Illinois River Modeling QAPP Concerns

from Dr. Karen Miles

- The preface made it sound as if this is a new QAPP. If the previous one was accepted by EPA that is problematic since errors in the previous draft are still in this one. Is EPA Region 6 not mandating that AQUA TERRA follow the requirements outlined in R5? [EPA Requirements for Quality Assurance Project Plans (http://www.epa.gov/quality/qs-docs/r5-final.pdf).] For example, AQUA TERRA is still using numbers instead of letters (R5 is dated 2001 so the outline format has been in place for a long time), there is no distribution list, and an unacceptable document control format in the header (See section 3.2.2 of R5 of what is supposed to be in Section A2, Table of Contents).

- R5 says that Section A5 (Problem definition/Background) is supposed to, "Include sufficient background information to provide a historical, scientific, and **regulatory** perspective for this particular project." Though the AQUA TERRA QAPP in 2.0 says segments of the Illinois River are on the 303(d) list for TP, the QAPP gives neither the regulatory citation nor the regulatory limit here. The limit isn't given until page 8.

- There is no mention about the actual <u>PROBLEM</u> in the Problem Definition Section. It talks about various animals (the word "chicken" is not used anywhere in this 67-page document), about rivers in the area, and about Oklahoma having a TP limit that is not given. Nothing in here about nutrients or NPS pollution.

- There is supposed to be a section *A6 - Project/Task Description* which provides maps or tables that show or state the geographic locations of field tasks. A map showing the study area, including impaired/unimpaired areas, should have been included.

- In the last QAPP, it said, "AQUA TERRA Quality Assurance Officer develops the QAPP." I commented that was a problem since the QAPP is supposed to be generated by those who generate the data since a QA Officer cannot be objective if they are developing the QAPP. This time they just omitted completely who wrote the QAPP.

- In Section 3.0 on Page 6, the QAPP says, "*Five technical tasks **have either been completed, or remain to be completed for this** project.*"   QAPPs are supposed to describe what the project is going to be, not what has been done.

- Section 4 is supposed to be A7, Quality Objectives and Criteria. But the meat of what is supposed to be in this section is missing. For example, **there is no acceptance criteria** even though the title of this section included in it, "The Criteria for Model Inputs/Outputs". In a secondary data QAPP like this, the acceptance criteria needs to be specified to insure that there is quality data going into the project. According to G5-M[1], Section A7 is to include "Acceptance criteria focus on whether data generated outside of the project are acceptable for their intended use on the project (e.g., as input to a model)." This has to identify the secondary sources that will be used in the model and what criteria are being used to decide if that data is acceptable or not.

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[1] G5-M is the EPA Guidance document based in R5 but specific for modeling projects. See: http://www.epa.gov/quality/qs-docs/g5m-final.pdf

- Since the acceptance criteria is not addressed then the following are also not addressed which must be included in A7 according to G5-M,

  o *The statistical criteria (e.g., limits on decision error) to be used in the model-building process to identify those variables considered statistically important to the prediction process and included as input to the model;*

  o *desired limits placed on the probability of making a certain type of decision error due to the uncertainty associated with the model output (if a decision is to be made) and/or criteria to demonstrate the model performs adequately (e.g., as well or better than a previously accepted model for a given situation);*

  o *how the parameter, input, calibration, and test data necessary for this project are acquired and evaluated for use in model development and/or in producing output;*

  o *requirements associated with the hardware/software configuration (e.g., run time or processing capabilities) for those studies involving software evaluation.*

- This is one of the most important sections of the QAPP because as G5-M states, "While DQOs state the user's data needs relative to a given decision, corresponding criteria need to be placed on the data to determine whether the data have satisfied these needs. For modeling projects, such quality criteria can be placed on outcomes such as software performance (e.g., run time or processing capabilities) and model prediction (e.g., acceptable level of uncertainty associated with model prediction, relative to decision error). This element of the QA Project Plan links the DQOs with appropriate *data quality indicators (DQIs)*, which measure features of data quality such as precision (i.e., variability in data under prescribed similar conditions), bias (i.e., systematic error), accuracy, representativeness, completeness, and comparability. Although the level of rigor with which this is done and documented within the QA Project Plan can vary widely depending on the particular type of modeling project, this linkage represents an important advancement in implementing quality assurance."

- Instead of these requirements for DQO and DQI, this QAPP just had vague language. The DQOs in this QAPP consisted of just these seven lines :

  Objectivity—all work should be based on a methodology and utilize a set of evaluation criteria that can be explicitly stated and applied.
  Thoroughness—all elements of the study should be carried out and documented in a thorough manner.
  Consistency—all work should be performed and documented in a consistent manner.
  Transparency—the documentation will make it clear the sources of the data used, the assumptions used in the modeling, and the results obtained.

  This section had other vague language such as, "Data of known and documented quality." What data? Known by whom? How was the quality documented? In looking at what were called DQOs above, it said that the "documentation" would make clear the sources and assumptions used in the modeling. That is supposed to be here in this QAPP.

- Section 4 said, "The quality assurance process for this type of study consists of using appropriate data, data analysis procedures, modeling methodology and technology, administrative procedures, and auditing." How is "appropriate" defined? Nothing here about that. All these items are supposed to be addressed - not just mentioned.

- Since the next section in the IR Modeling QAPP is "Documents and Records", that means that the information that is supposed to be in A8 is missing. According to R5 3.2.8, "***A8 - Special Training/Certification:*** *Identify and describe any specialized training or certifications needed by personnel in order to successfully complete the project or task. Discuss how such training will be provided and how the necessary skills will be assured and documented*.

- From text in the QAPP, consideration was given to which model would be used. Because of that, these records should be included according to G5-M: *If candidate models are assessed as part of a model selection process, certain documentation (e.g., code verification, testing results, user's guide, application examples) are needed to ensure that the model selected meets necessary acceptance criteria, such as criteria placed on hardware/software configuration*.

- Because the proper format wasn't used, the QAPP's Section 6.2 is supposed to be B7. In Section 6.2 it says, "*Calibration and validation of the Illinois River Watershed models will be achieved by considering qualitative and quantitative measures, involving both graphical comparisons and statistical tests… Statistical procedures will be applied as appropriate, including error statistics, correlation and model-fit efficiency coefficients, and goodness-of-fit tests*." The problem here is that the statistical level that would be considered "acceptable" in these tests was never specified in the data quality objectives. As a result, any result with this undefined, fuzzy language could be considered "acceptable' according to this section.

- Section 6.2 discusses many inputs that will go into the model with no discussion whatsoever of the sources of that data, why that particular data source was chosen, and why that data source collected the data in the first place. In a secondary data QAPP like this one, the primary element of the QAPP is supposed be, according to Table 9, Chapter 3, of G5 (http://www.epa.gov/quality/qs-docs/g5-final.pdf), Section B9 which contains information on existing data, their intended uses, and their limitations. This section is also supposed to include the acceptance criteria **for <u>specific</u> data sources** that were supposed to be introduced in A7 - Quality Objectives and Criteria.

- The information on Page 57 was supposed to be in Section A7.