests for information on data precision and accuracy and overall QC performance. The section chief is expected to track the QC performance of WPSU staff and assist these staff in identifying QC deficiencies within their respective projects and facilitate necessary corrective actions. Results of any internal reviews as conducted by WPSU shall be summarized in the annual program/project evaluation reports discussed in section 4.7 of this document.

4.6 Staff/Supervisor Performance Evaluations

Position descriptions and performance evaluations shall reflect the QA and QC functions and performances of staff. All staff involved in environmental monitoring and data analysis are expected to carry out their responsibilities under the QMP to the best of their abilities. Administrative staff and the section chief are expected to foster an appreciation for the role of QA and QC among employees. In turn, the QA and QC opinions and insights of employees shall be carefully considered by section chief and administrative staff. The quality and credibility of the section's environmental monitoring and data analysis efforts ultimately depend on the willingness of all employees to work as a team, learn from their mistakes, and continually strive for improvement.

4.7 Annual Program/Project Evaluations

As directed by the section chief, end-of-year program/project evaluations shall be conducted by section staff and the results submitted, in writing, through the appropriate section QA representative to the section chief and bureau QA officer by March 15 of the following year. These written evaluations shall indicate when, how, and by whom the evaluation was conducted and describe the specific aspects of the programs/projects subjected to review. They shall include a summary of important findings and recommendations for any necessary corrective actions. All section staff shall cooperate with administrative requests for QA and QC data during the preparation and review of the written program/project evaluations.

Section 5

PERSONNEL QUALIFICATIONS AND TRAINING

5.1 Personnel Qualifications

Unit staff involved in the collection, storage, retrieval, transfer, and analysis of environmental data and section staff involved in the development of geospatial mapping and modeling applications must possess the minimum level of education, training, and experience necessary to meet the demands of their position (as reflected in the class specifications for the job position or in the employee position description). The knowledge and skills possessed by staff and supervisory personnel strongly influence the quality of environmental monitoring data, the interpretation of these data, and the appropriateness of most administrative and regulatory actions taken by the agency.

5.2 Continuing Educational Opportunities

Methods employed in the collection, analysis and modeling of environmental data and the development of geographical information systems are subject to ongoing review and improvement. Occasional conceptual or technological breakthroughs may rapidly antiquate existing methods and require extensive training or retraining on the part of staff. Continuing educational courses offered by some agencies, software vendors, colleges or vocational educational institutions may fulfill these training needs. The section may reimburse employees for course work and related expenses provided the course subject matter is within the general scope of the employee position description, funds for training have been set aside within the budget of the beneficiary program/project, requests for reimbursement have been approved prior to attending training, and participation is otherwise allowable under prevailing agency training and travel policies.

5.3 Quality Assurance Training

The section QA representative is responsible for working with all section staff to ensure staff implementing QAPPs/QMP Part IIIs and SOPs are familiar with their responsibilities under the QMP and have received an appropriate level of QA training. As time, training opportunities, and agency resources allow, the section chief and section QA representative are expected to complete the following (or equivalent) EPA training courses: *Orientation to Quality Assurance*, *Systematic Planning Process (Data Quality Objectives)*, *Quality Assurance Project Plans*, and *Standard Operating Procedures*. Additionally, as time and availability allows, the section QA representative is expected to complete the following (or equivalent) EPA courses: *Quality Management Plans* and *Data Quality Assessments*. As resources and work priorities allow, other employees shall be encouraged to participate in QA training courses offered by EPA. Quality assurance training needs shall be addressed in the end-of-year program/project evaluation reports discussed in section 4.7, above.

5.4 Supervisory Expectations

The quality of the section's environmental data and its analyses is strongly influenced by the level of staff training, experience, and preparation. The Unit Leaders and Program Managers are expected to address the general training needs of staff within the annual program/project evaluation reports. This information is incorporated annually into the WPMAS budget prepared by fiscal staff and the section chief. To broaden the experience of staff, the section chief may provide occasional opportunities for interested employees to participate in activities outside their daily work routines (i.e., cross training opportunities). Such activities must be within the general scope of the employee classification specifications and conform to the training requirements presented in sections 5.5 and 5.7, below.

5.5 New Employee Orientation

The unit leaders shall ensure that new personnel, including newly hired employees, recent transfers, or cross trainees from other programs/projects, receive an introduction to the QA and QC policies and procedures of the division, bureau and the section. The present document, together with Parts I and II of the QMP and all applicable QAPPs/QMP Part IIIs and SOPs, shall be required reading on the part of all such employees. Apart from QA and QC considerations, supervisors shall ensure that all new personnel participate in orientation and training seminars required by the KDHE Office of Human Resources Management. Similarly, new supervisory employees are expected to successfully complete the introductory training course for supervisors offered by the Department of Administration. Safety procedures shall be thoroughly reviewed before any new employee engages in a potentially hazardous duty. New employees must demonstrate a satisfactory understanding of safety issues before they are permitted by their supervisors to participate independently in any potentially hazardous activity (section 5.7).

5.6 Annual Review Affidavit

All section employees participating in environmental monitoring or analysis operations shall review DOE QMP Part I, BOW QMP Part II and other applicable QAPPs/QMP Part IIIs and SOPs, at least once each year. Upon completion of this annual review, each employee shall sign an affidavit indicating he/she has read the appropriate QA documentation. The signed affidavit shall be routed through the section chief and section QA representative to the Divisional QA officer.

5.7 Safety Considerations

Section staff participating in monitoring programs/projects encounter potentially hazardous situations on a frequent basis. In addition to the routine possibility of automobile, boating, or equipment accidents, employees may encounter slippery surfaces, toxic substances, fire or electrocution hazards, infectious microorganisms, vicious animals, belligerent persons, or other threatening situations. Injuries or illnesses resulting from such situations may lead to substantial human suffering. To minimize this risk,

staff must observe all safety requirements set forth in applicable QMP Part IIIs, SOPs, QAPPs. Additionally, staff must observe safety requirements defined in the policies, and directives established by KDHE's Division of Environment Safety Manual available here:

http://kdhenet/env_safety/safety_manual.htm

Section 6

PROCUREMENT OF GOODS AND SERVICES

6.1 Procurement of Services

Contractual services involving the acquisition or analysis of environmental data shall be planned and controlled to ensure that these services meet applicable technical and QA requirements. All contracts for services shall require a QAPP to be developed by the outside contractor and submitted to WPSU (and any other participating bureaus or sections) for review and approval prior to the initiation of data collection (section 4.2). Procurement of services shall comply with procedures and SOPs established by the KDHE Fiscal Services Office. Contracts shall reference or contain specific drawings, regulatory requirements, specifications, codes, standards, standard methods, procedures, and/or instructions that describe the services to be provided by the contractor. Contracts also shall specify minimal requirements for evaluating the suitability and acceptability of any data, reports, or other deliverables stemming from the contractual agreement. The section chief and the section QA representative (with the input, as determined by the section chief, from applicable staff) shall be directly responsible for ensuring that deliverables meet the requirements stipulated in the contracts.

6.2 Procurement of Equipment and Supplies

The procurement of equipment and supplies (goods) shall be planned and controlled to ensure that the quality of obtained goods is documented and meets the technical requirements of the bureau and the division. Quality assurance specifications shall be clearly indicated in purchase orders or related procurement documents. As needed to comply with data performance criteria, reference shall be made in the procurement documents to specific regulatory requirements, specifications, codes, standards, methods, procedures, or instructions. The procurement documents shall specify minimal technical requirements for acceptance of goods by WPSU. Program/project managers (or their designees) shall ensure that all technical specifications are met before goods are accepted by WPSU. Unit leaders and section QA representatives shall assist in these activities, as needed. This requirement does not apply to services, equipment and supplies purchased under statewide contracts developed by the Division of Purchases, Department of Administration, on behalf of state agencies.

Section 7

COMPUTER TECHNOLOGY

7.1 Computer Hardware and Software

All purchases of computer hardware and software must be approved in advance by the KDHE Office of Information Technology Systems (OITS). Anti-virus software approved by Office of Information Technology shall be installed and utilized on all WPSU lap-top and desktop computers and any agency minicomputers and mainframe systems used for storage, retrieval, transfer, backup, and/or analysis of environmental data. KDHE's Internal Directives and Policies concerning information technology are available here: http://kdhenet/human_resources/policies.htm

7.2 Data Entry Requirements

Environmental data (and metadata) manually entered into a state or federal computer database by any WPSU employee shall be examined and verified by at least one other DOE employee familiar with the database. Staff transferring data electronically shall perform random spot checks of the transferred data and report any problems to OITS (or the external cooperating entity) for further investigation and resolution. Persistent or recurring problems shall be reported to the section chief and/or the section QA representative for determination of necessary corrective actions. Such problems shall be addressed in the end-of-year program/project evaluation reports (section 4.7).

7.3 Verification of Calculations

Computer-based mathematical, statistical, graphical, geographical programs and models involving environmental data shall be tested before application and periodically thereafter. As needed, the reliability of software for performing calculations shall be tested by comparison to other computer programs, through hand calculations involving randomly selected data, or through other appropriate means. Calculations by separate staff for each computer-based analysis will be made to ensure random checks in computer calculations and program applications. The reliability of computer-based calculations shall be verified according to schedules established in applicable QAPPs and whenever a problem is reported within the computational system. Quality assurance program/project plans shall describe the types of computer-based calculations to be performed and prescribe measures for monitoring the precision and accuracy of these calculations. This requirement may be waived by the section chief for specific applications involving commercial software (e.g. Microsoft Excel, ESRI ArcGIS, MiniTab) after review by both the section chief and the section QA representative. Use of results from watershed modeling (AnnAGNPS, GWLF, FLUX32) or lake eutrophication (CNET, BATHTUB) modeling will conduct quality assurance consistent with the SOP for both types of modeling (Appendices C and D).

Section 8

DOCUMENTS AND RECORDS

Changes in the general manner of environmental data procurement, contracted environmental data procurement, the quality of the data collected by the contractors, or the analytical methods of data analysis shall be documented in the applicable QMP Part III or SOP for future reference. The section QA representative shall maintain an electronic library of all current and historical QA management plans, QAPPs, and SOPs administered by WPSU.

An electronic representation of the current QA management plans and associated SOPs shall be maintained on the KDHE internet server in a PDF read-only format and made accessible to any interested employee or outside party. The section QA representative is authorized and required to update this representation. Only changes which have been formally approved pursuant to section 4.1 of this document shall be made to the master hard copy and electronic versions of the QA management plans and associated SOPs.

All environmental monitoring data generated by WPSU or obtained from contracted sources or other bureaus, and any WPSU analysis of these data for the purpose of a TMDL are kept as a matter of public record and are available from WPSU upon request.

Section 9

PLANNING AND IMPLEMENTATION OF WORK

9.1 Planning Requirements

All section operations involving the generation or analysis of environmental monitoring data must be systematically planned and documented. The primary planning documents utilized by WPSU include, Kansas Surface Water Quality Standards, Kansas Surface Water Register, 303(d) Methodology and List of Impaired Waters, the Kansas TMDL Vision Process, TMDL assessments and reviews, the annual divisional budget, the performance partnership agreement with EPA, work plans associated with other federal grants/agreements, the Kansas surface water quality monitoring strategy, and the QMP. End-of-year program/project reports and the division's annual QA report also serve in a planning capacity by addressing staff training needs, pending corrective actions, and upcoming QA initiatives and assessments.

QAPPs and QMP Part IIIs constitute formal planning tools for both intramural and extramural environmental monitoring programs/projects. In developing a QAPP or QMP Part III, the program/project manager is expected to obtain input from the person(s) originally requesting the monitoring data and/or representing the end user(s) of the data. The program/project manager also is expected to solicit comments from field, analytical, data management, supervisory and other staff likely to participate in the environmental monitoring program/project. Prior to implementation, each QAPP or QMP Part III must be reviewed and approved by the supervising section chief for conformance with organizational work policies and priorities and by the appropriate section QA representative for conformance with applicable QA requirements. The EPA document *Data Quality Objectives* (QA/G-4) may be used by program/project manager as a tool in the QAPP or QMP Part III planning and development process.

The Kansas TMDL Vision Process supplanted the Kansas Continuing Planning Process in 2015 as the process used to determine TMDL development priorities. TMDL development over the 2014-2022 time-frame is guided by the Kansas TMDL Vision Process that identified watersheds as high priority for nutrient reduction.

9.2 Implementation Requirements

Environmental data analyses and monitoring activities shall be implemented by qualified personnel based on approved QAPPs/QMP Part IIIs and SOPs. In the event of unforeseen contingencies, any deviation from approved procedures shall be documented and reported by the applicable section staff or contractor to the section chief and the section QA representative. The significance of the deviation and any needed adjustments or corrective actions shall be determined by the section chief and section QA representative with input, as necessary, from the staff actually performing the analyses.

Section 10

ASSESSMENT AND RESPONSE

10.1 Assessments

Assessments are intended to increase the user's understanding of the system being examined and to provide an objective basis for improving the system. Pursuant to section 4, above, environmental monitoring operations and data analyses covered by this QMP may be subject to internal and external assessments including, but not necessarily limited to, management system reviews, audits, performance evaluations, and data quality assessments. Primary assessment tools selected during the planning stages of a program/project shall be specified within the applicable QAPP/QMP Part III and, at a minimum, subject to review and approval by the section chief and section QA representative. The results of routine assessments and any special assessments implemented at the discretion of administrative staff or other parties, and any corrective actions stemming from these assessments, shall be summarized in the end-of-year program/project evaluation reports discussed in section 4.7, above.

The section QA representative and, as directed by the section chief, other employees called upon to assess the QA and QC performance of either an environmental monitoring program/project or a data analysis project must have a working familiarity with the technical and management operations performed within that program/project. They also must meet the minimum QA training requirements set forth in sections 5.1 and 5.3, above. These employees are granted the authority to:

(1) access records, data, and other forms of documentation needed to evaluate the QA and QC performance of the program/project;

(2) identify and document problems that diminish data quality;

(3) suspend work operations upon detection of a serious adverse condition impacting quality or the safety of staff or the general public;

(4) propose recommendations for resolving documented quality or safety problems; and

(5) independently confirm the effectiveness of any implemented corrective actions.

The results of internal quality assessments must be set forth in writing and forwarded to the section QA representative, section chief, and divisional QA officer within the time frame stipulated in section 10.2, below.

10.2 Corrective Actions

Within ten working days of the completion of an internal QA assessment, the WPSU assessor shall document, in writing, the need for any apparent corrective action and share this information, as applicable, with the section QA representative, section chief, and divisional QA officer. Within thirty working days of receipt of this notification, the WPMAS assessor, in consultation (as applicable) with the section chief and section QA representative, shall prepare a written response detailing his/her chosen course of corrective action and presenting a schedule for implementing this action. Copies of this response shall be forwarded to the section QA representative, section chief, and divisional QA officer. The section chief and section QA representative shall be responsible for reviewing, approving, and monitoring the implementation of the chosen corrective action. Corrective actions implemented during the preceding calendar year or scheduled for the upcoming calendar year shall be summarized for each program/project in the end-of-year program/project evaluation reports generated by the designated section staff (section 4.7).

Copies of program/project QA audit reports prepared by external assessment entities shall be distributed by recipient staff to the section QA representative, section chief, and divisional QA officer. Disputes concerning external audit findings and the need for corrective action shall be resolved at the lowest practicable organizational level. Disputes still unresolved after an interval of thirty working days may require intervention by the divisional QA officer and/or division director. Prior to intervention, the divisional QA officer or division director shall notify and consult with the section QA representative and the section chief. Upon resolution and/or acceptance of external audit findings, the section staff, in consultation with the section chief and section QA representative, shall prepare a written response within thirty working days detailing his/her chosen course of corrective action and providing a schedule for implementing this action. Copies of this response shall be forwarded to the section QA representative, section chief, and divisional QA officer. The section chief and section QA representative shall be responsible for reviewing, approving, and monitoring implementation of the chosen corrective action. Corrective actions implemented during the preceding calendar year or scheduled for the upcoming calendar year shall be summarized for each program/project in the end-of-year program/project evaluation reports generated by staff (section 4.7).

In accordance with Part I of the QMP, MSR reports submitted by external assessment entities shall be distributed by the divisional QA officer to the division director, the section chief, and the section QA representative. If a need for corrective action is indicated within an MSR report, a written response shall be prepared by the divisional QA officer within thirty working days and submitted to the division director for review and approval. The section QA representative and section chief shall be provided an opportunity to comment on the proposed response prior to its finalization and forwarding to the external assessment entity. The divisional QA officer shall monitor the implementation of each approved corrective action and summarize the status of each action in the DOE annual QA report.

Section 11

QUALITY IMPROVEMENT

Previous sections of this document have discussed specific mechanisms for bringing about the continual improvement of the unit's quality management system. These mechanisms include, but are not necessarily limited to, QA planning requirements (sections 4, 9), internal and external quality assessments (sections 4, 10), employee training requirements (section 5), continuing educational opportunities (section 5), performance feedback requirements (section 4), corrective action procedures (section10), and end-of-year program/project evaluations (sections 2, 3, 4, 5, 7, and 10)). This section addresses two additional mechanisms for ensuring continual improvements in the quality management system:

1) the ongoing review and revision of the QMP itself; and
2) the regular communication of QA and QC concerns and recommendations among DOE staff.

In addition, as the state's public health agency, KDHE is seeking accreditation from the Public Health Accreditation Board a requirement of which is a comprehensive Quality Improvement Plan that can found here: http://kdhenet/qi/index.htm.

11.1 Quality Management Plan Review

At approximately yearly intervals, the section QA representatives shall review the section QA management plan, formulate any needed major revisions, and obtain the approval of the section chief, the bureau director, the divisional QA officer, and the division director. Similarly, section staff shall review those QAPPs and SOPs administered under their purview, formulate any needed revisions, and obtain the approval of the section chief and section QA representative.

Minor revisions to the section QA management plan do not require review and approval beyond the section QA representative and section chief. Questions regarding the appropriateness of an abbreviated review/approval process are resolved by the section QA representative in consultation with the divisional QA officer. Annual activities related to the review, revision, and approval of the section QA management plan and associated QAPPs and SOPs normally follow the completion and submission of

the program/project evaluation reports in February. However, revisions to these documents may be implemented at any time based on urgency of need or staff workload considerations. All approved revisions are subject to the documentation, tracking, and record keeping requirements of section 8, above.

11.2 Quality Assurance Communication

The section QA representative shall meet with the divisional QA officer to review and discuss QA initiatives, training/resource needs, assessments, corrective actions, and other issues relevant to the divisional and section quality management systems. Any critical information exchanged during these meetings shall be communicated to the section chief by the section QA representative. The section chief is expected to meet with section staff as needed to obtain feedback on QA and QC issues and to relate this feedback to the section QA representatives.

In addition to the meetings considered above, those personnel involved in environmental monitoring and data analyses are encouraged to communicate openly and often on QA and QC issues and to express any concerns or recommendations to the section chief, section QA representative, and/or the divisional QA officer. An ongoing exchange of thoughts and opinions on these issues encourages the timely recognition of needed areas of improvement and is a hallmark of a healthy quality management system.

11.3 KDHE Quality Improvement Program

KDHE's Quality Improvement (QI) Program is an agency level program that endeavors to ensure quality services are provided across all programmatic and administrative areas and are consistently improved to meet customer and stakeholder needs. All KDHE staff are expected to incorporate QI practices and principals into their daily work processes. As a key element of the accreditation granted to KDHE by the Public Health Accreditation Board, the QI program is comprised of a Performance Management System, a QI Plan, and a QI Council. An intranet website (http://hewwebint2/qi/index.htm) is maintained making QI resources easily accessible to all staff.

APPENDIX A
WPSU-001

(The following is a link to the current 303(d) methodology and list)

http://www.kdheks.gov/tmdl/methodology.htm

APPENDIX B
WPSU-002
KANSAS TMDL VISION PROCESS

THE 303(D) PROCESS

Section 303(d) of the Clean Water Act calls for each state to identify those waters within its boundaries for which effluent limitations are not stringent enough to implement any water quality standard applicable to such waters. The state also priority ranks those waters, accounting for the severity of the pollution and the uses to be made of the waters. For those identified waters, the state is to establish the total maximum daily load (TMDL) for those pollutants causing the non-attainment of the water quality standards. Such loads are to be established at a level necessary to implement the applicable water quality standard with seasonal variations and a margin of safety, which accounts for uncertainty concerning the relationship between effluent limitations and water quality.

Federal Regulations provide additional guidance on the 303(d) process. 40 CFR 130.7 describes:

1. The process for identifying water quality limited segments requiring TMDLs.
2. The process for setting priorities for developing TMDLs, including Wasteload Allocations and Load Allocations.
3. The process for establishing TMDLs for those identified segments, including,
    a. water quality monitoring
    b. modeling
    c. data analysis
    d. calculation methods
    e. the list of pollutants to be regulated.
4. The process of submitting the state's list with priority ranking and established TMDLs to EPA for approval.
5. The process of incorporating the approved loads into the state Water Quality Management Plans and NPDES permits.
6. The process to involve the public, affected dischargers, government agencies, and local government in 303(d) activities.

TMDLs are required when technology based effluent limitations, additional federal, state, or locally required effluent limitations and other pollution control requirements (best management practices) are not stringent enough to allow attainment of the applicable water quality standards. Water quality standards include numeric criteria, narrative criteria, designated uses of the water, and antidegradation provisions.

Beginning in 1994, the list of water quality limited waters is submitted every two years to EPA and is

due on April 1 of every even-numbered year. The list includes a priority ranking of those waters., The schedule of submission of the TMDLs is to be determined by EPA Regional Administrator and the state. The Regional Administrator shall approve or disapprove the list and the TMDLs no later than 30 days after submission to EPA. Upon approval, the state shall incorporate any approved loadings and allocations into other Clean Water Act programs such as NPDES permitting or the Section 319 program. If the Regional Administrator disapproves the listing or loadings, EPA will identify such waters and establish such loads necessary to achieve the applicable water quality standard within 30 days of the disapproval, a process also known as constructive submission.

In order to develop the list of water quality impaired waters, the state is to assemble and evaluate all readily available water quality data and information, including:

1. waters identified by the most recent 305(b) water quality report as partially meeting or not meeting designated uses or as threatened.
2. waters for which dilution calculation or predictive models indicate non-attainment of water quality standards.
3. waters for which water quality problems have been identified by agencies, the public or academic institutions.
4. waters identified as impaired or threatened in nonpoint assessments submitted to EPA under 319 of the Clean Water Act.

Supporting documentation is submitted with the list of water quality limited waters which describes the methodology to develop the list, the data and information used by the state, rationale for not using existing available data and demonstrated good cause for not including certain waters on the list. Good cause includes, more recent and accurate data, more sophisticated water quality modeling, and flaws in the original analysis that led to erroneous listing of the water and changes in conditions.

TMDL development establishes levels necessary to attain and maintain water quality standards, allowing for seasonal variations and a margin of safety to safeguard the environment in the face of uncertain relationships between effluent limitations and loading conditions and water quality. TMDL determinations take into account critical conditions of streamflow, loading, and water quality parameters. TMDLs may be established on a pollutant basis or using biomonitoring approaches. In either case, site-specific information should be used if possible. TMDLs are established for all pollutants which prevent or are likely to prevent attainment of the water quality standards. All calculations to establish TMDLs are subject to public review.

TMDLs may also be required to regulate thermal loads which cannot be exceeded to assure protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife. For the specific

purpose of developing information and as resources allow, the state should also identify water bodies not water quality impaired and estimate TMDLs for probable pollutants. However, such listing and load estimation is not required to be submitted to EPA and priority will be given to TMDL determinations on those waterbodies identified as water quality limited.

THE 1998 COURT DECREE AND RESULTING SCHEDULE FOR TMDLS

On November 1, 1995, the Kansas Natural Resource Council and the Sierra Club filed a complaint against the EPA, compelling it to enforce Section 303(d) of the Clean Water Act by establishing TMDLs pursuant to Section 303(d) and to compel EPA to approve or disapprove Kansas' Continuing Planning Process (CPP) relative to Section 303(e) of the Clean Water Act. Kansas intervened in the litigation, since the state had lead responsibility for identifying and ranking in priority the waters requiring TMDLs and establishing such TMDLs. A settlement was reached and a consent decree approving the settlement was made on April 13, 1998. Under the terms of the court decree, a schedule of submittals was agreed upon regarding the Continuing Planning Process document and the TMDLs established for the water quality limited water bodies of the state.

The court decree required Kansas to update and submit to EPA a Continuing Planning Process consistent with Section 303(d) of the Clean Water Act by December 31, 1998. The Court Decree required EPA to review the updated CPP within 90 days of receipt and provide Kansas and the plaintiffs with a summary of its review.

The court decree set out a schedule for the state to submit TMDLs for water quality limited stream segments and lakes in each of the 12 major river basins in Kansas over an eight-year period. The initial submittal was for the water bodies of the Kansas-Lower Republican Basin, due June 30, 1999. Thereafter, TMDLs for two of the remaining eleven basins were due for submittal on June 30, 2000. TMDLs for one of the remaining nine basins were due on the following June 30 in 2001, then TMDLs from two of the remaining basins were due in 2002. This 1-2-1-2 sequence continued until all TMDLs from the 12 river basins were submitted to EPA by June 30, 2006.

Kansas submitted TMDLs only on those waters deemed to need such load determinations consistent with Section 303(d). This includes waters on the 1998 and 1996 Section 303(d) lists which were not removed from subsequent lists under the provisions of the Clean Water Act and the implementing federal regulations. Thus, changes to water quality standards had removed and added segments to these lists. Should a water quality limited segment or pollutant removed from the 1996 list be restored to the list by EPA or Court order, Kansas established the TMDLs for that segment or pollutant by the date set by the court decree schedule or two years after the court order, whichever was later. Should the state not establish the TMDL, EPA was obligated to do so consistent with the court decree.

TMDLs established by Kansas may be done on a watershed basis and may use a pollutant-by-pollutant

approach or a biomonitoring approach or both as appropriate. TMDL establishment means a draft TMDL has been completed, there has been public notice and comment on the TMDL, there has been consideration of the public comment, any necessary revisions to the TMDL have been made and the TMDL has been submitted to EPA for approval. Had Kansas failed to comply with its obligations under the court decree, EPA would have taken appropriate action to establish the TMDLs in question within 180 days after the deadlines established in the court decree schedule.

Beginning January 31, 1999 and by January 31 of each year thereafter during the effective period of the court decree, EPA and Kansas provided the plaintiffs with a written report, jointly if possible, regarding the activities undertaken to comply with the court decree during the previous calendar year. The report included:

1. The water quality limited segments which had TMDLs established during the year;
2. The TMDLs established during the year; and
3. The water quality limited segments on the 1996 Section 303(d) list that are not on the current Section 303(d) list and an explanation why they are not on the current list.

The court decree also provided for the remedy and scope of judicial review, dispute resolution, modification procedures for the schedule, recognized exceptions in compliance with the court decree, demonstration of good cause and termination of the decree and dismissal of the plaintiff claims.

COMPLETION OF THE 1998 COURT DECREE AND TMDL DEVELOPMENT SCHEDULE

As of June 30, 2006, Kansas had completed its obligations to develop TMDLs in the twelve river basins of the state. 413 TMDLs addressing impairments that had appeared on the 1996 Section 303(d) list and the 1998, 2002, and 2004 lists were developed between January 1999 and June 2006. The Stipulation of Dismissal was filed on January 19, 2007 and so ordered by Judge Lungstrum on January 22, 2007.

UPDATE TO THE KANSAS TMDL PRIORITIZATION FRAMEWORK *(UPDATE TO THE CPP)*

KANSAS TMDL VISION PROCESS – FEBRUARY 24, 2015

1. Introduction

The Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program established by EPA and the States proclaims:

"The Clean Water Act Section 303(d) Program provides for effective integration of implementation efforts to restore and protect the nation's aquatic resources, where the nation's waters are assessed, restoration and protection objectives are systematically prioritized, and Total Maximum Daily Loads and alternative approaches are adaptively implemented to achieve water quality goals with the collaboration of States, Federal agencies, tribes, stakeholders, and the public" (emphasis added).

Among the six elemental goals of the Long-Term Vision is "Prioritization":

"For the 2016 integrated reporting cycle and beyond, States review, systematically prioritize, and report priority watersheds or waters for restoration and protection in their biennial integrated reports to facilitate State strategic planning for achieving water quality goals".

The draft guidance for the 2016 Integrated Report encourages States to establish and identify their priorities beyond the traditional 2-year window rendered by the biennial Section 303(d) listing of impaired waters. States have flexibility in how they define their priorities and may use a variety of ways to describe these priorities, which include:

- by geographic units: watersheds, ecoregions, and basins;
- by pollutants; or,
- by designated uses.

Setting long-term CWA 303(d) priorities from FY 2016 to FY 2022 affords States an opportunity to strategically focus their efforts and demonstrate progress over time in achieving environmental results. As such, the long-term priorities are not expected to substantially change from FY 2016 to FY 2022.

Consistent with the new Vision, beginning in 2016, the Integrated Report (IR) submitted by States should include or reference: the State's long-term priorities for the CWA 303(d) program from 2016 to 2022 and the associated rationale used to set these long-term priorities. The rationale should explain how the State arrived at the long-term priorities; and, it should discuss where the State plans to develop future TMDLs, alternative restoration approaches or protection plans and the extent to which they already exist in priority watersheds or water segments.

KANSAS NUTRIENT REDUCTION FRAMEWORK

Since 2004, Kansas has chosen to attack nutrients through a strategy of load reduction rather than pursuing numeric criteria. Much of the Kansas strategy has subsequently been endorsed through issuance of a 2011 EPA memorandum outlining the elements of a framework for States to follow in reducing nutrients prior to formally adopting numeric nutrient criteria. The eight elements address prioritization and goal setting, implementing actions, and accounting and reporting of nutrient reduction efforts in the State. The first element calls for "prioritizing watersheds on a statewide basis for nitrogen and phosphorus loading reductions". The three steps under the first element include:

A. Use best available information to estimate nutrient loadings on a HUC 8 basis.
B. Identify the major watersheds that contribute a substantial portion of nutrient loadings in the State
C. Within each major watershed, identify targeted or priority subwatersheds at the HUC 12 scale to implement specific nutrient load reduction activities.

This first element of the nutrient reduction framework became the foundation for Kansas establishing its priorities under the Vision for its 303(d) program. As subsequently described, a number of factors were evaluated for 68 of the 80 HUC 8's in Kansas that had such information with each HUC 8 ranked relative to the others on each factor. A final selection of 16 priority HUC 8s underpinned the beginning of establishing long-term priorities for TMDL development with the 2014 Integrated Report.

A follow-up exercise is underway currently, using EPA Headquarters assistance with the Recovery Potential Tool to verify the placement of the original top 16 HUC 8s as priorities, based on current and potential stressors, water resource value and potential point and non-point implementation success.

2. The Kansas 303(d) Prioritization Process: the Factors

Pursuant to the 2011 EPA Nutrient Reduction Framework, Kansas, in 2012, began collating information on factors influencing nutrient impacts in the state. Of the 90 HUC 8s comprising the state of Kansas, 68 had ambient phosphorus data. Phosphorus was chosen as the key nutrient to control because 1) phosphorus levels are inherently high in Kansas fresh waters; 2) conventional wisdom says phosphorus has been the controlling nutrient in fresh waters systems, whereas nitrogen controls in saltwater ecosystems; 3) phosphorus is typically easier to control, given its penchant to adhere to sediment and organic matter and settle out of the water column, whereas nitrogen tends to remain in the water column; and, 4) nitrogen is going to be reduced extensively by controls on nitrate and ammonia through water quality criteria.

HISTORIC CONDITION

The first set of factors described the historic ambient condition and relative generation of phosphorus loads within each of the 68 HUC 8s. Those factors include:

1. Estimated average incremental P load generated within the HUC 8 in T/yr
2. The estimated total P load exiting the HUC 8 (including P loads imported from upstream HUCs in T/yr
3. The median TP concentration of all streams within the HUC 8 in mg/l

The loads provided some hydrologic context to the ambient concentrations found in each HUC 8. For example, a HUC 8 with a very high median TP concentration was the Lower Sappa Subbasin in Northwest Kansas. However, the lack of surface flows in that subbasin precluded high loads being generated within the HUC and, hence, low P loads exiting the HUC. Therefore, the inclusion of hydrology tended to push the rankings of loads toward the eastern and central portions of Kansas.

The HUC 8s were ranked from high to low for each of these indicators and scores were assigned to percentile groupings, i.e., Ranks 1 – 7 got 5 points (top 10%); Ranks 8 – 17 got 4 points (11 – 25%);

Ranks 18 – 34 got 3 points (26 – 50%); Ranks 35 – 51 got 2 points (51 – 75%); Ranks 52 – 61 got 1 point (76 – 90%) and the lowest seven ranked HUC 8s, #'s 62 – 68 (bottom 10%) got no points.

STRESSORS

The next set of factors described the current and probable future stresses that would exacerbate the impacts of phosphorus loading within each HUC 8. These factors included:

1. The crop acres in the HUC 8
2. The percentage of land area within the HUC 8 that was cropland
3. The urban acres in the HUC 8
4. The percentage of land area within the HUC 8 that was urban
5. The number of stream TP impairments and the number of lake eutrophication impairments present in the HUC 8
6. The total design volume of wastewater potentially discharged by the major facilities in the HUC 8
7. The percent population change between 2000 and 2010 for each county within the HUC 8
8. The number of cattle inventoried in each county in 2007 within the HUC 8

These factors were similarly ranked and scored as the historic condition factors.

RELATIVE VALUE OF WATER

Several factors were identified that conveyed a sense of value for the surface waters found in each HUC 8. These factors describe:

1. The number of Outstanding National Resource Waters (i.e., Tier 3) present in the HUC 8.
2. The number of Exceptional State Waters (i.e., Tier 2.5) present in the HUC 8.
3. The Priority Riparian Area scores for each HUC 8.
4. The presence of a public water supply lake in the HUC 8.
5. If public water supplies have a direct point of diversion into any of the streams in the HUC 8 (i.e., public water supplies served by surface waters).
6. The influence of the pour point of the HUC 8 on the quality of water seen at the interstate border (At the border, close to the border, distant from the border, or no impact at the border).

Rankings and scores were tabulated for the 68 HUC 8s as with the other factors.

IMPLEMENTATION POTENTIAL

The final set of factors dealt with the probability that effective implementation could occur if nutrient TMDLs were established for waters in any given HUC 8. For point source discharges, previous stressor

factors involving major NPDES discharges, population growth, and urban land distribution in a HUC 8 also serve as indicators of our ability to control those regulated discharges through wastewater and stormwater NPDES permits. Given the pervasive rural constitution of Kansas watersheds, the key for implementation then lies with the ability of the non-point source control programs at the disposal of the state (i.e., 319, State Water Plan, Farm Bill). Because non-point source control implementation depends heavily on local leadership and management, the factors used for this consideration were tied to the presence and ability of Watershed Restoration and Protection Strategy groups (WRAPS) in certain HUC 8s. Four factors were evaluated for WRAPS in each HUC 8, including:

1. Is there an active WRAPS group present in the HUC 8?
2. Does the WRAPS group have a history of performing effective implementation on the ground since it formed?
3. Has the WRAPS group identified critical HUC 12's?
4. Does the WRAPS group have effectiveness monitoring in place to evaluate its efforts?

RESULTS OF HUC 8 PRIORITIZATION

Kansas decided to concentrate its TMDL development over 2014 – 2022 on the top 25% of HUC 8's among the 68 HUC 8s subject to the ranking and scoring exercise. Essentially 16 HUC 8's were designated as top priority for 303(d) purposes addressing nutrient impairments. These 16 HUC 8's are identified in the table below and displayed in the following map.

1	10270102	Middle Kansas
2	11030012	Little Arkansas
3	10270104	Lower Kansas
4	11030013	Middle Arkansas-Slate
5	11070205	Middle Neosho
6	10260008	Lower Smoky Hill
7	10270103	Delaware
8	11070207	Spring
9	11030018	Lower Walnut River
10	10260007	Big
11	11030017	Upper Walnut River
12	10270205	Lower Big Blue
13	10290101	Upper Marais des Cygnes
14	11070201	Neosho Headwaters
15	10250017	Lower Republican
16	11070204	Upper Neosho

Table B1. *Top Priority HUC 8's with Nutrient Impairments to be addressed by the 303(d) Program.*

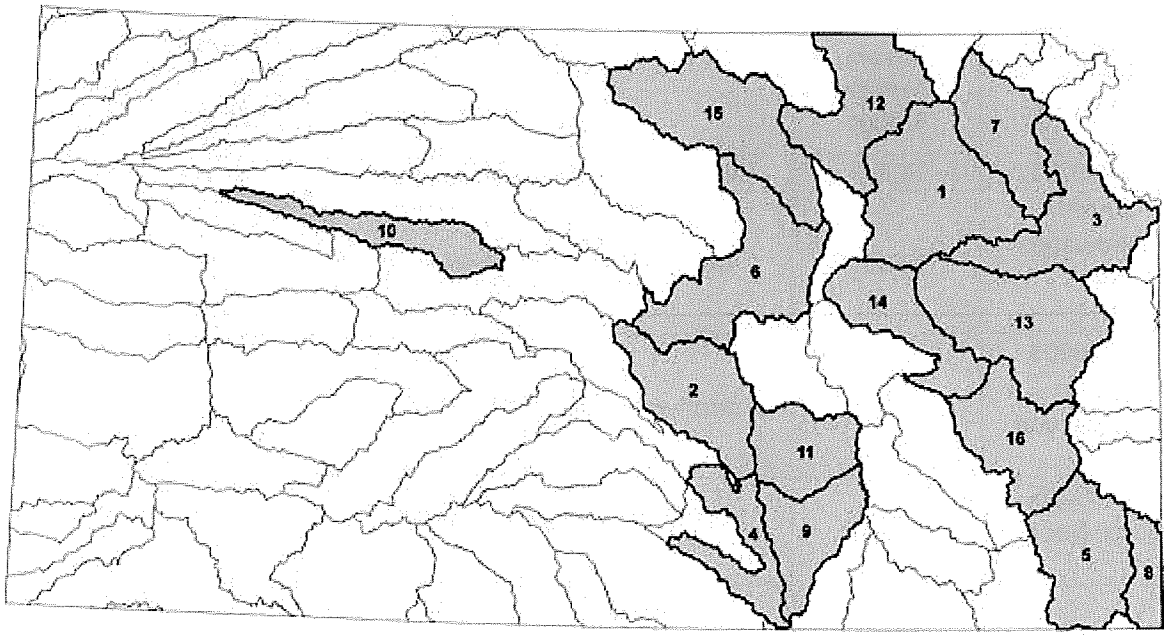


Figure B1. *Top Priority HUC 8's with Nutrient Impairments to be addressed by the 303(d) Program.*

These 16 priority HUC 8s became the centerpiece of setting priorities in Kansas' 2014 Integrated Report, including the 303(d) list of impaired waters. The methodology for listing those waters in 2014 included the following provision:

STREAM CHEMISTRY CATEGORY 5 PRIORITY FOR TMDL DEVELOPMENT

Consistent with Kansas' emerging TMDL Vision Strategy, establishing priorities for TMDL development between 2014 and 2022, certain AUs [Assessment Units] containing streams impaired by total phosphorus in certain HUC 8s will be designated for TMDL development. The targeted HUC 8s and impaired streams intended for TMDLs in 2014 are listed in Table B2.

The HUC 8s and associated impaired streams impacted by phosphorus slated for TMDL development in 2015 are listed in table B3.

Subsequent years will be tied to TMDL development in certain HUC 8s for streams impaired by excessive total phosphorus as seen in Table B4. The year 2017 will be used to catch up on TMDL development in previous AUs that slipped past the end of their designated year and also to develop TMDLs for any emerging issues involving pollutants other than phosphorus. Targeted HUC 8 TMDL development will re-commence in 2018 – 2020 with another catch up period in 2021 prior to the grand evaluation of TMDL impacts, possible revision to existing TMDLs and designation of the next 10 years of priorities in 2022. Adjustments to targeted AUs will be made with the submission of each biennial Integrated Report.

HUC 8 Subbasin	Stream Chemistry Station	Stream Assessment Unit	Targeted TMDL Development Year
11070201 Neosho Headwaters	SC273	Neosho River at Neosho Rapids	2015
	SC637	Neosho River near Parkerville	2015
11070203 Lower Cottonwood	SC274	Cottonwood River below Emporia	2015
11070205 Middle Neosho	SC564	Labette Creek near Labette	2015
11070207 Spring	SC567	Cow Creek near Lawton	2015
	SC212	Shoal Creek near Galena	2015
	SC570	Short Creek near Galena	2015
11030017 Upper Walnut	SC279	Walnut River below El Dorado	2015
	SC038	Whitewater River at Towanda	2015
11030018 Lower Walnut	SC106	Walnut River at Gordon	2015
	SC704	Eight Mile Creek near Douglass	2015
	SC744	Four Mile Creek near Gordon	2015

Table B2. Targeted HUC8s and impaired streams intended for TMDL development in 2015.

HUC 8 Subbasin	Stream Chemistry Station	Stream Assessment Unit	Targeted TMDL Development Year
10270101 Upper Kansas	SC518	Kansas River near Ogden	2016
10270102 Middle Kansas	SC260	Kansas River near Wamego	2016
	SC259	Kansas River at Willard	2016
10270104 Lower Kansas	SC257	Kansas River at Lecompton	2016
	SC255	Kansas River at Eudora	2016
	SC254	Kansas River at Desoto	2016
	SC203	Kansas River at Kansas City	2016

Table B3. Targeted HUC8s and impaired streams intended for TMDL development in 2016.

Targeted HUC 8s	Intended TMDL Development Year
11030012 Little Arkansas	2017
11030013 Middle Arkansas – Slate	2017
TMDL Slippage & Ad hoc Addressed Impairments	2017
10260008 Lower Smoky Hill	2018
10250017 Lower Republican	2019
10260103 Delaware	2019
10260205 Lower Big Blue	2019
11030012 Little Arkansas	2020
11030013 Middle Arkansas – Slate	2020
TMDL Slippage & Ad hoc Addressed Impairments	2021
Evaluation and Revision of Existing TMDLs & Re-designation of Priorities for 2023 - 2032	2022

Table B4. Targeted HUC8s and impaired streams intended for TMDL development in 2017-2022.

As can be seen in the first two tables, some discretionary additions were made to the designated HUC 8's subject to TMDL development in 2015 and 2016. Certain HUC 8's were included with the original priority 16 HUC 8's because those additional HUC 8's exert significant influence on the quality seen in the designated HUC 8's. For example, the Lower Cottonwood Subbasin has the city of Emporia located within it and Emporia's wastewater and stormwater discharge near the pour point of that HUC 8 into the Neosho Headwaters HUC 8, which is a priority 16 HUC. It made sense to Kansas to include that lowest portion of the Lower Cottonwood to account for Emporia's influence, even though the ranked factors used to score that HUC 8 came in at a moderate score.

Similarly, the Upper Kansas HUC 8 was not among the priority 16 HUC 8's but it conveys the waters and loads from two upstream priority HUC 8's, the Lower Republican and the Lower Smoky Hill to a downstream priority HUC 8, the Middle Kansas. Hence, it was included to maintain continuity in load

transport and relations. Kansas anticipates that other HUC 8's, such as the Gar – Peace Subbasin (11030010) above the Middle Arkansas – Slate priority HUC 8 or the Lower Saline (10260010) and Solomon River (10260015) discharging into the Lower Smoky Hill might be included if their influence is significant.

Additionally, some tributaries to the main stem streams of certain HUC 8's might be subject to TMDL development in subsequent years leading up to 2022. For example, Stranger Creek in the Lower Kansas Subbasin is a major non-point source contributor of phosphorus to the lower Kansas River and will have TMDLs established on it in 2017.

The 2014 Kansas Integrated Report included text, preliminary outlining the priority and direction of the Kansas Vision for its 303(d) program.

PRIORITIES AND SCHEDULES; INTRODUCTION OF THE KANSAS TMDL VISION

Since 1999, TMDL development efforts in each of the state's twelve major river basins have attempted to adhere to a five-year rotational schedule. With the emergence of a Kansas TMDL Vision, consistent with the approach supported by EPA's national TMDL Program, significant alteration in scheduling has been made for the years 2014- 2022. Kansas TMDL Vision is tied to KDHE's Nutrient Reduction Framework and will concentrate on stream phosphorus or nitrate impairments within 16 HUC8's deemed as high priority. The 2014 303(d) list identifies streams in the Neosho Headwaters, Middle Neosho, Spring, and Upper and Lower Walnut HUC8 sub-basins with excessive total phosphorus as slated for TMDL development in 2015.

The list similarly identifies segments of the Kansas River in the Upper, Middle and Lower Kansas sub-basins to have phosphorus TMDLs established in 2016. Streams in six other HUC8's will have stream phosphorus TMDLs developed over 2017- 2022. As time permits, secondary impairments caused by excessive nutrients including pH, deficient dissolved oxygen or lake eutrophication, may also have TMDLs developed within the priority 16 HUC8 sub-basins. This priority schedule means that no TMDL development will be conducted in other basins of the State, particularly those in western Kansas. Additionally, current plans are that impairments other than nutrients [-driven] will not be addressed during 2014- 2022.

RELATIONSHIP WITH EPA PERFORMANCE MEASURES WQ-27 AND WQ-28

With the advent in Federal Fiscal Year 2015 of two new performance measures tied to tracking State progress under its Vision-based priority schedule, a clear picture is emerging in Kansas as to what constitutes its universe of priorities slated for TMDL development, the associated baseline of previous accomplished work done in 2012 – 2014 under the guise of the Vision and annual targeted commitments of TMDL production anticipated for each year of the 2015 – 2022 time period.

A subsequent listing within this document will outline the specifics regarding timing of TMDL development for certain stream segments and their supporting HUC 12 sub-watersheds. Those stream segments will be impaired by total phosphorus and/or nitrate and constitute the primary priorities for TMDLs within the 16 priority HUC 8's. These stream segments and associated sub-watersheds

represent the assessment units that Kansas will report to EPA in order to populate the WQ-27 measure database.

Other nutrient-based impairments, such as elevated pH or lake eutrophication, in those 16 priority HUC 8's addressed by TMDLs will be accounted for through populating databases supporting WQ-28. Additionally, certain phosphorus or nitrate impairments in other HUC 8's outside the priority 16 that are successfully addressed by TMDLs or, alternatively, technical support for NPDES permitting or 319 watershed planning will also be accounted for in WQ-28. Any emerging phosphorus or nitrate impairments on streams in the priority HUC 8's that arise in the 2016, 2018 or 2020 Integrated Reports for Kansas will be attempted to be addressed with TMDLs in 2021 and credited to WQ-28. Kansas anticipates that the WQ-28 credits will transition over to become part of the baseline for WQ-27 for the time period 2023 – 2032.

3. Alignment of Kansas 303(d) Priorities with EPA National & Regional Priorities

The central theme of Kansas' priorities for its 303(d) program is nutrient reduction in certain surface waters of Central and Eastern Kansas. This priority aligns closely with EPA's priorities on both the national and regional scale. EPA's FY 2014-2018 Strategic Plan continues past practice and reaffirms among its goals and objectives:

Goal 2: Protecting America's Waters
Objective 2.2: Protect and Restore Watersheds and Aquatic Ecosystems
Sub-objective 2.2.1: Improve Water Quality on a Watershed Basis

The Strategic Plan is implemented through the FY 2014 Final National Water Program Manager Guidance and the FY 2015 Final Office of Water Addendum to the FY 2014 NWPMG. A core priority within the FY14 NWPMG was *"Controlling Nutrient Pollution"*. Among the anticipated actions to be undertaken by EPA with the States is:

1. *Work with States to implement the March 2011 memorandum "**Working in Partnership with States to address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions**".*

2. *Focus on continuing to work with States to implement the Section 319 program reforms, including updating State NPS Management Plans.*

3. *Continue to work with States to ensure effective permitting of nutrient pollution to protect State WQS.*

Secondarily, the efforts of Kansas and its 303(d) program coincide with EPA's priority to, at least indirectly, protect and restore the health of the Gulf of Mexico through, lowered nutrient loads entering

the Missouri and Arkansas Rivers, en route to the Mississippi River and the Gulf. One of Region VII's three priorities is protecting and improving water quality across America's greatest watershed, the Missouri-Mississippi Basin.

Among the performance measures associated with the Strategic Plan and Water Program Guidance that are supported by the nutrient-based priorities of Kansas' 303(d) program are:

1. WQ-26: Number of states implementing nutrient reduction strategies by (1) setting priorities on a watershed or state-wide basis; (2) establishing nutrient reduction targets, and (3) continuing to make progress (and provide performance milestone information to EPA) on adoption of numeric nutrient criteria for at least one class of waters by no later than 2016. *Region VII target = 0.67 for FFY15.*

2. WQ-SP-10.N11: Number of waterbodies identified in 2002 as not attaining water quality standards where standards are now fully attained. *Region VII targets = 467 in FFY15; 456 in FFY14, 443 in FFY13.*

3. WQ-SP-11: Remove the specific causes of waterbody impairment identified by States in 2002. *Region VII targets = 1449 in FFY15, 1417 in FFY14, 1363 in FFY13.*

4. WQ-SP-12.N11: Improve water quality conditions in impaired watersheds nationwide using the watershed approach. *Region VII targets = 14 in FFY15, 13 in FFY14, 11 in FFY13.*

Additionally, Kansas' efforts support indirectly the Gulf of Mexico measure that calls for reducing releases of nutrient throughout the Mississippi River Basin to reduce the size of the hypoxic zone in the Gulf. Finally, two performance measures directly tied to the Vision will be unveiled in FFY 15 and fully in place for FFY 16. The setting of priority areas by Kansas directly aligns with tracking progress and performance defined by these measures.

1. WQ-27: Extent of priority areas identified by each state that are addressed by EPA-approved TMDLs or alternative restoration approaches for impaired waters that will achieve water quality standards.

2. WQ-28: State-wide extent of activities leading to complete TMDLs or alternative restoration approaches for impaired waters.

4. The Kansas Priorities for TMDL Development from 2014 – 2022

Based on the priority HUC 8's identified as part of the Nutrient Reduction Framework and emphasis on stream phosphorus and nitrate impairments pursuant to the initial identification of the universe and baseline for performance measure WQ-27. The specific assessment unit priorities identified herewith will be used to populate the measure with the associated catchment areas and the schedule of intended TMDL development should translate to annual expectations of commitment between Kansas and EPA. These priorities are memorialized within the 2014 Kansas 303(d) list as either completed TMDLs or listings within the priority 16 HUC 8s.

TMDL Development Year	BASIN	HUC8	WATERBODY NAME	IMPAIRMENT	STATION
2014	KR	10250017	Milford Lake	Eutrophication	LM019001
2014	KR	10250017	Milford Lake	Dissolved Oxygen	LM019001
2014	NE	11070201	Lake Kahola	Eutrophication	LM043401
2015	WA	11030017	Whitewater River At Towanda	Total Phosphorus	SC038
2015	WA	11030017	Walnut River Near El Dorado	Total Phosphorus	SC279
2015	WA	11030017	Augusta City Lake	Eutrophication	LM040001
2015	WA	11030017	Walnut River Near El Dorado	Dissolved Oxygen	SC279
2015	WA	11030018	Walnut River At Gordon	Total Phosphorus	SC106
2015	WA	11030018	Eight Mile Creek Near Douglas	Total Phosphorus	SC704
2015	WA	11030018	Four Mile Creek Near Gordon	Total Phosphorus	SC744
2015	WA	11030018	Eight Mile Creek Near Douglas	Dissolved Oxygen	SC704
2015	NE	11070201	Neosho River At Neosho Rapids	Total Phosphorus	SC273
2015	NE	11070201	Neosho River Near Parkerville	Total Phosphorus	SC637
2015	NE	11070203*	Cottonwood River Near Emporia	Total Phosphorus	SC274
2015	NE	11070205	Labette Creek Near Labette	Total Phosphorus	SC564
2015	NE	11070207	Shoal Creek Near Galena	Total Phosphorus	SC212
2015	NE	11070207	Cow Creek Near Lawton	Total Phosphorus	SC567
2015	NE	11070207	Short Creek Near Galena	Total Phosphorus	SC570
2016	KR	10270101*	Kansas River Near Ogden	Total Phosphorus	SC518
2016	KR	10270102	Kansas River At Willard	Total Phosphorus	SC259
2016	KR	10270102	Kansas River At Wamego	Total Phosphorus	SC260
2016	KR	10270104	Kansas River At Kansas City, Kansas	Total Phosphorus	SC203
2016	KR	10270104	Kansas River At Desoto	Total Phosphorus	SC254
2016	KR	10270104	Kansas River At Eudora	Total Phosphorus	SC255
2016	KR	10270104	Kansas River At Lecompton	Total Phosphorus	SC257
2017	LA	11030010*	Arkansas River Near Yoder	Total Phosphorus	SC524
2017	LA	11030012	Little Arkansas River At Wichita	Total Phosphorus	SC728
2017	LA	11030013	Arkansas River Near Arkansas City	Total Phosphorus	SC218
2017	LA	11030013	Arkansas River At Derby	Total Phosphorus	SC281
2017	LA	11030013	Arkansas River At Oxford	Total Phosphorus	SC527
2017	LA	11030013	Arkansas River At Wichita	Total Phosphorus	SC729
2017	LA	11030013	Arkansas River At Derby	Nitrate	SC281
2017	KR	10270102	Shunganunga Creek Near Topeka	Total Phosphorus	SC238
2017	KR	10270104	Mill Creek Near Shawnee	Total Phosphorus	SC251
2017	KR	10270104	Cedar Creek Near Cedar Junction	Total Phosphorus	SC252
2017	KR	10270104	Stranger Creek Near Easton	Total Phosphorus	SC602
2017	KR	10270104	Crooked Creek Near Winchester	Total Phosphorus	SC683
2018	SS	10260008	Smoky Hill River At Junction City	Total Phosphorus	SC264

TMDL Development Year	BASIN	HUC8	WATERBODY NAME	IMPAIRMENT	STATION
2018	SS	10260008	Smoky Hill River At Enterprise	Total Phosphorus	SC265
2018	SS	10260008	Smoky Hill River Near Salina	Total Phosphorus	SC268
2018	SS	10260008	Mud Creek Near Abilene	Total Phosphorus	SC643
2018	SS	10260008	Sharps Creek Near Freemount	Total Phosphorus	SC749
2018	SS	10260008	Smoky Hill River Near Salina	Nitrate	SC268
2018	SS	10260010*	Saline River Near New Cambria	Total Phosphorus	SC267
2018	SS	10260010	Mulberry Creek Near Salina	Total Phosphorus	SC640
2019	KR	10250017	Republican River Near Clay Center	Total Phosphorus	SC503
2019	KR	10250017	Republican River Near Clay Center	Total Phosphorus	SC504
2019	KR	10250017	Buffalo Creek Near Concordia	Total Phosphorus	SC509
2019	KR	10250017	Republican River Near Rice	Total Phosphorus	SC510
2019	KR	10250017	Peats Creek Near Clifton	Total Phosphorus	SC649
2019	KR	10250017	Salt Creek Near Hollis	Total Phosphorus	SC650
2019	KR	10250017	Wolf Creek Near Concordia	Total Phosphorus	SC707
2019	KR	10250017	Elm Creek Near Ames	Total Phosphorus	SC709
2019	KR	10250017	Mulberry Creek Near Clifton	Total Phosphorus	SC710
2019	KR	10270103	Delaware River Near Half Mound	Total Phosphorus	SC554
2019	KR	10270103	Grasshopper Creek Near Muscotah	Total Phosphorus	SC603
2019	KR	10270103	Elk Creek Near Larkinburg	Total Phosphorus	SC604
2019	KR	10270205	Big Blue River Near Oketo	Total Phosphorus	SC233
2019	KR	10270205	Big Blue River Near Blue Rapids	Total Phosphorus	SC240
2019	KR	10270205	Black Vermillion River Near Frankfort	Total Phosphorus	SC505
2019	KR	10270205	Horseshoe Creek Near Marysville	Total Phosphorus	SC717
2019	KR	10270205	North Elm Creek Near Oketo	Total Phosphorus	SC731
2019	KR	10270205	Robidoux Creek near Frankfort	Total Phosphorus	SC754
2019	KR	10270207	Little Blue River Near Hollenberg	Total Phosphorus	SC232
2019	KR	10270207	Rose Creek Near Narka	Total Phosphorus	SC712
2019	KR	10270207	Little Blue River Near Waterville	Total Phosphorus	SC741
2020	LA	11030012	Little Arkansas River At Alta Mills	Total Phosphorus	SC246
2020	LA	11030012	Emma Creek Near Sedgwick	Total Phosphorus	SC534
2020	LA	11030012	Kisiwa Creek Near Halstead	Total Phosphorus	SC703
2020	LA	11030012	Black Kettle Creek Near Halstead	Total Phosphorus	SC705
2020	LA	11030012	Little Arkansas River At Valley Center	Total Phosphorus	SC282
2020	LA	11030013	Cowskin Creek In Wichita-Valley Center Floodway	Total Phosphorus	SC288
2020	LA	11030013	Slate Creek Near Wellington	Total Phosphorus	SC528
2020	LA	11030013	Cowskin Creek Near Belle Plaine	Total Phosphorus	SC702
2020	LA	11030013	Cowskin Creek At Wichita	Total Phosphorus	SC730

* Not a priority HUC 8 but exerts significant influence on water quality of priority HUC8

Table B6. TMDL Development schedule 2014-2020

Approach to Changing Priorities

The priorities described in this document and on the 2014 303(d) list represent the anticipated universe of priority waters and issues that will comprise the Kansas Vision effort between 2014 and 2022. However, these priorities and their schedule will be subject to two situations: slippage in TMDL development and emerging new priorities. Slippage will be handled by having two turnout periods, in 2017 and 2021, to catch up development of TMDLs underway in previous years. Additionally, 2022

may be used, in part, to finalize any late TMDL development prior to reporting out on performance measure WQ-27.

There are four scenarios anticipated to occur that would interrupt the priorities established with this 2015 framework.

1. First, there may be new stream phosphorus or nitrate listings for streams in the 16 priority HUC 8's that emerge from the 2016, 2018 or 2020 303(d) lists. These new listings will alter the original universe of priority areas and will have TMDLs developed for them in 2016 -2022. Adjustments will be made to the WQ-27 universe to reflect these additional priorities and targets for 2021 and 2022 will correspond to their TMDL development in those years.

2. Impairments associated with excessive nutrients (pH, deficient DO, stressed biological communities or lake eutrophication) within the 16 priority HUC 8's may have TMDLs developed on them, as time and staffing dictate. Such TMDLs ("priority non-priorities") will have any TMDL established in 2022. .

3. Phosphorus or nitrate impairments on streams outside the 16 priority HUC 8's may be addressed by alternative means, either NPDES permitting or implementation of 319 watershed plans (WRAPS). As such, technical aid will be provided by calculating the necessary Wasteload Allocations (WLAs) for point source discharges or Load Allocations for non-point sources without developing a formal TMDL on those impaired waters. These situations will be noted as "5-alt" waters in subsequent 303(d) lists. They shall initially be accounted for within WQ-28, however, when the WQ-27 universe will be reset for 2023 – 2032, these waters will be included in that universe and baseline for the performance measure.

4. Some impaired waters, not associated with nutrient pollution, may be hoisted upon the Kansas TMDL program for addressing due to some prevailing social, political, environmental, or economic reason. These impairments may be addressed anytime between 2016 – 2022 through an alternative means (e.g., NPDES or 319-WRAPS), without need for a formal TMDL. These "non-priority priority" alternatives will be identified as "5-alt" waters in subsequent 303(d) lists. It may also be possible that Kansas decides to develop a TMDL on these anomalous impairments. If so, they will be developed in 2022 and accounted for within WQ-28.

Kansas will use the Integrated Report to biennially document the status and changes to the universe of priority waters between 2016 and 2020, with a full accounting of all efforts that occurred from 2011 – 2022 in the 2022 Integrated Report.

5. Philosophical Shift in Prioritization Considerations between 2006 – 2012 and 2014 – 2022

Over the period 1998 – 2006, TMDL development in Kansas was dictated by the terms and schedule of the 1998 Court Decree regarding such development. Under that schedule, all impairments from the 1996 and 1998 303(d) lists had TMDLs developed on a staggered basis, with all such waters in the 12 major river basins having TMDLs established between 1999 and 2006.

After 2006, control over scheduling reverted to Kansas and a five-year rotation among the 12 river basins was attempted to address priority impairments within those basins. Priorities during this time, prior to the emergence of the National TMDL Vision in 2012, were a function of the value of impaired waters, e.g., large Federal or State lakes afflicted with eutrophication. Many times, Basin Advisory Committees in each of the 12 river basins advised KDHE on those priorities. Additional priority was given to waters of an interstate nature, e.g., the Arkansas River between Colorado and Kansas; or impairments that were initially of concern by emerging watershed groups, e.g., bacteria in streams. After 2010, consideration grew for listings that had been present for some time, approaching the end of 8-13 year window expressed by EPA as the appropriate pace for TMDL development.

With the advent of the National TMDL Vision and Kansas' adoption of a Vision Strategy that focuses on nutrient issues, 303(d) priorities became focused on streams impaired by excessive phosphorus or nitrate. Most major lakes with eutrophication already had TMDLs in place, but streams needed attention because of the prevailing anecdotal evidence that excessive nutrients were a problem, because most major NPDES discharges loaded nutrients into streams, not lakes and because the export of high nutrients from Kansas to downstream locales occurred through stream transport. Coinciding with the State's quest to establish a Nutrient Reduction Framework that would ultimately be implemented through TMDLs, the priorities expressed in this document were established for the time period 2014 - 2022. Some initial work on stream TMDLs had been done and EPA's approval of the Big Creek phosphorus TMDL in 2011 paved the way for TMDL development on the priority stream systems identified in the 2014 303(d) list.

Pace of TMDL development will be dictated by the schedule within this document. Other pollutants will be deferred until 2023 or thereafter. TMDL development will be concentrated in 16 select HUC 8's, located within 6 of the 12 major river basins. No TMDL development is expected in the western third of

Kansas, nor in certain eastern basins where population and land use stresses are less prevalent than in the priority areas. An evaluation of the outcomes of this priority TMDL process will occur in 2022, after which, there will be a newly established prioritization scheme for the next 10-year period, 2023 – 2032. Priorities anticipated for that next period will be a function of the progress made on nutrient reductions between now and 2022 and the emergence of environmentally and socially significant impairments that warrant near-term attention on the part of the State.

6. Public Engagement

The interested public has been informed and engaged in the priorities established under the Kansas TMDL Vision since the State undertook its Nutrient Reduction Strategy and Framework over 2004 – 2012. The primary forum for public engagement in the TMDL/303(d) process has always been the 12 Basin Advisory Committees (BAC's)_ across Kansas. These BAC's were briefed on the changing philosophy on scheduling TMDL development since 2012. In December 2014, the Kansas Water Authority in conjunction with the Long Term Vision for the Future of Water Supply in Kansas established fourteen regional planning areas. In August 2015, at a meeting of the Kansas Water Authority, the 12 Basin Advisory Committees were transitioned to the 14 Regional Advisory Committees (RACs).

Additionally, the 16 priority HUC 8's have been incorporated into the planning strategy of the Kansas Water Plan and its 12 Basin Plans. These 16 HUC 8's are highlighted as part of the Governor's 50-year Vision for Future Water Supply in Kansas. Implementation decisions regarding fund allocation for non-point source abatement and Federal initiatives such as the National Water Quality Initiative of USDA have utilized the priority HUC 8's and associated priority sub-watersheds to place those funds and programs in order to effect nutrient reduction.

One outcome of the Governor's 50-year Vision is the alteration of the original 12 river basins as the basis for water planning and their replacement as 14 planning regions, which better reflect the blend of surface and ground water resources that dominate certain areas of the state. In keeping with the emerging water planning structure, KDHE has presented how the new planning regions interface with surface waters with nutrient impairments and the priority 16 HUC 8's directing nutrient reduction, including TMDL development. From the following map, one can see that far western areas of Kansas have no significant nutrient issues in their paltry surface water inventory. Nutrients become more prevalent as issues in the central and eastern portion of the state, but there are still areas where the dominant land use of grassland or forest and low population densities dampen the urgency for nutrient control in regions where surface water is abundant.

Because the Kansas 303(d) Vision is tilted toward implementation potential, the primary audiences for where Kansas TMDL priorities are located are the NPDES community and active watershed management groups overseeing non-point source abatement. Numerous discussions and presentations have been made to these groups and their associations to convey the sense of priority that Kansas is taking with nutrients and TMDLs between now and 2022. Major wastewater dischargers and MS4 urban stormwater programs have been fully briefed on these priorities. Interaction between the TMDL program and the 319 program ensures that watershed planning and implementation are coordinated with an eye toward nutrient reductions. Subsequent plan revisions will reflect those priorities and coincide with the priorities presented within this document.

Starting with the 2014 Integrated Report, the 303(d) priorities have been displayed and the rationale behind their enhanced status explained to stakeholders interested in the Kansas environment. The priorities and this document will be posted on both the water quality assessment and TMDL development websites of KDHE for public access and review.

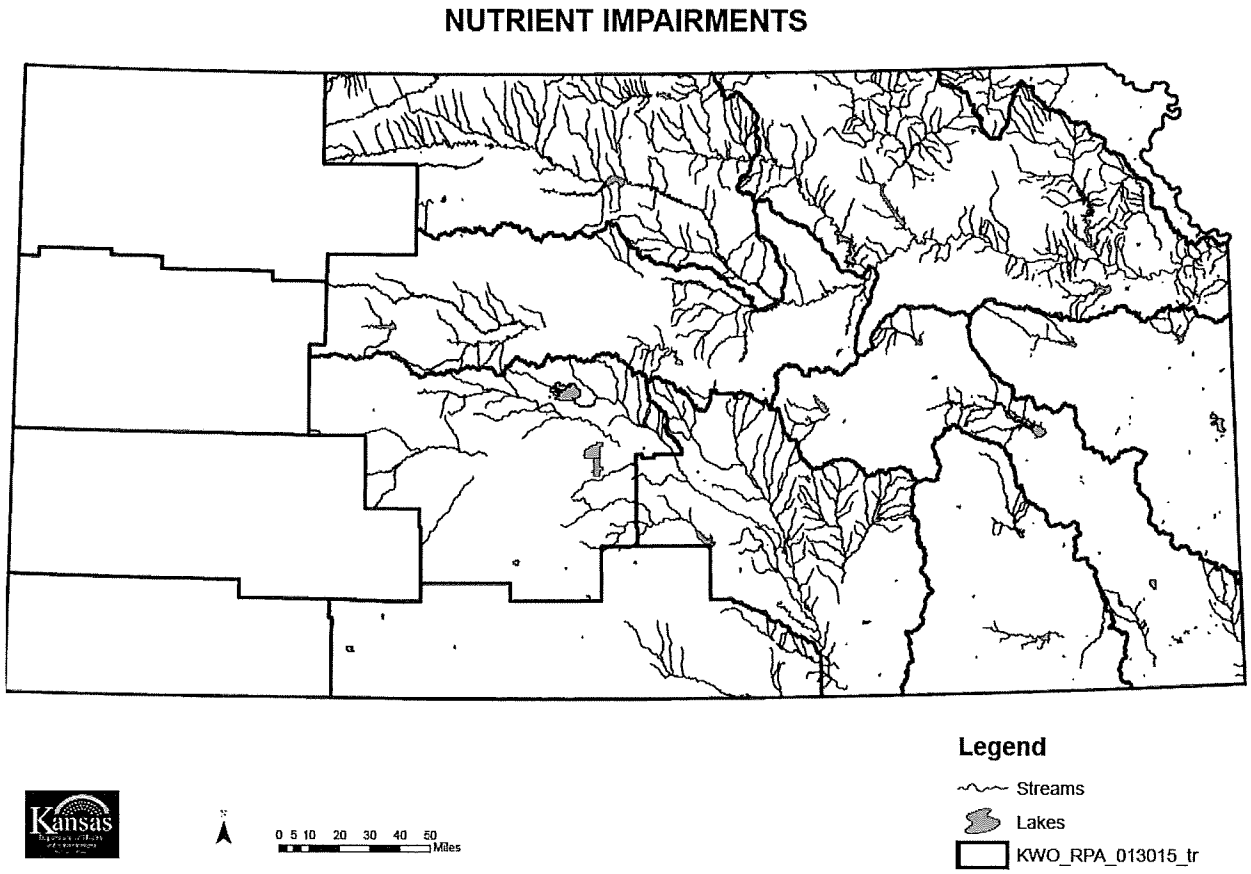


Figure B2. Nutrient impaired streams and the Kansas Water Office water planning regions.

7. Conclusion

This prioritization framework represents Kansas' direction for its 303(d) program, scheduling TMDL development to reflect nutrient reduction on priority streams where stresses, value, and opportunities are prevalent. Sufficient flexibility has been designed into the schedule to account for slippage in TMDL development and emergence of additional priorities or issues of concern between now and 2022. The priorities lend themselves to easy translation to populate the new performance measures WQ-27 and WQ-28, allowing for full accounting of TMDL progress leading into the 50th anniversary of the Clean Water Act in 2022. Finally, aggressive adherence to this schedule will expedite Kansas' Nutrient Reduction Framework to move implementation toward real environmental benefits realized through less ambient phosphorus present in stream systems and the accompanying responses in the biological and

chemical conditions of those streams more fully supporting their designated uses of aquatic life support, recreation and public water supply, as decreed by Kansas Water Quality Standards.

Establishing Total Maximum Daily Loads

Total Maximum Daily Loads (TMDLs) are viewed as the quantitative objectives and strategies needed to achieve water quality standards. The water quality standards, themselves, constitute the goals of water quality adequate to fully support designated uses of streams, lakes, and wetlands. The process of developing TMDLs determines:

- the pollutants causing water quality impairments,
- the degree of deviation away from applicable water quality standards,
- the levels of pollution reduction or pollutant loading needed to attain achievement of water quality standards,
- corrective actions, including load allocations, to be implemented among point and non- point sources in the watershed affecting the water quality limited water body and,
- the monitoring and evaluation strategies needed to assess the impact of corrective actions in achieving TMDLs and water quality standards, including,
- provisions for future revision of TMDLs based on those evaluations.

In Kansas, TMDL development will follow the process described in the EPA's Guidance for Water Quality-Based Decisions: The TMDL Process as well as the seven TMDL components suggested in the recommendations of the Federal Advisory Committee on the TMDL Program in its final report, issued July 1998. The TMDL process involves:

1. Selection of the pollutant to consider, identifying the problem and defining the goal for improved water quality

2. Determination of the assimilative capacity of the water body to receive that pollutant without violation of the applicable water quality standard and the current deviations exceeding that assimilative capacity.

3. Estimation of the type, location and magnitude of pollutant sources contributing loads to the waterbody.

4. Estimation of the linked relationship between those pollutant sources and their relative impact on the ambient water quality of the water body, including the anticipated response in water quality conditions upon load modifications arising from the contributing sources.

5. Allocation of permissible loads among point, non-point and background sources of contributed pollutant reaching the waterbody. Assignment of responsibility for implementing corrective actions among point sources and non-point sources. Establishment of a margin of safety to safeguard the quality of the

environment against uncertain relationships between pollutant contributions and ambient water quality.

6. Follow-up monitoring to assess the level of implementation along the water body and within the watershed and to evaluate the impact of that implementation on the water quality condition of the impaired waterbody.

7. A feedback mechanism which allows TMDLs and their implementation to iterate toward progressive improvement in water quality, as determined though compliance with water quality standards, over time and in response to evaluated information on the effective impact of corrective actions on water quality.

More specifically, each TMDL Kansas submits to EPA will contain the following components:

A. Problem Identification. The pollutant causing the impairment and the designated uses which are impaired will be identified. The rationale for listing the stream segment, watershed or lake on the Section 303(d) list will be described.

B. Current Situation and Desired Objective. The desired outcome of this TMDL process will be expressed, using the current situation as the reference condition of impairment. Deviations from the water quality standards will be documented. From the Kansas perspective, outcomes will be expressed in terms of the minimum frequency (how often), magnitude (how much) and duration (how long) of future deviations above the applicable water quality standard.

In the case of TMDLs involving numeric criteria and empirical stream or lake chemistry monitoring data, Kansas will develop load duration analyses which will describe the idealized desired loadings across the spectrum of flow conditions. Such analyses will be developed using the long term flow historic duration of a stream and converting that cumulative frequency distribution of daily flows into loads by applying the appropriate numeric criteria to the flows and making the appropriate conversions.

The resulting curve relates the load distribution over time and flow conditions which would attain and maintain water quality standards. Empirical data from the stream chemistry monitoring network can overlay this curve by determining the flow conditions when the individual sample was taken, the sample data's relative position is determined by the percent exceedance of that flow over the long term, converting the sampled concentration by applying the flow and conversion values. Points plotting above the curve represent deviations from the water quality standard and the permissible loading function, those plotting below the curve represent compliance with standards and represent adequate quality support for the appropriate designated use. Similar analysis can be done for certain lakes, using cumulative frequency distributions of their volume or elevation.

Comparative analysis such as this allows the state to assess the frequency of deviations (how many samples lie above the curve vs. those that plot below); magnitude (how far the deviations plot away from the curve); and duration (potentially how long the deviation is present). The issue of duration can be viewed in terms of

the flow conditions under which violations of the standards arise. In this analysis, loads which plot above the curve in the flow regime defined as being exceeded 85-99 percent of the time are likely indicative of point source influences on the water quality. Those plotting above the curve over the range of 10-70 percent exceedance likely reflect non-point contributions. Some combination of the two source categories lies in the transition zone of 70-85 percent exceedance. Those plotting above the curve at exceedances less than 10 percent or more than 99 percent reflect extreme hydrologic conditions of flood or drought.

This analysis allows a triage approach to identifying the likely significance of various sources along the waterbody or within the watershed and their contributions to the impaired condition seen within the water quality of the waterbody. Similar analysis is then conducted on a seasonal basis, using three seasons: winter low flow: November-March; spring runoff: April-June; and summer/fall baseflow: July-October. Each analysis serves to identify the critical time periods when water quality conditions deteriorate. Through this analysis, the circumstances and contributing factors of each deviation may be isolated and analyzed as part of the remaining components of the TMDL.

For impairments involving narrative criteria or biomonitoring data, surrogate indicators will be developed to define the TMDL objective. Such indicators include biotic index values, trophic state indices, number of acres covered by macrophytes, etc. Use of time trends in those surrogates will document the current conditions and will be used to define the quantitative outcome desired from establishing the TMDL and making progress toward reducing pollution and impairment in the identified waterbody.

For those waterbodies listed as a result of simulation model results indicating probable violation of water quality standards and impaired uses, the results of the modeling will be used along with sensitivity analysis to adequately define the conditions leading to impairment and the impact of intervening corrective actions toward improving those conditions.

In all situations, the TMDL will state its objective in meeting the appropriate water quality standard by quantifying the degree of pollution reduction expected over time on a mass, volume or percent basis. Interim objectives or milestones will also be defined for midpoints in the implementation process. In some situations, such interim objectives will look for progress in moving the condition of an impaired waterbody from a condition of non-support to one of partial support en route to the ultimate objective of full support of that water's designated uses.

C. Source Assessment. Each pollutant source contributing to the deviation from the water quality standards will be identified and their relative contribution to the impaired situation determined/ Based on the flow-load analysis, judgments can be made on the degree point and non-point sources are contributing to the current condition. The number of sources, their geographic location along the segment or within the watershed, the type of source, the magnitude of their potential pollutant loading and their degree of influence on water quality will be identified.

For point sources, the assessment will include the type of wastewater and treatment they use, the volume of

their discharged effluent, degree of compliance with existing permits, the limits in place on current permits, the expiration date of those existing permits, their potential for future growth and the expected flow conditions which they are expected to protect. Situations where the point source impacts will accumulate in a watershed setting or in a downstream manner will also be described.

For non-point sources, information will be gathered on the land uses within the watershed, the underlying topographic and soil features, likely contributing areas producing runoff, percent of impervious area within the watershed producing stormwater discharges, stream-aquifer interactions, existing management practices in place and the limits of those practices to influence hydrologic extremes, and types of water use present along the streams and lakes, including diversions of that water.

This component will also present any documented information on the background levels of pollutants emanating from natural sources or sources lying outside the effective area under TMDL development. Levels of spatial or temporal uncertainty in the flow and water quality conditions of the impaired water body and its watershed will be expressed as part of the background assessment.

D. Load Allocation. In this context, allocation has the dual meaning of allocation actual allowable pollutant loadings among point and non-point sources as well as the more significant role of assigning appropriate responsibility of pollution reduction to sources and activities influencing the water quality of the impaired stream or lake. This component will lay the groundwork for implementation action to correct or improve the source impacts on water quality. A hierarchy of relative contributions among the sources will be established so that initial efforts will focus on those sources with greater influences. Considerations will be made of future alterations in those sources, seasonal variations and defined flow conditions. A margin of safety will be declared as part of the TMDL objective to provide safeguards to the waterbody from the uncertainty inherent in the impacts of point and non-point sources. The margin of safety will likely vary by pollutant.

E. Implementation. This component will describe the actions to be taken to control and manage point and non-point source contributions to pollutant loadings. Typically, a ten year period of implementation actions will be anticipated after TMDL approval. In the case of point sources (municipal, industrial and livestock), allocations of wasteloads will be made through renewed NPDES permits. The state will strive to place all NPDES permits along a segment, string of segments, within a watershed and eventually throughout each basin on the same schedule. For those point sources needing improvements, a compliance schedule will be developed. Use of the Kansas Water Pollution Control Revolving Loan Fund for upgrading wastewater facilities will continue to assign additional priority points to those scheduled projects discharging into a stream listed under Section 303(d) and subject to the conditions of a TMDL. Permits will reflect TMDL objectives by placing water quality based limitations on effluent discharges. In some cases, individual permits will assign the individual allocation of a wastewater load to a discharger, reflecting the distribution of wasteload allocations among the group of point sources sharing a common waterbody.

The principal mechanism of implementation for non-point sources will be targeted technical assistance, educational outreach and financial resources directed toward placing best management practices in critical

contributing areas of watersheds influencing the water quality of listed streams and lakes. The key strategy will be to reduce pollutant loadings from these areas to the maximum extent practicable. Most of these efforts will rely on voluntary, incentive based approaches, consistent with current practice of the *Kansas Water Plan,* KDHE's Watershed Management Section and the Watershed Restoration and Protection Strategy (WRAPS) activities and federal programs, such as Environmental Quality Improvement Program (EQIP). Reasonable assurances can be made to implement this strategy with the use of the *Kansas Water Plan* and its supporting programs, its Annual Implementation Plan to set short term priorities for those programs, the $16 million annually available from the State Water Plan Fund and the development of Unified Watershed Assessments (UWAs; described in the Water Quality Management Plan section) to funnel federal funds such as Section 319 grants and EQIP into priority subbasins and watersheds. TMDLs will supplement efforts to improve quality in the priority watersheds identified through the UWA process, by directing resources to priority locations within those watersheds.

The *Kansas Water Plan* supports water quality protection efforts through directing and funding a number of programs such as non-point source pollution technical assistance, non-point pollution control cost sharing, local environmental protection planning, water resource cost-share, wetland and riparian protection, subbasin water resource management, water quality buffer initiatives, biological monitoring, stream gaging, research evaluations and basin assessments. With the call by the Kansas Water Authority to significantly increase the percentage of stream miles and lake acres which fully support their designated uses by the year 2010, implementation of TMDLs, particularly related to non-point source activities, will work toward achieving that Water Plan goal as well as the goals of the surface water quality standards.

Three mechanisms exist within state authority to address pollution sources, particularly those of a non-point nature.

1. Critical Water Quality Management Areas. Watersheds may be designated as critical water quality management areas because of pollutant sources which cause or may reasonably be expected to cause, damage to resources of the state; public nuisance or health hazards; destruction of fishery habitat; excessive deposition of sediments on river bottoms, lakes or reservoirs; additional risk to threatened or endangered fish or wildlife or violation of water quality standards. The Department of Health and Environment evaluates all the pollutant sources and the extent by which they contribute to pollution problems within a proposed area and determines the technical and economic feasibility of simultaneous control of all pollutant sources. A proposed management plan is set forth with an implementation schedule for control of each source, an analysis of the costs and benefits of the plan and the boundaries of the proposed area. Considerable public input is solicited in the pre-designation phase, and the preparation of the management plan as well as formal public hearings on the proposed designation of the area.

2. Pesticide Management Area. The Kansas Department of Agriculture is empowered to develop pesticide management areas when notified by EPA or KDHE that a pesticide poses a serious threat to the public health, safety and welfare or to the natural resources of the state. Such areas are developed upon examination of precipitation, topography, soils and depths to ground water and are designated as permitted, modified or

prohibited in the use of certain types of pesticides. The Department uses a technical advisory committee in establishing the boundaries and management plan for the proposed area. Designation of the proposed area and its management plan is subject to public notice and comment through public hearings.

3. Source Water Protection Planning. Under the guise of the federal Safe Drinking Water Act, the Department of Health and Environment is to stimulate, provide assistance and coordinate the development of state and local source water assessments to protect public water supplies. Such assessment planning delineates local public water supplies, inventories pollutant sources, analyzes the susceptibility of the pollutant risks and informs the public on the present conditions, risks and risk reduction plans associated with their water supplies. The program is coordinated with the State Wellhead Protection Program assessing the protection of ground water supplies. In many situations, developed plans are implemented through actual protective measures in the source water contributing areas falling under local jurisdiction of zoning and ordinances to reduce pollutant threats.

F. Follow-up Monitoring. Follow-up monitoring will be conducted in order to further reduce the uncertainty in environmental impacts of pollutant source contributions and alteration encountered in establishing the objectives and implementation of TMDLs and to determine the effectiveness of implementing actions on improving water quality. Monitoring is conducted on numerous fronts. Implementation monitoring tracks the degree to which corrective or management practices have been put in place for point and non-point sources along the segment or within the watershed. Non-point measures might include acres of land treatment implemented over time, increases in riparian area adjacent to streams, number of agricultural producers participating in cost-share programs and participation in outreach education events focused upon non-point source reductions. Point source monitoring would include compliance monitoring relative to existing and future NPDES permits, episodes of combined sewer overflows, status of scheduled upgrades in treatment facilities, episodes of emergency bypass through treatment works, maintenance schedules and upkeep for treatment facilities and ongoing training for treatment works operators.

Resource monitoring assesses the improvement in water quality conditions in the identified impaired waterbody. Baselines need to be established documenting current conditions. Generally, water quality data taken over a ten-year period will serve as the benchmark by which implementation of TMDLs will improve upon. Data will be examined in summarized form and as to trends over time. The ambient stream chemistry network will be generally maintained, with possible suggestions to expand spatial and temporal coverage in terms of additional sites and frequency of collection. Biomonitoring will continue to play a chief role in representing the integrated impacts of activities on water quality as registered by the supported biota of a stream or lake. The measure of success will be reductions in the frequency, magnitude and duration of violations of the water quality standards over the next decade.

Occasionally, synoptic surveys may be conducted to further evaluate loadings in a watershed setting above historic monitoring points, confirming load contributions from tributary areas within the watershed. Low flow intensive surveys will document impacts of effluent discharges on receiving waters. Stormwater

monitoring may be recommended to further evaluate the contributions of urbanized areas on non-point loadings. Some follow up modeling may also be conducted, using BASINS, QUAL-2K, EUTROMOD, CNET, BATHTUB, AnnAGNPS, GWLF etc, to verify previous results, leading to implementation decisions and to further discern locations and conditions needing treatment in order to achieve the TMDL objectives.

The utilization of modeling applications to assist in TMDL development and follow up monitoring are anticipated to become more frequently utilized to predict watershed and loading conditions in selected watersheds.

The purpose of these monitoring efforts is to continue to guide implementation actions toward those opportunities creating the greatest, timely benefits in improving water quality. Monitoring should look toward trends of improvement and the meeting of interim milestones established within the period of TMDL implementation. In all cases, follow up monitoring will incorporate appropriate quality assurance/quality control protocols to assure the reliability of the data used for verification, increased scrutiny and evaluation of management practices.

G. Feedback Mechanism. As stated previously, Kansas intends to use a decade of implementation and monitoring after TMDL establishment to maximize the opportunity of placing resources on pollutant sources at the basin scale. This timeframe also increases the likelihood to discern the signal of positive influence amidst the variable noise associated with flow and water quality data, particularly in non-point source situations. There will be interim objectives incorporated within the TMDL implementation schedule to assess the direction of corrective actions at the midpoint of implementation and make appropriate adjustments. All implementation actions are available for review and adjustment within the timeframe of trying to accomplish the objectives of the TMDLs. NPDES permits are renewed at least every five years. Best Management Practices are subject to availability of funding and administrative policies and will reflect revised directions provided by the *Kansas Water Plan* and its Annual Implementation Plan.

Public Participation Process

Kansas intends to use the existing Water Planning Process to create opportunities for coordination with other agencies, interest groups and the general public.

Internally, the Department of Health and Environment will convene appropriate intra-agency work groups to address specific issues of TMDL establishment and implementation. Such work groups include staff from the Bureau of Water dealing in water quality standards, municipal permits, livestock permits, non-point source pollution, monitoring, biomonitoring, use attainability analysis, data analysis, geographic information and planning. The WPMAS Section will interact with the other state agencies on TMDLs through the coordination functions of the Kansas Water Office, the Kansas Water Authority and the *Kansas Water Plan.*

Agency coordination is assured through monthly agency meetings, the Governor's Water Quality Coordinating Committee, the Kansas Water Authority's Quality Committee and staff-level interactions. The Quality Committee of the Kansas Water Authority receives briefings on water quality protection activities of

the state, particularly those which implement the *Kansas Water Plan.* The Committee makes policy and budget recommendations influencing implementation activities centered on improving the water quality conditions of the state. The committee meets coincidently with the quarterly meetings of the Kansas Water Authority in January, April, July and October and provide public forums. Regional Advisory Committees are present in each of the 14 regional planning areas, appointed by the Kansas Water Authority to advise the Authority on planning area issues and concerns relative to the programs and policies of the *Kansas Water Plan.* The 11 members of the RAC reside in the planning area and represent some aspect of water use in the basin; domestic, municipal, industrial, irrigation, fish, wildlife and recreation, as well as the interested public. The chief responsibility of the RAC is to advise the Kansas Water Office and the Kansas Water Authority on the issues of the planning area, the desired direction of applicable state programs and guidance of such programs through the provisions of its Basin Plan. Such plans reflect the direction and priorities of the basin relative to issues of water supply, water quality, flooding, environmental protection, fish, wildlife and recreation, water conservation and data and research. These plans represent the basis for setting priorities through the Annual Implementation Process.

The State Water Planning Process is typically framed around the state fiscal year. Beginning in July, issues of policy and basin specific concern are investigated and analyzed, culminating in the possible release of a preliminary draft of a policy or basin subsection of the *Kansas Water Plan* in January. During the initial six months, background information is collected, preliminary ideas are discussed and evaluation of the issues is completed at the RAC and Water Authority levels. The preliminary drafts approved for release by the Authority in January summarize the issue and its background information and present initial options and recommendations for public consideration. Public meetings are held throughout the state in March, after which, public comments are incorporated and a working draft of the proposed subsection is prepared for Authority review at its April meeting. The Authority approves the working draft for release to the public for formal comment and testimony at public hearings in June. After those hearings, the comments are considered in redrafting the subsection into a final draft for presentation and approval to the Kansas Water Authority at its July meeting. Should the Authority approve the subsection in July, it becomes part of the *Kansas Water Plan*, applicable as state policy and authority for implementation, including using funds from the State Water Plan Fund.

Funding issues are handled though the Annual Implementation Plan which is framed around the budget preparation schedule of the state agencies. The process typically starts in January and February with the collection of information from the agencies on the status of achieving the previous and current year implementation objectives, current activities, raised issues and suggested direction for the next fiscal year. That information is presented to Basin Advisory Committees in the spring and the Authority issues the implementation plan at its July meeting in order for state agencies to incorporate the recommendations in their next fiscal year budget requests submitted on September 15. At the October meetings of the RAC and the Authority, the agency budgets are analyzed relative to the implementation plan and recommendations are made from the Authority to the Governor and Legislature regarding allocations of State Water Plan Funds to the various state agency programs.

With the impending work on TMDLs across the state, the Authority has authorized expenditures from the State Water Plan Fund for developing and implementing TMDLs. Plans also call for the incorporation of specific TMDLs and priorities for implementation within the planning areas into each of the specific plans for the RAC of the *Kansas Water Plan* during the time period that TMDL work is underway within that basin. The proposed RAC Plan subsections will include background information, including the impaired water bodies in the basin and the associated pollutants; the linkage of TMDL development to the Water Quality Protection Strategy policy subsection of the *Kansas Water Plan*; priorities for TMDL implementation in that planning area, identification of programs to be used in implementing TMDLs in the planning area; and any data, monitoring and research needs in the planning area associated with TMDLs.

By incorporating TMDLs into the RAC Plans, the Kansas TMDL process will use the public participation aspects of the State Water Planning Process. Briefings will be made to the Kansas Water Authority at its quarterly meetings. Monthly meetings with the RAC in the basin where TMDL work is being conducted is anticipated. The March public meeting in that planning area will center on the question of TMDLs and their implications for planning area activities. Likewise, the June public hearings will take testimony not only on the TMDL subsection of the RAC Plan, but on the TMDLs themselves. Additionally, planning area specific TMDL public forums will be scheduled for April of each year at a couple of locations within the planning area to facilitate a dialogue among the agencies, the general public, impacted dischargers, interest groups and municipalities on the TMDLs and their implementation.

Recognizing that tangent deliberations occur outside the State Water Planning Process, the Department is also scheduling regular meetings with the interest groups representing municipalities, agriculture and environmental concerns. Such organizations include the League of Kansas Municipalities, the Kansas Farm Bureau, the Kansas Natural Resources Council, etc. Planning area specific interest groups will also be solicited for input and advice as the TMDLs specific to the water resources of their concern are developed. Additionally, specific task forces will be used for unique water resources or pollutants to help establish TMDLs for those situations. KDHE will develop, maintain and update a TMDL website on their agency Internet home page to provide the public with the status and new developments of TMDL activities on a statewide and planning area specific basis.

The input received through these forums and the other outlets provided by the State Water Planning Process will be incorporated within the submittal of the TMDLs to EPA.

APPENDIX C
STANDARD OPERATION PROCEDURE FOR ANNUALIZED AGRICULTURAL NONPOINT SOURCE POLLUTION (ANNAGNPS) AND GENERALIZED WATERSHED LOADING FUNCTION (GWLF) MODELS WPSU-003

Archived 2/10/2017

APPENDIX D
STANDARD OPERATION PROCEDURE FOR EUTROPHICATION (BATHTUB) MODEL
WPS-004

A. **INTRODUCTION:** BATHTUB (v. 6.14, Windows version), an empirical model designed to assess eutrophication for morphometrically complex reservoirs (Walker, 1996), is an effective tool for water quality assessment and management. BATHTUB is composed of three major components that include water balance, nutrient sedimentation, and eutrophication response models. One major advantage of BATHTUB over other models is its use of simple steady-state calculations to address eutrophication processes, which reduces data demands. The model allows the user to segment or partition complex watersheds such as elongated reservoirs into similar hydrological or biological units. These segment inputs and outputs are ideal with as units and weighted output values calculated for the waterbody as a whole. This approach also allows investigator to examine responses associated with each waterbody segment. BATHTUB has been widely applied in the nation to address many TMDLs relating to issues associated with morphometrically complex lakes and reservoirs (Mankin et al., 2003; Wang et al., 2005). A simple EXCEL version, CNET, has been extensively used in EPA Region VII areas and other regions as well.

B. **DATA PREPARATION:** Lake chemical, biological and physical data (e.g., TN, TP, chlorophyll *a*, transparency, mixing depth, and lake surface area) are required along with streamflow and nutrient information from a target watershed. Atmospheric nutrient deposition and evaporation data are also required by the model. Regional atmospheric nutrient loads can be downloaded from EPA Clean Air Status and Trends Network (CASTNET) at http://www.epa.gov/castnet. Detailed data requirements are listed in BATHTUB user's manual (Walker, 1996).

C. **CALIBRATION AND VALIDATION:** BATHTUB provides two calibration approaches (seasonal and annual), and annual calibration is often applied to characterize typical conditions found in a lake or reservoir. The following are the general calibration rules suggested by Tetra Tech during modeling training at EPA Region VII in 2007. The results of T-statistics should also be examined in this calibration phase.

   a. Water Balance (total inflow = total outflow)
   b. Nutrient Turnover Ratio (turnover ratio > 2.0)
   c. Dispersion Transport (numeric dispersion < estimated dispersion)
   d. Calibration Factor Range (N range = 0.3-3.0; P range = 0.5-2.0)

References Cited:

Mankin, K.R., S. Wang, J.K. Koelliker, D,G. Huggins and F. deNoyelles, Jr., 2003. Watershed-lake water quality modeling: verification and application. Journal of Soil and Water Conservation 58(4): 188-196.

Walker, W.W. Jr., 1996. Simplified procedures for eutrophication assessment and prediction: user manual. Instructional Report W-96-2. U.S. Army Engineer Waterways Experiment Station. Vicksburg, MS.

Wang, S.H., D.G. Huggins, L. Frees, C.G. Volkman, N.C. Lim, D.S. Baker, V. Smith and F. deNoyelles, Jr., 2005. An integrated modeling approach to total watershed management: water quality and watershed management of Cheney Reservoir, Kansas, USA. Water and Air and Soil Pollution 164: 1-19.

APPENDIX E
STANDARD OPERATION PROCEDURE FOR UTILIZATION OF BIOLOGICAL DATA WPS-004

A. **DATA DESCRIPTION:** Biological data have been used to evaluate the Aquatic Life Use Support (ALUS) of Kansas waters for many years. These data generally include quantitative measures of the diversity of stream macroinvertebrate communities. The presence and absence of species is considered an indicator of generalized conditions in a stream. In the case of unionid mussels, absence may reflect historic impairments that are no longer present if recolonization is limited. These data are used in conjunction with tolerance values to pollutants to determine if a stream is meeting its ALUS designation.

B. **DATA QUALITY:** Biological data used by the Watershed Planning, Monitoring and Assessment Section (WPMAS) are generally provided by the Stream Biological Monitoring Program (SBMP), although in future years additional data collected by the Stream Probabilistic Monitoring Program (SPMP) may be used. Both of these programs now operate within the WPMAS. Quality assurance on collection efforts shall be ensured by the Quality Management Plans (QMPs) of the monitoring programs. Should outside staff initiate field collection, a QAPP shall be adopted pursuant to the Division of Environment (DoE) QMP, and consistent with existing SBMP and SPMP QMPs. Biological monitoring data provided by sources outside the agency may be acceptable, if sufficient quality controls exist to satisfy professional judgment regarding their reliability.

C. **DATA RETRIEVAL:** Biological data used by WPMAS shall be retrieved from the databases maintained the Assessment and Information Unit within WPMAS. The Assessment and Information Unit shall maintain a database with SBMP and SPMP data, including individual species counts and summary measures for sampling events. WPMAS staff will retrieve data directly from this database at the time of use to ensure the most current and correct data are in use at all times. Storage of biological data in other databases and analytical software shall be allowed to facilitate the analysis being conducted. However, each new analysis shall begin with retrieval of data from the Assessment and Information Unit's database.

D. **DATA USE:** Biological data shall be used to evaluate the aquatic life use support of classified waters of the state, as designated in the Kansas Surface Water Register (KSWR). Waters outside the KSWR shall not be evaluated without prior confirmation that similar kinds and quantities of macroinvertebrate species are reasonably expected to occur. When using biological data to evaluate the ALUS of a stream on the KSWR, primary screening shall be done with the summary values calculated pursuant to the Kansas Biological Index- Nutrients and Oxygen Demanding Substances (KBI-NOD, also referred to as KBI or KBNSBIOIDX) (Moffett & Huggins, 1988), the Macroinvertebrate Biotic Index (MBI, also referred to as KBMBI), the Ephemeroptera, Plecoptera, Trichoptera species richness index (EPT Index), the Ephemeroptera, Plecoptera,

Tricoptera percent population (EPT%), and mussel loss index.

Mussel loss index may not be available at all monitoring sites, and may reflect historic conditions that no longer exist, therefore use of mussel loss data shall be restricted to sites that also show signs of current biological or chemical stress characteristic of impaired conditions for unionid mussels.

Biological condition is assessed by applying the Aquatic Life Use Support Index (ALUS Index) to data generated from macroinvertebrate samples. The index is designed to assess the response of macroinvertebrate communities to a wide variety of stressors including various toxics, low dissolved oxygen and sedimentation. The index is composed of five metrics (Table 1), which are standardized to a range of scores from 0 to 4. The metric scores are summed to generate the ALUS index score, which has a range of 0 to 20 (Table 2).

THE BIOLOGICAL METRICS UTILIZED IN THE ALUS INDEX ARE AS FOLLOWS:

1. Macroinvertebrate Biotic Index (MBI) (Davenport and Kelly 1983) - A measure used to evaluate the effects of nutrients and oxygen demanding pollutants on macroinvertebrate communities. The index provides order and family level tolerance values for several benthic macroinvertebrate classes. The value represents a weighted average tolerance value for the organisms in a sample. The value is weighted by the number of individuals in each taxa.

2. Kansas Biotic Index for Nutrients (KBI-N) (Huggins and Moffett 1988) – Mathematically equivalent to the MBI, however the tolerance values are species specific and restricted to aquatic insect orders.

3. Ephemeroptera, Plecoptera and Trichoptera Index (EPT) - The number of taxa belonging to the insect orders Ephemeroptera, Trichoptera, and Plecoptera. Most species in these insect orders are considered intolerant of water quality and habitat perturbations.

4. EPT Percent of Count (EPT % CNT) – The percentage of organisms in a sample consisting of individuals belonging to the EPT orders.

5. Shannon's Evenness – A measure of diversity that describes how evenly distributed the numbers of individuals are among the taxa in a sample.

Table 1. ALUS Index metrics with scoring ranges and standardized scores.

MBI	KBI-N	EPT	EPT % CNT	SHANNON'S EVENNESS	SCORE
<=4.18	<=2.52	>=16	>=65	>=0.849	4
4.19-4.38	2.53-2.64	14-15	56-64	0.826-0.848	3
4.39-4.57	2.65-2.75	12-13	48-55	0.802-0.825	2
4.58-4.88	2.76-2.87	10-11	38-47	0.767-0.801	1
>=4.89	>=2.88	<=9	<=37	<=0.766	0

Table 2. ALUS Index score range, interpretation of biotic condition, and supporting, partial and non-supporting categories.

ALUS Index Score	Biological Condition	Support Category	Reporting Category
> 16.0 – 20.0	Very Good	Full Support	1 – If Never Impaired 2 – If Previously Impaired
> 13.0 – 16.0	Good		
> 6.0 – 13.0	Fair	Partial Support	4a – If TMDL Exists 5 – If No TMDL Exists
> 3.0 – 6.0	Poor	Non-Support	
3.0 – 0.0	Very Poor		

Because biological data are inherently variable, and because relatively few samples are taken each year (typically one per year per site, and in some cases less often), biological data shall only be evaluated if a minimum of four years of comparable data exist. Recent data shall be given greater weight when evaluating current conditions and data older than five years shall only be used for comparative purposes. Evaluation of impairments shall be coupled with evaluation of all available chemistry monitoring data to attempt to discern specific pollutants linked to the impairment. In every case, evaluation of ALUS shall be done with best professional judgment and consultation with the monitoring program staff.

Criteria used for fish consumption advisories and assessment of food procurement use support were as follows:

1. If a fish consumption advisory was in effect with in a water-body segment then food procurement use was assigned "Not Supported" for that segment.

2. If a fish consumption advisory was not in effect in a sampled segment, then the food procurement use was assigned "Fully Supporting" of Food Procurement Use.

Fish consumption advisories were issued, in general, based on data from a minimum of three duplicate (6 total) composite samples (3-5 fish) collected over a three year period. Fish consumption advisories were developed following EPA guidelines using risk assessment methodology (KDHE 2007a, EPA 1989, 1995 a-b, 2000a-b).

E. UN-USUAL USES:

a. Errors – Occasionally WPMAS staff may encounter errors in the dataset stored on the agency database. These errors may arise from erroneous data entry, database storage and retrieval errors, or other sources. Program staff should be alerted to values which fall significantly outside the range of expected scores for a site, which may indicate that an error has occurred. In some cases an error may occur that has a value within the range of expected scores. These errors are more difficult to detect. Use of multiple sampling years when analyzing biological data should minimize the impact of any errors that may be present in the dataset. Suspected errors should be discussed with Assessment and Information Unit staff.

b. Discharge Related – Invertebrates living in streams are subject to significant hydrologic stress when extreme flow conditions occur. Extremely low values may result in limited habitat, increased predation, low dissolved oxygen, and other stresses that could alter the composition of the invertebrate community. Extremely high flows, particularly in small watersheds with rapid rise and fall rates, can also result in significant disruption of the biological community. When evaluating the presence of unusual values all efforts shall be made to determine the general (or specific) flow conditions that existed during the sampling effort, and the weeks and months prior to the collection. When data are available that indicates extreme flow conditions may have occurred, evaluation of biological data shall account for possible hydrologic effects.

c. Seasonal Variation – Generally, SBMP and SPMP staff collect macroinvertebrate data during the late spring, summer and early fall months. The WPMAS database includes records from all sampling events, some of which have occurred during all months of the year. Seasonal variation in community and recorded community composition may occur due to life-history patterns, temperature variation, flow variation, stream inputs (e.g. leaf litter), and other factors. To ensure comparable data are used in all analyses, primary evaluation shall be conducted based on samples collected in the months of May through October.

d. Correction of Unusual Values – Should WPMAS program staff discover values they believe to be questionable they shall consult with Assessment and Information Unit staff. Should Assessment and Information Unit staff discover and correct errors within the agency database, evaluation of biological data shall be redone using corrected data.

WPMAS staff shall not substitute alternate values for unusual observations, but may disregard sample values deemed suspect. Generally, if data are retrieved from the WPMASdatabase they shall be used unless significant evidence discounts their validity.

F. **Reporting Results:** WPMAS staff shall use best professional judgment when evaluating all biological data. Result of analysis shall be evaluated by peers and supervisors to ensure quality control of all analytical products. WPMAS staff shall make every effort to ensure that SBMP and SPMP staff are consulted about conclusions drawn from biological data. When data are used to establish total maximum daily loads (TMDLs), text shall be included to explain the limitations on direct linkages between observed biological communities and pollutants. Each TMDL using biological data shall also include a summary explanation of the metrics used, their calculation and range of acceptable scores.

References Cited:

Huggins & Moffett, 1988. Proposed Biotic and Habitat Indices for use in Kansas Streams. Report No. 35 of the Kansas Biological Survey, The University of Kansas, Lawrence, KS 66045.

APPENDIX F
STANDARD OPERATING PROCEDURE FOR TMDL INTERPRETATION AND ESTIMATING POLLUTANT LOAD REDUCTIONS FOR WATERSHED MANAGEMENT SECTION AND KANSAS WRAPS PROJECTS
WPS-006

The Watershed Planning and Standards Unit assists the KDHE BOW Watershed Management Section (WMS) and local watershed WRAPS groups in understanding and planning TMDL implementation activities through the EPA 319 9-Element Planning Process. WPSU staff attends initial WRAPS focus meetings to help establish watershed impairment priorities as determined from established TMDL documents and current 303(d) impairment listings. The WPSU closely works with the WRAPS Project Officer to review and interpret the components of the WRAPS plans that address TMDLs and load reductions as they pertain to watershed impairments. All information provided by WPSU to the WRAPS groups will be coordinated through the WMS Project Officer.

Nonpoint source pollution load reduction calculations are provided to the WRAPS groups by WPSU to meet established TMDLs or targets for 303(d) impairment listings. Approved TMDLs will be interpreted based on the approved document and the readily available data that has been collected since the document was published. Calculations utilized to determine pollutant load reductions are established utilizing currently available; data, methods, and publications. The calculated load reduction and methods utilized in the calculations for work products provided to WMS and the WRAPS groups are reviewed by the WPMAS Section Chief or the appropriate WPMAS supervisor. All information and load reduction calculations that are provided to the WMS and WRAPS groups will be documented in an electronic memorandum to the appropriate WMS Project Officer.

The WPSU is responsible to review the sections of the submitted WRAPS 9-Element Watershed Plans that pertain to identifying watershed impairments, TMDLs, and pollutant load reductions as interpreted from the TMDL documents. WPSU will comment on these sections of the plans to ensure accuracy. Additional information to clarify or correct inaccuracies is included in the comments provided by WPSU, if necessary.

APPENDIX G
STANDARD OPERATING PROCEDURE FOR MAPS PRODUCED BY THE WATERSHED PLANNING, MONITORING AND ASSESSMENT SECTION
WPSU-007

The Watershed Planning, Monitoring and Assessment Section produces numerous maps primarily for TMDL development and the section's website. In addition, the section receives numerous requests for maps regarding TMDLs or water quality impairments on an ad hoc basis. Maps are produced by utilizing the most current version of ArcGIS/ ESRI® ArcMap software available to the agency. Information contained in the maps, commonly referred to as "GIS layers", are either created by staff within the section or obtained from: the KDHE Information Technology GIS Section, the State of Kansas GIS Data Access and Support Center (DASC) website located at http://www.kansasgis.org/, or through data sharing with other federal, state, or local agencies.

The Watershed Planning, Monitoring and Assessment Section routinely creates custom map layers utilizing available information from the agency and their database. Custom map layers are to be created with accurate information and are to be checked for errors by staff from the appropriate section that the information originated from. All map layers made specifically to display TMDL or 303(d) impairment listings are to be shared with other sections within the agency as requested.

The Watershed Planning, Monitoring and Assessment Section is not to share map layers or information that does not originate from their section or DASC. These requests are to be routed to the responsible work section and/or the KDHE Information Technology GIS Section.

All maps produced by the Watershed Planning, Monitoring and Assessment Section are to be reviewed and approved by the Section Chief or appropriate supervisor.

APPENDIX H
STANDARD OPERATING PROCEDURE FOR KANSAS SURFACE WATER QUALITY STANDARDS WPSU-008

The overall object of the Clean Water Act (Act) is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The interim goal of the Act is to achieve water quality that can support recreational use and aquatic life use of the nation's waters. The Water Quality Standards (WQS) translate the broad overall objective and goal of the Act into waterbody-specific objectives. WQS are also the foundation of the water quality-based pollution control program mandated by the Act. WQS define the goals for a waterbody by designating its uses, setting criteria to protect those uses, and establishing provisions such as antidegradation policies to protect waterbodies from pollutants. In addition to the three required components (designated uses, criteria, and antidegradation policy) by the Act, WQS can have other provisions set by states, such as the mixing zone policy.

The KSWQS consist of the following statute and regulations:

- K.S.A. 82a-2001
- K.A.R. 28-16-28(b) to (h)
- Tables of Numeric Criteria (adopted by reference)
- Kansas Antidegradation Policy (adopted by reference)
- Kansas Surface Water Register (adopted by reference)
- Kansas Implementation Procedures – Surface Water Quality Standards (adopted by reference)
- Kansas Surface Water Quality Standards – Variance Register

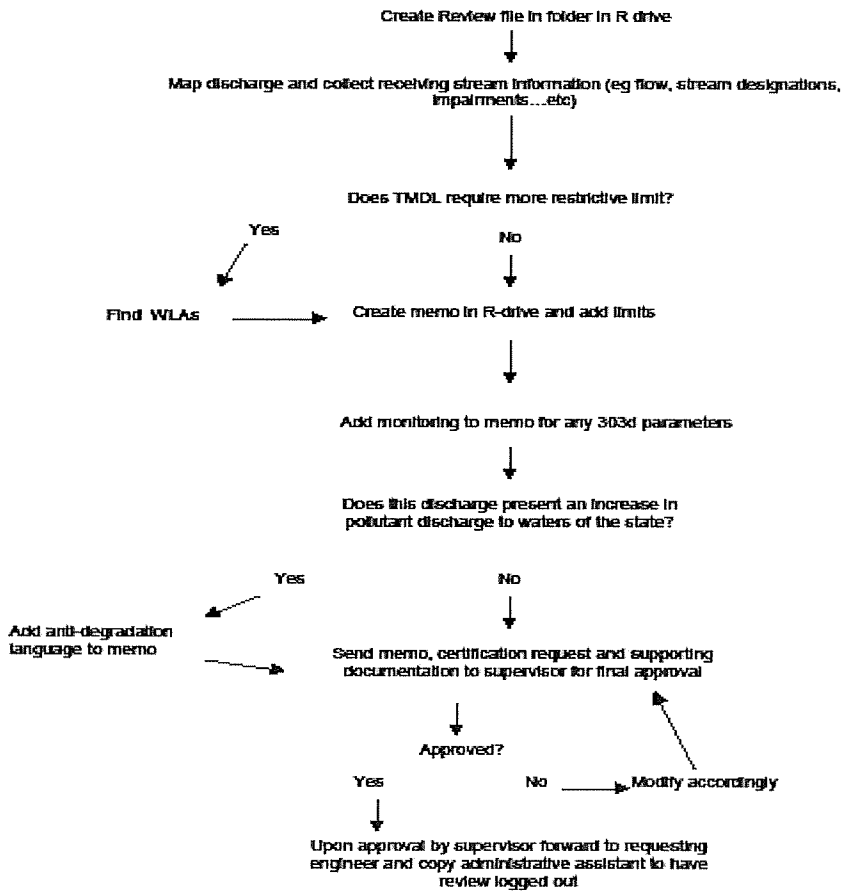
The Clean Water Act also requires a state to review its water quality standards through a public process called the Triennial Review. The language of the Act requires a state "from time to time, but at least once every three years, hold public hearings for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards" (40CFR 131.20(a)). Based on the public process, a state may choose to propose modifications to its water quality standards. The rule-changing processes in Kansas are outlined in the "Policy and Procedure Manual for the Filing of Kansas Administrative Regulations" by Dept of Administration.

APPENDIX I
STANDARD OPERATING PROCEDURE FOR WATER QUALITY CERTIFICATION
WPSU-009

Kansas
Department of Health and Environment

Water Quality Certification Process

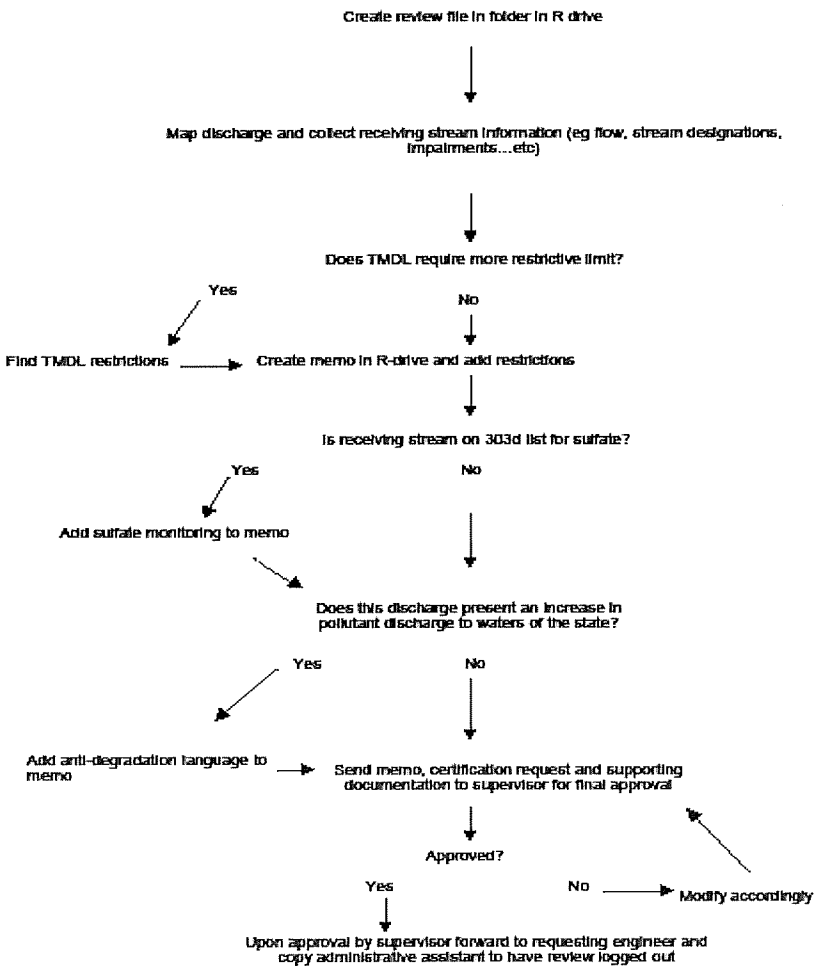
(sheet 2)



Kansas Department of Health and Environment

Water Quality Certification Process

(sheet 3)



APPENDIX J
STANDARD OPERATING PROCECURE FOR BIOTIC LIGAND MODEL WPSU-10

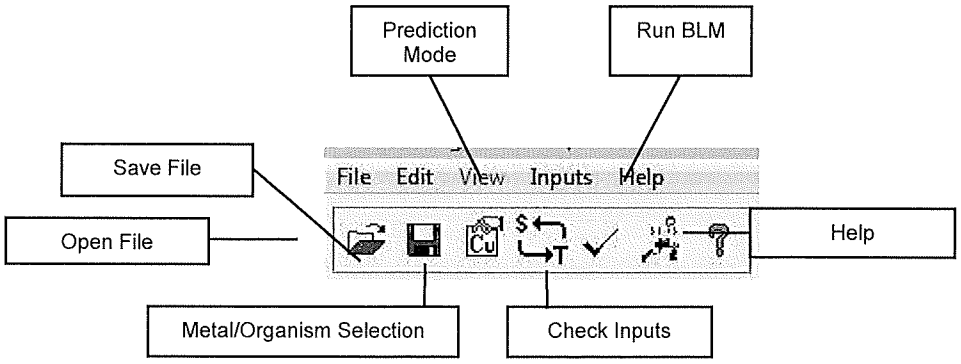
Biotic Ligand Model (BLM) Version 2.2.3 Procedure

Introduction: The Biotic Ligand Model (BLM) is a tool used in aquatic toxicology that examines the bioavailability of metals in the aquatic environment and the affinity of these metals to accumulate on gill surfaces of organisms. BLM depends on the site-specific water quality including such parameters as pH, temperature, and dissolved organic carbon (DOC). In this model, lethal accumulation values (accumulation of metal ion the gill surface, in the case of fish, that cause mortality in 50% of the population) are used to be predictive of lethal concentration values that are more universal for aquatic toxicology and the development of standards.

The point of the model is to provide an easy way to estimate how WQC values should respond to changes in water chemistry variables such as DOC, pH, alkalinity, Ca, Na, etc. This capability enhances analyst's ability to develop WQC that are consistent with the level of protection that is intended by the Water Quality Standards.

Purpose: The BLM can be used to predict metal speciation and toxicity, predicting Water Effect Ratios (WER), comparison to laboratory measurements of toxicity, and etc. This procedure will provide step-by-step instruction on how to run the BLM model to predict copper levels in a water system.

Shortcuts Menu: Comprehending the shortcuts menu will aid users in using the BLM. The following figure is a diagram of the shortcuts menu demonstrating the various icons and their functions.



Procedure:

1. Identify the site and dataset to be modeled in the BLM.
    a. This data will be compiled from the ENVI database and imported into an excel worksheet (Image 1) **or** will be provided by the permit writer or other requestor and entered into the Input fields of the BLM (Image 2).
    b. The water chemistry parameters required to run the BLM includes, in the order presented here: Site Label, Sample Label (Sample Date), Temp, pH, Cu, DOC, HA, Ca, Mg, Na, K, SO_4, Cl, Alkalinity and S; see the following Excel screen shot.
        i. All chemical parameters will be in mg/L.
        ii. When acquiring a dataset include the TOC and then convert the TOC to DOC for the BLM. The conversion follows: **DOC = TOC x 0.7482**
        iii. Humic Acid (HA) is not monitored for as an individual parameter. Therefore, a value of 10% humic acid content is recommended for most natural waters.
        iv. Sulfide is not monitored as an individual parameter. Sulfide can complex copper very strongly, but typically sulfide is at such low concentrations relative to copper water quality criteria that it does not have a large effect on results. This is also a difficult parameter to measure well, and if poor quality data are entered, they can have a significantly adverse effect on the calculated results. Because of these problems copper-sulfide reactions have been removed from the thermodynamic database. Therefore, any non-zero value for sulfide will no longer affect the model results. It is recommended a very small but non-zero value such as 1E-10 be entered into the BLM sulfide input field.

Image 1: Excel Spread Sheet

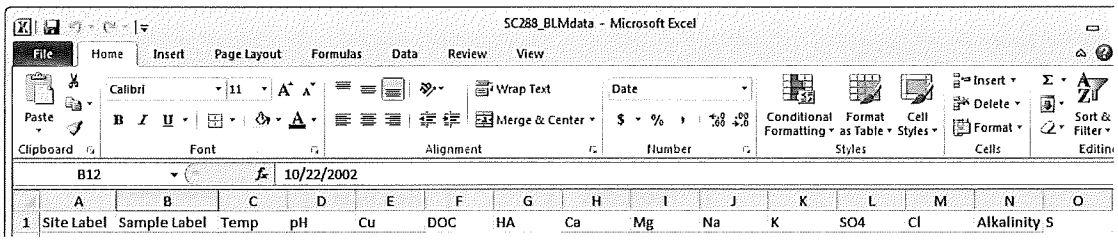
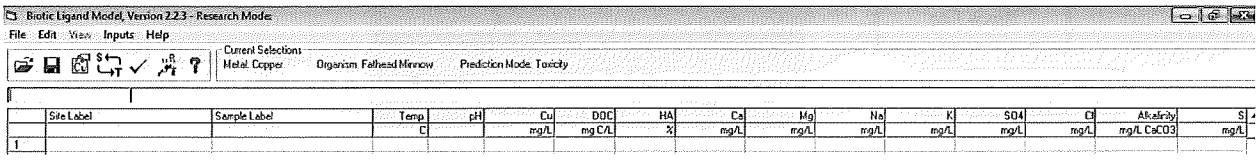


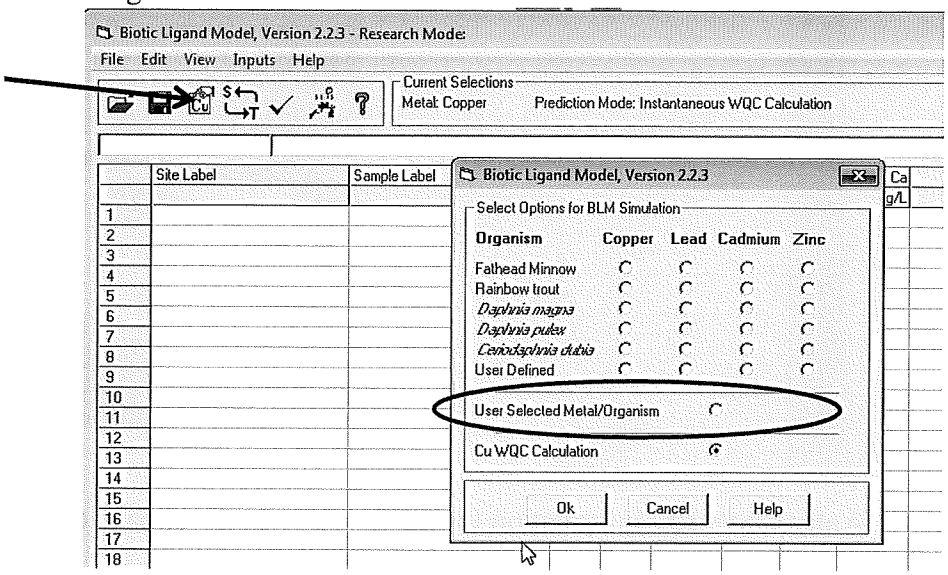
Image 2: BLM Input Screen



2. Data Inputs: Data may be entered into the BLM from cutting and pasting from an Excel worksheet or manually entered. Following are the data input fields:
    a. Select the Prediction Mode icon to Toxicity. The Current Selections field located at the top of the page should read Prediction Mode: Toxicity.

b. Select the Metal/Organism icon. When the pop up window comes up (Image 3), click on the radial button besides Cu WQC Calculation and select Ok; this will set the BLM to run for copper toxicity.

Image 3: Metal/Organism Icon



c. Prior to inputting water chemistry data into the BLM Windows Interface, click on the Inputs icon in the menu bar and select Set Unit (Image 4). Go to the Cu parameter and select mg/L and select Ok (Image 5).
   i. Water chemistry data is generated in mg/L and the BLM model defaults to µg/L thus the reason to change the units.

Image 4: Inputs icon

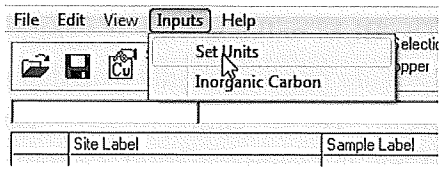
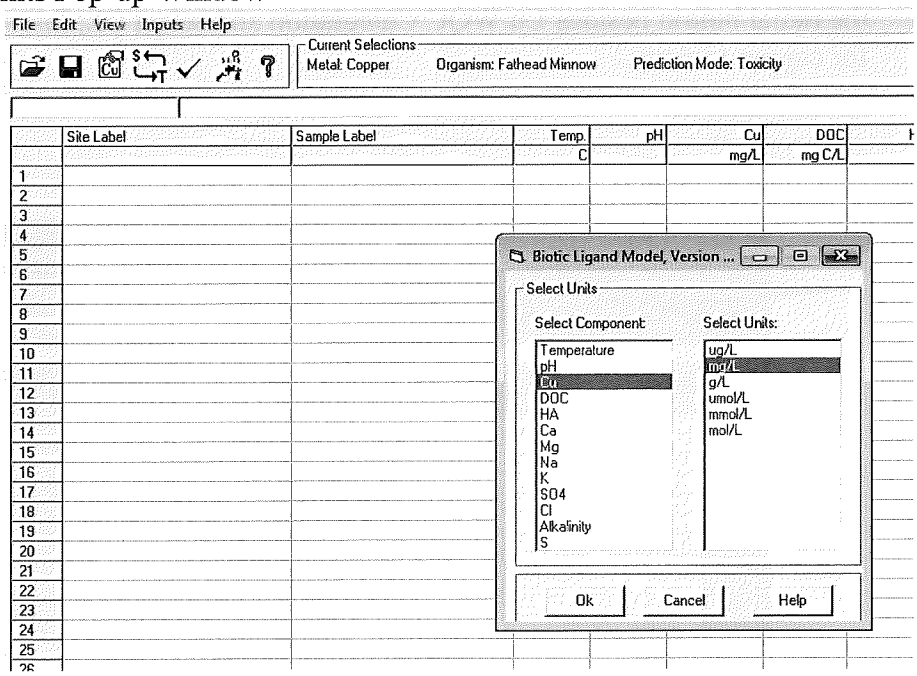


Image 5: Units Pop-up Window



d. Enter Water Chemistry information for the desired data set (Image 6):
   i. Site Label equals station name or other specific identifier
   ii. Sample Label the date or other sample identifier may be used.
   iii. Water chemistry inputs as listed in 1. b.
      1. When parameter values are not within the overall range for which the BLM has been calibrated the values will show up in red font when the model is run or when the values are checked using the Check Inputs icon. When this occurs the results should be assessed to determine if it is usable or not.
      2. The BLM will not work if a parameter is missing; if the monitoring data files are missing results than that sample should be eliminated from the BLM. The exception to this is when using default values for HA and S.
      3. When the temperature of a sample is zero, change the temperature to a value such as 0.01 or remove the sample from the data set for the model to run; determine what action to take based on the data file/number of samples and professional judgment.

Image 6: Data entered into the BLM windows interface

File Edit View Inputs Help

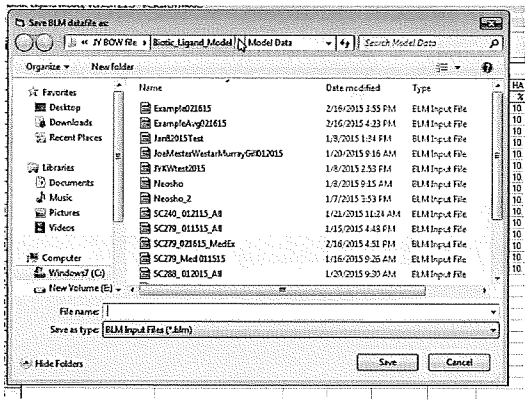
Current Selections
Metal: Copper Organism: Fathead Minnow Prediction Mode: Toxicity

SC288

	Sample Label	Temp.	pH	Cu	DOC	HA	Ca	Mg	Na	K	SO4	Cl	Alkalinity	S
		C		mg/L	mg C/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L CaCO3	mg/L
1	04/25/11	15.	8.2	0.0048	4.2468	10.	50.3764	11.3518	105.86	5.6308	75.9596	87.004	193.38	1.E-10
2	07/25/11	30.	8.4	0.0092	3.6924	10.	77.5922	18.3055	177.0817	7.491	238.4105	131.968	200.07	1.E-10
3	10/24/11	19.	8.1	0.0092	2.6015	10.	51.5634	11.4961	111.7107	5.2728	82.7396	92.6332	186.24	1.E-10
4	02/20/12	8.	7.8	0.0063	3.3422	10.	51.9924	11.2793	89.9507	5.7815	59.968	92.1076	178.59	1.E-10
5	05/14/12	24.	7.9	0.0038	3.1013	10.	51.2574	11.8388	110.2384	5.7198	72.6251	105.518	186.32	1.E-10
6	09/13/12	27.	8.2	0.0063	0.4794	10.	71.7518	16.8307	167.4766	5.4641	210.5986	115.6469	192.55	1.E-10

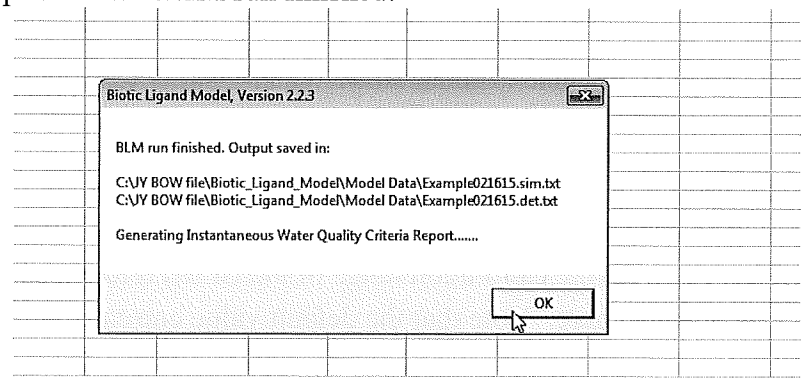
3. Run BLM: Once the data file has been entered launch the BLM by selecting the Run BLM icon.
   a. A pop-up window will come up asking you where you would like to save the BLM file (Image 7).

Image 7: Save BLM Data file



   b. The next pop-up window will come up running.
   c. The final pop-up window will say, "BLM run finished. Output saved in:...Generating Instantaneous Water Quality Criteria Report…." (Image 8)

Image 8: Pop-up window - BLM run finished.



   d. BLM Water Quality Criteria Report is generated. (Image 9)

i. The BLM generates a criteria report displaying the calculated acute (Criterion Maximum Concentration, CMC) and chronic (Criterion Continuous Concentration, CCC) water quality criteria for the various water samples. If dissolved copper is input, the BLM also calculates the acute toxic units as the ratio of the dissolved copper to the CMC. In addition to displaying the calculated water quality criteria and toxic units on the screen, the BLM also creates an output file describing the criteria report.

ii. The final report displays the Final Acute Value (FAV), the Criterion Maximum Concentration (CMC=FAV/2), the Criterion Continuous Concentration (CCC=CMC/ACR, where ACR is the acute-to-chronic ratio) and if dissolved copper is present Acute TU=Cu/CMC.
    1. CMC = Acute Criteria
    2. CCC = Chronic Criteria

Image 9: BLM Report

Biotic Ligand Model, Version 2.2.3 - Instantaneous Cu WQC Report: Example021715.blm

Action

	Site Label	Sample Label	Final Acute Value (FAV), ug/L	CMC (CMC=FAV/2), ug/L	CCC (CCC=FAV/ACR), ug/L	Cu ug/L	Acute Toxic Units (Acute TU=Cu/CMC)
1	SC288	04/25/11	99.3859	49.693	30.8652	4799.9999	96.5931
2	SC288	07/25/11	158.865	79.4325	49.337	9199.9992	115.8216
3	SC288	10/24/11	61.163	30.5815	18.9947	9199.9992	300.8353
4	SC288	02/20/12	49.299	24.6495	15.3102	6300.	255.5833
5	SC288	05/14/12	63.6095	31.8048	19.7545	3800.	119.4789
6	SC288	08/13/12	21.3832	10.6916	6.6408	6300.	589.2468
7	SC288	11/19/12	48.1488	24.0744	14.953	4199.9998	174.4592
8	SC288	03/11/13	51.4151	25.7075	15.9674	6499.9996	252.8441
9	SC288	06/10/13	132.4299	66.2149	41.1273	5499.9997	83.0628
10	SC288	09/16/13	59.2884	29.6442	18.4126	4300.0002	145.0536
11	SC288	12/10/13	30.9977	15.4989	9.6266	6099.9998	393.5771
12	SC288	01/13/14	68.7568	34.3784	21.353	4499.9998	130.8962
13	SC288	04/22/14	87.2487	43.6243	27.0959	1.2E+4	275.0759
14	SC288	07/21/14	81.7837	40.8919	25.3987	4199.9998	102.7099
15	SC288	10/20/14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

4. Report Converted to a Useable Format: BLM Water Quality Criteria Reports may be copied and pasted into Excel so the results can be utilized as needed.

Other BLM information:

1. The BLM may be used for one sample to many samples.
2. The Input Check Range (the calibration range of the BLM) referenced in section 2.d. of this document can be found here. Note that the default value currently being used for humic acid content is 10.

PARAMETER	LOWER BOUND	UPPER BOUND
Temperature (°C)	10	25
pH	4.9	9.2
DOC (mg/L)	0.05	29.65
Humic Acid Content (%)	10	60
Calcium (mg/L)	0.204	120.24
Magnesium (mg/L)	0.024	51.9
Sodium (mg/L)	0.16	236.9
Potassium (mg/L)	0.039	156
Sulfate (mg/L)	0.096	278.4
Chloride (mg/L)	0.32	279.72
Alkalinity (mg/L)	1.99	360
DIC (mmol/L)	0.056	44.92
Sulfide (mg/L)	0	0

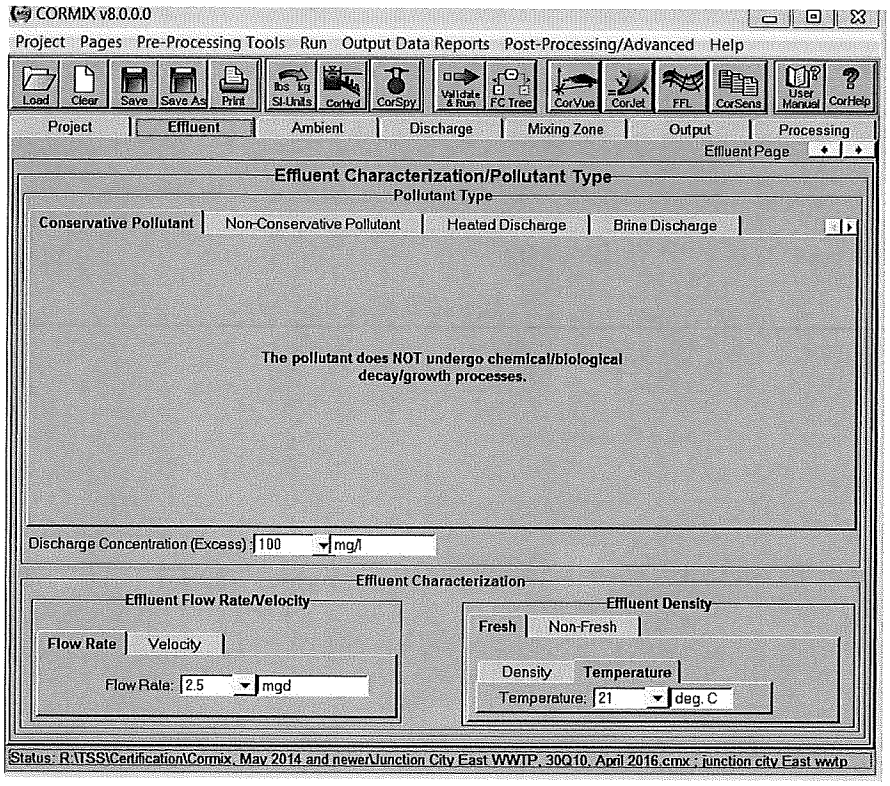
3. Saved BLM data files may be opened through the BLM software.
4. It is recommended that the user not modify BLM data files using a program other than the BLM Windows Interface application as it may result in the data file becoming corrupted.

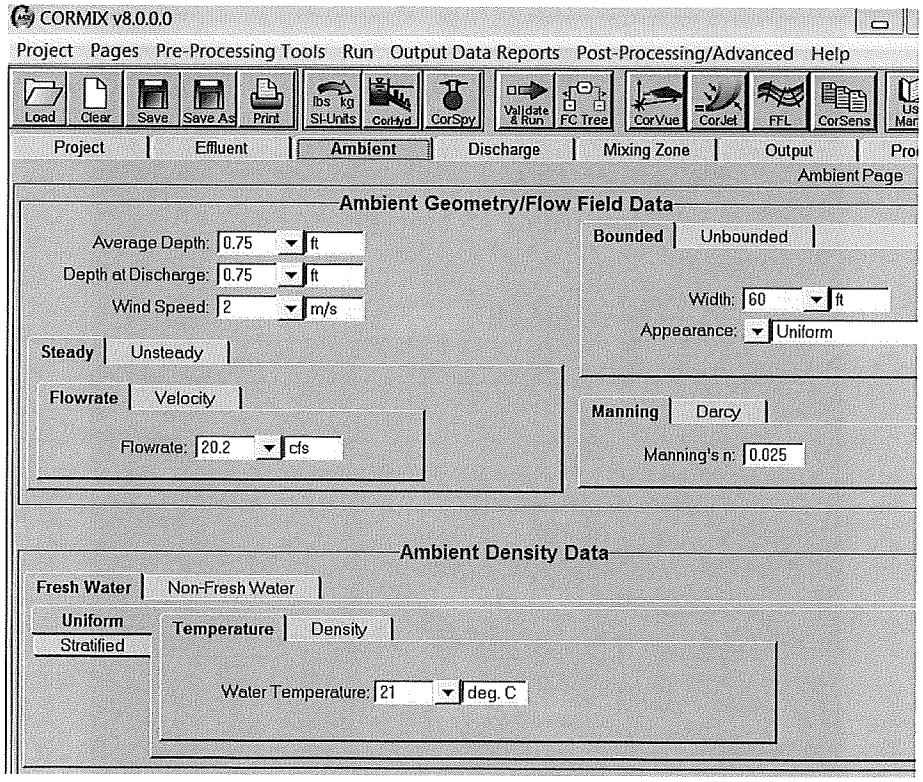
APPENDIX K
STANDARD OPERATING PROCECURE FOR CORMIX – ESTIMATING MIXING ZONES
WPSU-11

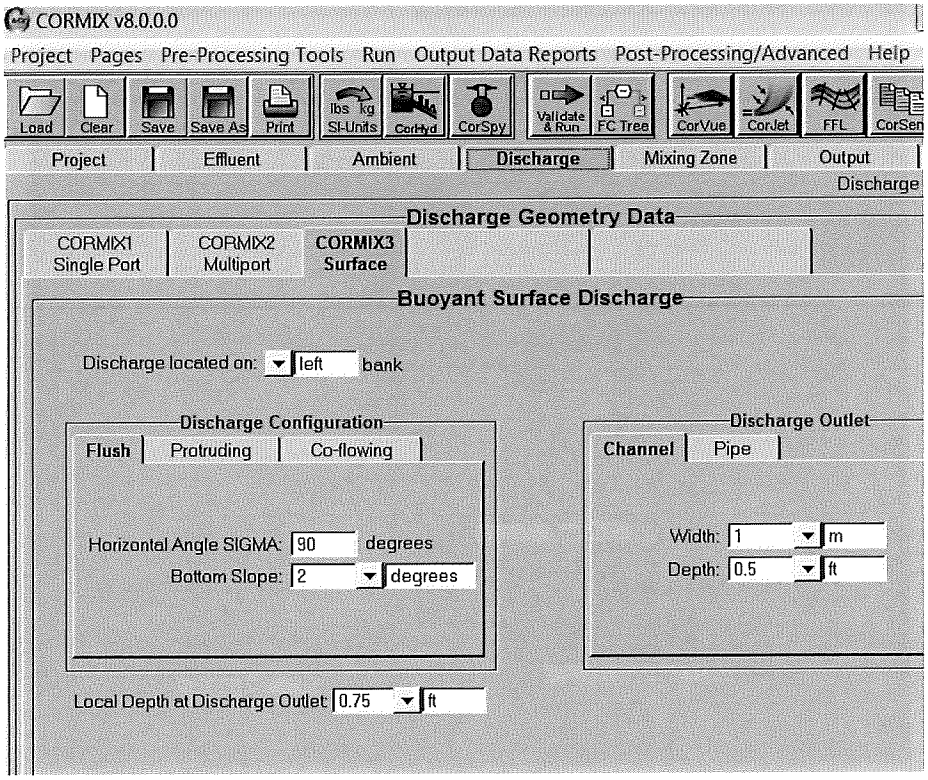
Cormix - Instructions for estimating mixing zones

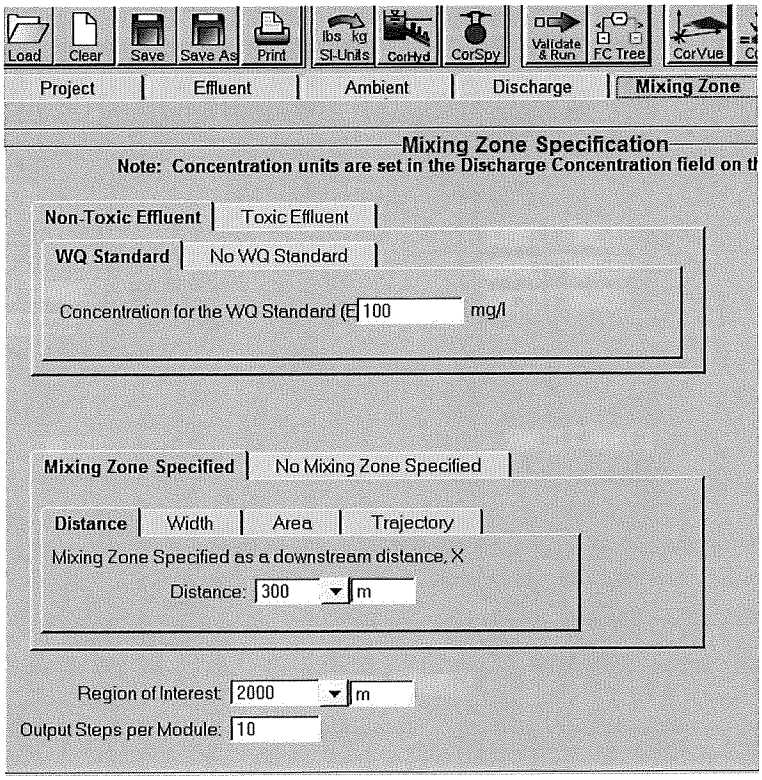
Begin by opening the latest version of Cormix located on desktop short cut. Enter information on each tab for outfall, effluent and ambient (in stream) conditions. Keep in mind that some stream and outfall information may require an onsite outfall survey. Occasionally, the use of Google Earth and best professional judgement may be usable in place of an onsite survey. Certain inputs require the use of defaults in order to make the process practical. The following defaults are used:

Manning's n: 0.025
Wind speed: 2 m/s (per EPA recommendation)
Horizontal angle (SIGMA): 90 degrees (recommendation of Mike Tate)
Ambient and Effluent temperature: 21 C
Bottom slope: 2% (recommendation of Mike Tate)
Pollutant type: conservative (per EPA training)
Discharge Concentration: 100 mg/l (per EPA training)
Concentration for water quality standard: 100 mg/l (per EPA training)


CORMIX v8.0.0.0
Project Pages Pre-Processing Tools Run Output Data Reports Post-Processing/Advanced Help
Load Clear Save Save As Print SI-Units CorHyd CorSpy Validate & Run FC Tree CorVue CorJet FFL CorSens User Manual CorHelp
Project Effluent Ambient Discharge Mixing Zone Output Processing
Effluent Page
Effluent Characterization/Pollutant Type
Pollutant Type
Conservative Pollutant Non-Conservative Pollutant Heated Discharge Brine Discharge
The pollutant does NOT undergo chemical/biological decay/growth processes.
Discharge Concentration (Excess): 100 mg/l
Effluent Characterization
Effluent Flow Rate/Velocity
Flow Rate Velocity
Flow Rate: 2.5 mgd
Effluent Density
Fresh Non-Fresh
Density Temperature
Temperature: 21 deg. C
Status: R:\TSS\Certification\Cormix, May 2014 and newer\Junction City East WWTP, 30Q10, April 2016.cmx ; junction city East wwtp


CORMIX v8.0.0.0
Project Pages Pre-Processing Tools Run Output Data Reports Post-Processing/Advanced Help
Load Clear Save Save As Print SI-Units CorHyd CorSpy Validate & Run FC Tree CorVue CorJet FFL CorSens
Project Effluent Ambient Discharge Mixing Zone Output
Ambient Page
Ambient Geometry/Flow Field Data
Average Depth: 0.75 ft
Depth at Discharge: 0.75 ft
Wind Speed: 2 m/s
Steady Unsteady
Flowrate Velocity
Flowrate: 20.2 cfs
Bounded Unbounded
Width: 60 ft
Appearance: Uniform
Manning Darcy
Manning's n: 0.025
Ambient Density Data
Fresh Water Non-Fresh Water
Uniform
Stratified
Temperature Density
Water Temperature: 21 deg. C

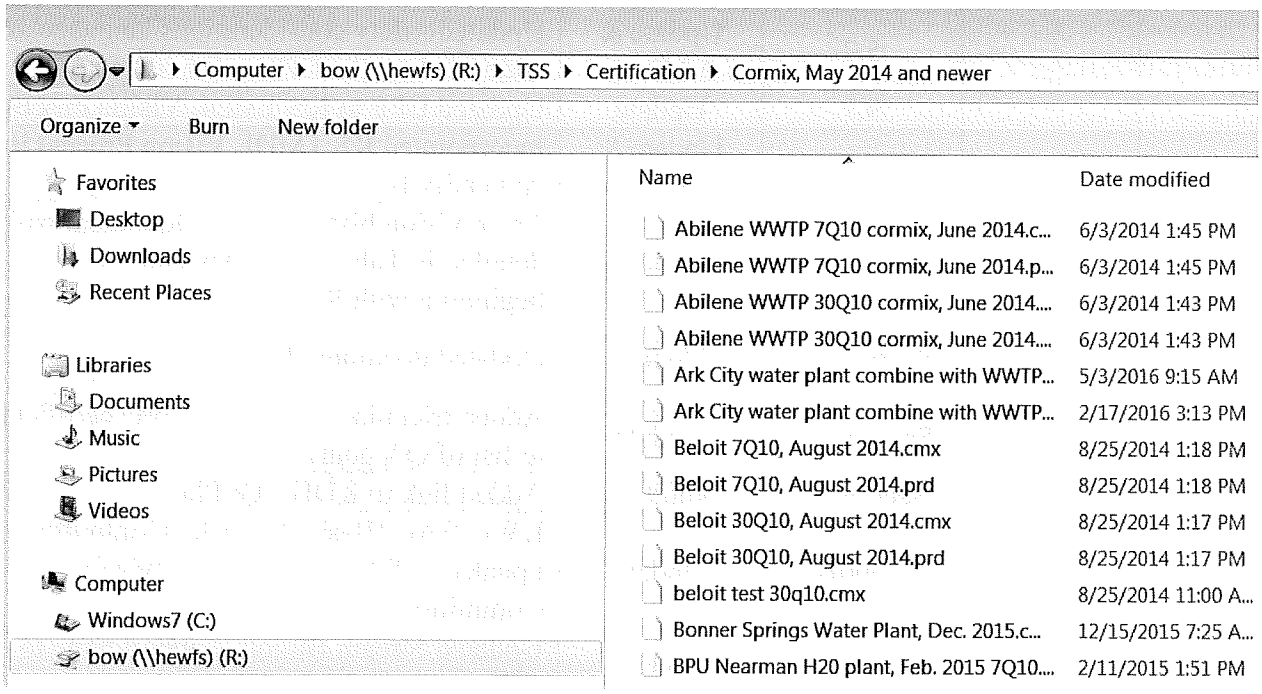

CORMIX v8.0.0.0
Project Pages Pre-Processing Tools Run Output Data Reports Post-Processing/Advanced Help
Load Clear Save Save As Print SI-Units CorHyd CorSpy Validate & Run FC Tree CorVue CorJet FFL
Project Effluent Ambient Discharge Mixing Zone Output
Discharge
Discharge Geometry Data
CORMIX1 Single Port
CORMIX2 Multiport
CORMIX3 Surface
Buoyant Surface Discharge
Discharge located on: left bank
Discharge Configuration
Flush Protruding Co-flowing
Horizontal Angle SIGMA: 90 degrees
Bottom Slope: 2 degrees
Discharge Outlet
Channel Pipe
Width: 1 m
Depth: 0.5 ft
Local Depth at Discharge Outlet: 0.75 ft


Load Clear Save Save As Print SI-Units CorHyd CorSpy Validate & Run FC Tree CorVue
Project Effluent Ambient Discharge Mixing Zone
Mixing Zone Specification
Note: Concentration units are set in the Discharge Concentration field on t
Non-Toxic Effluent Toxic Effluent
WQ Standard No WQ Standard
Concentration for the WQ Standard (E 100 mg/l
Mixing Zone Specified No Mixing Zone Specified
Distance Width Area Trajectory
Mixing Zone Specified as a downstream distance, X
Distance: 300 m
Region of Interest: 2000 m
Output Steps per Module: 10

- Select "Session Report" under "Output" tab.
- Then Select "Run Entire Simulation" under "Processing" tab.
- The Session Report with pop up. Now within this, find the "Regulatory Mixing Zone Summary".

```
********************** REGULATORY MIXING ZONE SUMMARY ************************
The plume conditions at the boundary of the specified RMZ are as follows:
  Pollutant concentration                c = 32.030514  mg/l
  Corresponding dilution                 s = 3.1
  Plume location:                        x = 300 m
    (centerline coordinates)             y = 0 m
                                         z = 0 m
  Plume dimensions:       half-width (bh) = 9.18 m
                           thickness (bv) = 0.23 m
Cumulative travel time:        1794.7036 sec.
```

- Now take the effluent flow (MGD) and covert it to cfs (by multiply by 1.547).
- Next multiply the effluent flow (in cfs) by the corresponding dilution (parameter "s") listed in the "Regulatory Mixing Zone Summary".
- Divide this number by the total stream flow and it gives the estimated mixing zone percent.
- Save the file in The "R drive" in the location shown below.



APPENDIX R
WPSU QMP PART III
DOCUMENT REVISION HISTORY

Table R1. Listing of the changes made to the WPSU QMP Part III.

Revision Number	Revision Date	Document Section	Revision Type	Revision Description
Revision 8	3/15/2015	Entire Document	Formatting	Individual section revision dates were removed
				A common revision date (3/15/2015) was applied all section headers
				Section breaks were removed and replaced with page breaks
				Sequential page numbering was applied to entire document replacing section page numbering
		Table of Contents	Formatting	Individual section revision dates were removed
		1.3	Addition	Added paragraph describing the TMDL Vision Process
		2.1	Update	Updated link to org chart
		4.2	Update	Updated CPP to KS TMDL Vision Process
		5.7	Update & Addition	Updated safety considerations language and added link to the DOE safety manual
		9.1	Update	Updated CPP to KS TMDL Vision Process
		Appendix B	Update & Addition	Incorporated KS TMDL Vision Process into Appendix B
		Appendix R	Addition	The revision history of this document will be detailed in Table R1 of Appendix R beginning with Rev. 8.
Revision 9	3/11/2016	Section 1.2	Update	Updated document history
		Section 1.5	Update	Added triennial reviews and WQ certification to list of QA goals
		Section 11	Addition	Added link to KDHE QI Plan
		Appendix B	Update	KWO BAC (Basin Advisory Committee) updated to RAC (Regional Advisory Committee)
Revision 9	3/11/2016	Appendix E	Update	Updated Stream Biology support table to reflect current methodology

Revision Number	Revision Date	Document Section	Revision Type	Revision Description
Revision 10	2/10/2017	Appendix B	Update	Updated table B6 to reflect current TMDL development schedule
		Table of Contents	Update	Updated page number of appendices
		Appendix C	Archive	Archived the ANNAGNPS/GWLF SOP
		Appendix I	Update	Updated certification flow charts
		Appendix J	Addition	Added appendix with the BLM SOP
		Appendix K	Addition	Added appendix with Cormix SOP
Revision 11	1/30/2019	1.2	Update	Updated to reflect Revision 3, 1/23/2018 Revision of QMP Part I
		7	Update	Updated language to reflect current operations/software
		11.3	Addition	Added KDHE Quality Improvement Paragraph to remain congruent with QMP Part I
		Appendix B	Update	Corrected table B1 to remove Independence Sugar and replace it with Neosho Headwaters
		Appendix E	Update	Updated title to remove reference to the 305(b) in the appendix title